Report

Plant Noise Assessment

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19 Charterhouse Street, London

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1 Introduction

Sweco UK have been commissioned by Farrview Limited to undertake an assessment of plant noise impacts associated with the proposed development at 19 Charterhouse Street, London, to support the associated planning application for the wider works.

The scope of this report has been developed through a review of national and local planning policy and following consultation with the Client Team. Due to the site location, this assessment takes account of the typical planning requirements of London Borough of Camden (LBC) (in which the site is located), London Borough of Islington (LBI) (which is immediately east of the assessment site), and City of London (CoL) (which is immediately south of the assessment site).

An environmental noise survey has been carried out at the application site and in the vicinity of adjacent noise-sensitive receptors. This report presents the survey methodology, a description of the observed noise sources and weather conditions, and the results of the survey.

The proposed development has the potential to affect ambient noise levels at existing noise-sensitive receptors. Noise from building services equipment associated with the proposed development will need to be controlled. For this purpose, noise emission limits have been established in accordance with Local and National Planning Policy and are presented within this report.

Calculations of noise propagation from the proposed plant have been undertaken, and assessments of noise impact at the nearest noise sensitive premises presented in accordance with the proposed noise limits set out herein.

This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

2 Assessment Criteria

A summary of the policy, standards and guidance documents used to inform the acoustic design of the scheme is provided below. Further details are provided in Appendix B.

- National Planning Policy Framework[1] ('NPPF'), 2024
- Noise Policy Statement for England[2] ('NPSE'), 2010
- Planning Practice Guidance – Noise[3], 2019
- London Borough of Camden Local Plan, 2017[4]
- London Borough of Islington Local Plan, 2023[5]
- City of London Local Plan, 2015[6]
- BS 4142:2014 + A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound*[7] ('BS 4142:2014'), 2019

2.1 Local Authority Requirements

Due to the site being located on the boundaries of LBC, LBI and COL, consideration has been given to the planning noise requirements for each Local Authority.

A summary of the identified design requirements is set out below.

2.1.1 London Borough of Camden

For residential receptors, the LBC Local Plan advises that noise from commercial and industrial developments should not exceed 10 dB below the measured background sound level when assessed according to BS 4142:2014. Guidance on the assessment approach set out in BS 4142:2014 is provided in Appendix B.

The LBC Local Plan recognises that different criteria will apply depending on the use of the receptor premises, Therefore, it is considered that sufficient protection will be provided to non-residential premises where noise emissions do not exceed the measured background noise level when assessed according to BS 4142:2014.

The LBC Local Plan (paragraph 6.100) states that noise emissions from emergency plant shall be designed to achieve a noise criterion of no more than 10 dB above the existing background noise level.

2.1.2 London Borough of Islington

For noise sensitive receptors, the LBI Local Plan states that noise from industrial and commercial developments shall not exceed 5 dB below the measured background sound level when assessed in accordance with BS 4142:2014

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[1] National Planning Policy Framework, 2024, Department for Levelling Up, Housing and Communities

[2] Noise Policy Statement for England (NPSE), 2010, Department for environment, Food and Rural Affairs ('DEFRA')

[3] Planning Practice Guidance – Noise, 2019, Department for Levelling Up, Housing and Communities

[4] Camden Local Plan, 2017, London Borough of Camden

[5] Islington Local Plan Strategic and Development Management Policies, 2023, London Borough of Islington

[6] City of London Local Plan, 2015, City of London Corporation

[7] British Standard 4142:2014 + A1:2019 *Methods for rating and assessing industrial and commercial sound*, 2019, British Standards Institution ('BSI')

Noise sensitive uses are defined in the LBI Local Plan as *"any receptor that may be adversely impacted by noise, typically residential dwellings, schools, hospitals, etc":*

The Local Plan advises that the above criteria apply to all new plant, including emergency and standby plant.

2.1.3 City of London

For noise sensitive receptors, the CoL Local Plan states that the level of noise emitted from any new plant should be below the background level by at least 10 dBA.

The City of London Noise Strategy 2016 - 2026[8] advises that noise sensitive receptors include housing, hotels, offices and any new public open spaces

No specific guidance is provided in the CoL Local Plan or supporting documentation regarding noise emissions from emergency plant; therefore, noise impacts from emergency plant operations have been assessed in accordance with BS 4142:2014.

[8] City of London Noise Strategy 2016 – 2026, 2016, City of London Corporation

3 Site Description and Development Proposals

3.1 Site Description

19 Charterhouse Street is an existing commercial property located in the predominantly commercial area of Farringdon, London, within the jurisdiction of London Borough of Camden.

The development site is bound by the adjoined commercial premises of 21 Farringdon Road to the north, A201 Farringdon Street to the east, Charterhouse Street to the south and to the south Saffron Hill and the partially adjoined premises of 17 Charterhouse Street.

It is understood that the borough boundary between Camden and Islington bisects Farringdon Street immediately to the east and as such some neighbouring properties (R6 and R7) fall into the jurisdiction of LBI. Furthermore, the borough boundary of City of London bisects Charterhouse Street to the south, with one receptor (R10) falling into the jurisdiction of CoL.

Figure 1 presents the approximate red line boundary for the proposed development and the location of the nearest and likely worst-affected existing noise sensitive receptors. In accordance with the Local Plan for each Local Authority in the vicinity, noise sensitive receptors have been determined to include housing, schools, hospitals and offices as appropriate.

The nearest/worst-affected existing noise-sensitive receptors to the proposed development are expected to be as follows:

Residential Receptors[9]

- R1 – Dwellings of 25-27 Farringdon Road to the north.
- R2 – Dwellings of 7 Bleeding Heart Yard to the north-west.
- R3 – 14 Ely Place to the west.
- R4 – Dwellings of 30 Greville Street to the north-west.

Commercial/Office Receptors

- R5 – 21 Farringdon Road to the north.
- R6 – 506 Central Market to the east.
- R7 – 48-50 Cowcross Street to the north-east.
- R8 – 140 Saffron Hill to the west.
- R9 – 17 Charterhouse to the west.
- R10 – 48 Farringdon Street to the south.

[9] Residential receptors have been identified following an initial review of the surrounding area in the context of registered addresses for Council Tax, utilising https://www.gov.uk/council-tax-bands.

Figure 1: Site Location and Nearest Noise Sensitive Receivers.

3.2 Proposed Development

The proposed development to which this report relates is for the refurbishment and upward extension of the existing 19 Charterhouse Street premises, including the installation of internal and external building services systems to provide heating, cooling and ventilation.

The primary plant location and noise generating area of the development will be the external plant area at roof level (level 09 and level 09 mezzanine).

Details of the proposed plant are provided in Section 6.

4 Baseline Sound Conditions

4.1 Overview

An environmental noise survey has been undertaken by Sweco UK to determine the prevailing noise levels in the vicinity of the Proposed Development. This survey consisted of long-term unattended measurements at three positions.

Long-term unattended noise monitoring was conducted from Thursday 14th December 2023 until Wednesday 20th December 2023.

Full details of the noise survey methodology can be found in Appendix B.

4.2 Baseline Conditions Summary

4.2.1 Measurement Positions

Measurements were undertaken to cover daytime and night-time periods to establish the pre-existing ambient ($L_{Aeq,T}$), and background ($L_{A90,T}$) noise levels.

For ease of reference, the monitoring locations for the long-term ('MP') measurements are shown in Figure 2.

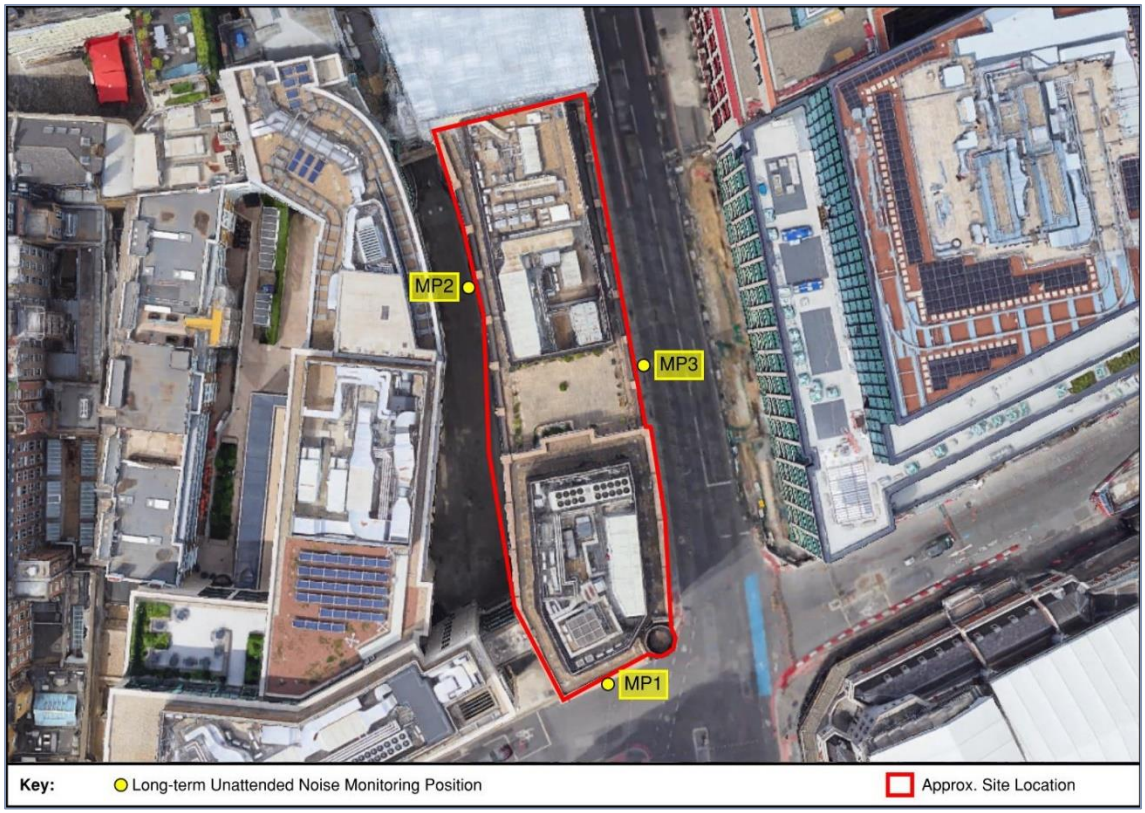

Figure 2: Site Location and Noise Monitoring Locations

4.2.2 Summary of Measured Noise Levels

A summary of the noise levels measured at each long-term measurement position are presented in Table 1.

Table 1: Summary of Measured Noise Levels

Measurement Position	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,15min}$
MP1	Daytime (07:00 – 23:00)	68	61
	Office Hours (07:00 – 19:00)	69	61
	Night-time (23:00 – 07:00)	65	56
MP2	Daytime (07:00 – 23:00)	56	49
	Office Hours (07:00 – 19:00)	58	54
	Night-time (23:00 – 07:00)	52	48
MP3	Daytime (07:00 – 23:00)	65	57
	Office Hours (07:00 – 19:00)	66	58
	Night-time (23:00 – 07:00)	63	52

The background $L_{A90,15min}$ sound level presented above has been determined in accordance with BS 4142 following statistical analysis of the measurements results in each period and at each location.

5 Limits on Building Services Noise

5.1 Overview

This section presents limits on building services noise which apply at the neighbouring sensitive receptors. These limits depend upon the measured background sound level, which varies depending on the time of day. Therefore, different sound level limits apply at different times of day.

5.2 Assessment Criteria

5.2.1 Typical/Day to Day Plant

Noise limits for building services plant have been set in accordance with the requirements of LBC, LBI and CoL, as appropriate for each receptor.

For residential receptors within LBC, the cumulative rating level ($L_{Ar,Tr}$) of building services noise shall be at least 10 dB below the prevailing background sound level ($L_{A90,15\ mins}$) at any time, when assessed according to BS 4142:2014.

For non-residential receptors within LBC (i.e., offices), it is considered that sufficient protection from noise will be achieved where the cumulative sound rating level ($L_{Ar,Tr}$) does not exceed the prevailing lowest typical background sound level ($L_{A90,15\ mins}$) at any time, when assessed according to BS 4142:2014. This would achieve a 'low' impact at commercial receptors.

For all receptors within LBI, the cumulative rating level ($L_{Ar,Tr}$) of building services noise shall be at least 5 dB below the prevailing background sound level ($L_{A90,15\ mins}$) at any time, when assessed according to BS 4142:2014.

For residential receptors within CoL, the cumulative noise level ($L_{Aeq,T}$) of building services noise shall be at least 10 dB below the prevailing background sound level ($L_{A90,15\ mins}$) at any time.

On this basis, Table 2 sets out the maximum permissible noise limit at the relevant noise-sensitive receptors based on the measured background sound levels in the area during the environmental sound survey. Noise limits are set out for both office-hours and 24/7 operations.

Table 2: Proposed Rating Level Limits for Noise Generating Plant					
Receiver Location	Representative measurement position	Office Hours (07:00 – 23:00) Operations		24/7 Operations	
		Background Sound Level, dB $L_{A90,T}$	Operational Noise Limit, dB	Background Sound Level, dB $L_{A90,T}$	Operational Noise Limit, dB
R1 – 25-27 Farringdon Road	MP2	54	44 ($L_{Ar,Tr}$)	48	38 ($L_{Ar,Tr}$)
R2 – 7 Bleeding Heart Yard	MP2	54	44 ($L_{Ar,Tr}$)	48	38 ($L_{Ar,Tr}$)
R3 – 14 Ely Place	MP2	54	44 ($L_{Ar,Tr}$)	48	38 ($L_{Ar,Tr}$)
R4 – 30 Greville Street	MP2	54	44 ($L_{Ar,Tr}$)	48	38 ($L_{Ar,Tr}$)
R5 – 21 Farringdon Road	MP2	54	54 ($L_{Ar,Tr}$)	48	48 ($L_{Ar,Tr}$)
R6 – 506 Central Market	MP3	58	53 ($L_{Ar,Tr}$)	52	47 ($L_{Ar,Tr}$)
R7 – 48-50 Cowcross Street	MP3	58	53 ($L_{Ar,Tr}$)	52	47 ($L_{Ar,Tr}$)
R8 – 140 Saffron Hill	MP2	54	54 ($L_{Ar,Tr}$)	48	48 ($L_{Ar,Tr}$)
R9 – 17 Charterhouse Street	MP2	54	54 ($L_{Ar,Tr}$)	48	48 ($L_{Ar,Tr}$)
R10 – 48 Farringdon Street	MP1	61	51 ($L_{Aeq,T}$)	56	46 ($L_{Aeq,T}$)

5.2.2 Emergency Plant

In accordance with the requirements of LBC, noise from emergency plant systems shall not exceed 10 dB above the measured background noise level at the identified sensitive receptors; receptors R1, R2, R3, R4, R5, R8, and R9 fall within the jurisdiction of LBC.

For receptors falling within the jurisdiction of LBI (receptors R6 and R7), the requirement for emergency plant is the same as indicated in Table 2.

For receptors falling within the jurisdiction of CoL (receptor R10), no specific guidance has been identified with relation to emergency plant noise emissions. Therefore, noise impacts have been assessed in accordance with BS 4142:2014 utilising the receptor background noise levels presented in Table 2.

As the emergency plant may operate at any time, assessments in this condition have been made against the measured night-time background noise levels as a worst-case.

6 Building Services Noise Impact Assessment

6.1 Overview

This section presents an outline assessment of noise from the proposed building services systems.

At this stage, initial proposals for the primary plant items have been developed. The key sources of building services noise are understood to be the heat exchange (condenser) plant and life-safety generator located within the primary rooftop plant area at level 09 and 09 mezzanine.

6.2 Methodology

In order to predict the propagation of noise from outdoor plant areas, a three-dimensional sound propagation model of the Proposed Development has been developed to include the primary plant systems proposed. This model has been used to predict the level of sound that would be associated with the operation of these primary plant systems.

The sound propagation model was constructed using the Datakustik Cadna/A (version 2024 MR1) software package and applies the ISO 9316-2:2024[10] methodology for point and line sound sources. ISO 9613-2 provides a general outdoor sound propagation model accounting for factors including geometric attenuation, ground and air absorption, screening and reflections due to buildings and structures. The use of these methods is standard UK industry practice.

The model has been used to predict the cumulative level of sound that would be associated with the operation of the proposed new external plant.

The sound propagation model allows for the specific sound level to be predicted at each assessment location taking into account factors such as geometric spreading, the effect of any intervening buildings, walls or ground features, as well as reflections from the hard surfaces that are part of the Proposed Development.

For the purposes of this assessment, the following assumptions have been made in the noise model:

- Ground absorption is ‘0.1’ to account for the predominately hard ground in the vicinity.
- All buildings are fully reflective, with second order reflections calculated.
- All noise sources have been modelled as point-sources or area-sources between 0.5 – 3.0m above the local mounting surface (as appropriate).
- Each noise source has been modelled with the octave-band noise emissions presented in Table 4.
- All noise sources are operating simultaneously and at maximum duty.

[10] International Standard 9613-2:2024, 2024, Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors. International Organization for Standardization

- Site topography and elevations have been taken from available open-source mapping data and site observations during the attended periods.

Figure 3 presents an isometric view of the 3D noise model for reference.

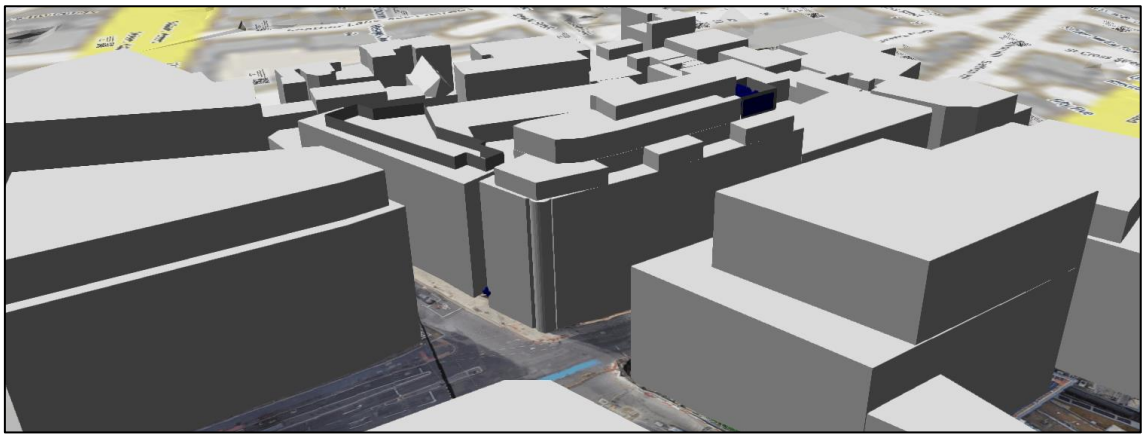

Figure 3: Isometric view of 3D noise model. View of 19 Charterhouse Street from south-east.

6.3 Proposed Sound Sources

The primary mechanical services plant proposed as part of the development is as follows:

- 19 no. Mitsubishi PURY-M250 condenser units, to be located at level 09 mezzanine.
- 1 no. 200 kVA life-safety generator to be located at level 09.

This plant will be located in an open top plantroom at level 09/level 09 mezzanine. The walls of the plantroom, approximately 5.0m tall, will incorporate louvered apertures for ventilation.

It is understood that the condenser plant will operate during daytime office hours only (07:00 – 19:00). The generator may operate only in emergency conditions or during periodic daytime testing.

The plant specifications are undergoing detailed development at the time of writing, however preliminary noise level data has been provided for the above plant, as detailed in Table 3.

Table 3: Preliminary Manufacturer's Published Noise Emission Data										
Plant Specification	Quantity	Octave Band Centre Frequency, Hz								Broadband Noise Level, dBA
		63	125	250	500	1000	2000	4000	8000	
		Sound Power Level, ref 10^{-12} W, dB								
Mitsubishi PURY-M250 *	19	96	86	83	79	72	66	62	54	80 L_{wA}
Life-Safety Generator	1	Refer to 6.4.2								-
** Spectrum based on the published octave-band Sound Pressure Level for similarly sized Mitsubishi PURY units at 1m in heating.*										

The location and dimensions of the proposed sound sources have been modelled using drawings provided by the mechanical engineer. Directionality of louvre/grille sources has been accounted for within the model based on typical louvre/grille dimensions.

6.4 Noise Mitigation Measures

The following embedded noise mitigation measures have been allowed for in the building services design and this assessment.

6.4.1 Plant Screen Louvres

Ventilation louvres in the level 09 and level 09 mezzanine plant room walls shall be specified with a minimum insertion loss as set out in Table 4. This is typically achieved with a 150mm thick acoustic louvre product.

Table 4: Minimum Insertion Loss for Plant Screen Louvres								
Item	Octave Band Centre Frequency, Hz							
	63	125	250	500	1000	2000	4000	8000
	Minimum Insertion Loss, dB							
Level 09 plant screen acoustic louvres	4	4	6	9	12	17	11	10

6.4.2 Life-Safety Generator

Detailed design coordination is still ongoing for the life-safety generator, however Sweco UK have been advised that this will be specified as a packaged unit within an acoustic housing.

In order to demonstrate feasibility with compliance at this planning stage, this packaged generator shall be selected and specified so as to not exceed a maximum sound pressure level of 77 dBA when measured at 1m from any elevation (including inlet, outlet and flue) when in free-field conditions.

6.5 Assessment of Noise Impact – Typical Plant

Calculations of roof plant noise emissions to the surrounding noise sensitive premises have been carried out based on the details presented above.

Figure 4 presents a summary illustration of the 3D noise model of the site, demonstrating the specific dB $L_{Aeq,T}$ noise levels predicted at the facades of neighbouring noise sensitive premises. The noise contours are calculated at 40m above ground, reflecting the height of the plant.

Figure 4: Specific noise level contours, dB $L_{Aeq,T}$, for Typical Plant. Office hours.

In accordance with BS 4142 assessment procedures, the calculated specific noise levels are subject to corrections based on the character of the acoustic emissions.

As the plant is not yet operating, it is not possible to assess the characteristics directly. Instead, the following corrections have been applied based on the expected sound source characteristics in accordance with the subjective method.

Section 9 of BS 4142 states: *"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention".*

The proposed condenser units are expected to operate at a predominately steady state condition with no distinguishable tonality or impulsiveness when considering the existing site context; the acoustic environment contains audible contributions from existing third-party (neighbouring) plant of a similar nature. However, as the plant will operate on demand, an element of intermittency may be audible at receptors. Therefore a +3 dB correction has been applied on a precautionary basis as per BS 4142 guidance.

Table 5 presents a summary assessment of the predicted worst-case operational noise levels for the installation and the subsequent predicted noise impact.

Table 5: Assessment of Noise Impact

Receiver Location	Period	Specific sound level (dB $L_{Aeq,T}$)	Rating sound level (dB $L_{Ar,Tr}$)	Background sound level (dB $L_{A90,T}$)	Difference and assessment result (dB)
R1 – 25-27 Farringdon Road	07:00 – 19:00	40	43	54	-11, compliant
R2 – 7 Bleeding Heart Yard	07:00 – 19:00	39	42	54	-13, compliant
R3 – 14 Ely Place	07:00 – 19:00	28	31	54	-23, compliant
R4 – 30 Greville Street	07:00 – 19:00	36	39	54	-15, compliant
R5 – 21 Farringdon Road	07:00 – 19:00	40	43	54	-11, compliant
R6 – 506 Central Market	07:00 – 19:00	45	48	58	-10, compliant
R7 – 48-50 Cowcross Street	07:00 – 19:00	41	44	58	-14, compliant
R8 – 140 Saffron Hill	07:00 – 19:00	41	44	54	-10, compliant
R9 – 17 Charterhouse Street	07:00 – 19:00	38	42	54	-12, compliant
R10 – 48 Farringdon Street	07:00 – 19:00	31	-	61	-30, compliant

Table 5 demonstrates that the predicted building services noise levels will be at least 10 dB below the measured pre-existing background noise levels at all receptors. Therefore, the planning requirements of LBC, LBI and CoL will be achieved for this plant installation during the proposed operational hours.

6.6 Assessment of Noise Impact – Emergency Plant

Calculations of noise emissions from the rooftop emergency generator to the surrounding noise sensitive premises have been carried out based on the details presented herein, and the understanding that this plant may operate at any time.

Figure 5 presents a summary illustration of the 3D noise model of the site, demonstrating the specific dB $L_{Aeq,T}$ noise levels predicted at the neighbouring noise sensitive premises and at the development site from this emergency plant. The noise contours are calculated at 40m above ground, reflecting the height of the plant.

Figure 4: Specific noise level contours, dB $L_{Aeq,T}$, for Emergency Plant. Night-time hours.

Whilst operational, noise emissions from the emergency generator are expected to be steady state in nature with a non-tonal broadband spectrum. Therefore, no corrections for intermittency, impulsivity or tonality have been applied in this instance. However, the noise emissions from the generator may be readily distinguishable at receptors in the vicinity, and as such a + 3dB correction has been applied as a precautionary measure in accordance with Section 9 of BS 4142.

Table 6 presents a summary assessment of the predicted worst-case rating levels for the installation and the predicted noise impact.

Table 6: Assessment of Noise Impact – Emergency Plant

Receiver Location	Period	Specific sound level (dB $L_{Aeq,T}$)	Rating sound level (dB $L_{Ar,Tr}$)	Background sound level (dB $L_{A90,T}$)	Difference and assessment result (dB)
R1 – 25-27 Farringdon Road	24-hour	43	46	48	-2, compliant
R2 – 7 Bleeding Heart Yard	24-hour	43	46	48	-2, compliant
R3 – 14 Ely Place	24-hour	30	33	48	-15, compliant
R4 – 30 Greville Street	24-hour	40	43	48	-5, compliant

Table 6: Assessment of Noise Impact – Emergency Plant					
Receiver Location	Period	Specific sound level (dB $L_{Aeq,T}$)	Rating sound level (dB $L_{Ar,Tr}$)	Background sound level (dB $L_{A90,T}$)	Difference and assessment result (dB)
R5 – 21 Farringdon Road	24-hour	45	48	48	0, compliant
R6 – 506 Central Market	24-hour	44	47	52	-5, compliant
R7 – 48-50 Cowcross Street	24-hour	43	46	52	-6, compliant
R8 – 140 Saffron Hill	24-hour	44	47	48	-1, compliant
R9 – 17 Charterhouse Street	24-hour	42	45	48	-3, compliant
R10 – 48 Farringdon Street	24-hour	30	33	56	-23, compliant

Table 7 demonstrates that the predicted building services noise levels during emergency operations will comply with the requirements of LBC and LBI at all receptors.

Furthermore, the calculations demonstrate that noise from the proposed emergency plant will not exceed 23 dB below the pre-existing background noise level at receptors within CoL (R10) indicating a very low impact.

6.7 Uncertainty

The acoustic assessment has been undertaken in accordance with industry best practice and utilises environmental noise data captured by Sweco UK Ltd using calibrated Class 1 monitoring equipment. Propagation of noise emissions has been modelled in accordance with ISO 9613 using industry standard procedures, open-source mapping/topographical data, site observations and Client proposals, and manufacturer's published noise emissions. Uncertainty in the assessment is therefore considered to be low.

6.8 Additional Mitigation Measures

On the basis of the current assessment, no further noise mitigation measures are considered necessary for the proposed primary plant systems.

The provision of sound attenuators to other items of ancillary plant may be necessary to not exceed the maximum permissible noise limit as well as to reduce the sound level produced by the plant to a reasonable extent around the footprint of the building itself.

Environmental attenuators and possibly other means of sound mitigation such as acoustic louvres or acoustic screens may be required to control sound emanating from the plantrooms, air intake and discharge points or from externally mounted plant.

This will be determined during the ongoing detailed design stages utilising the noise limits set out within this report.

7 Conclusion

Sweco UK have been commissioned by Farrview Limited to undertake an assessment of atmospheric plant noise impacts associated with the proposed development at 19 Charterhouse Street, London, to support the wider planning application for the works.

The assessment has considered noise emissions from both ‘day-to-day’ building services plant, and from emergency plant systems, in accordance with the planning requirements of the London Borough of Camden (in which the site is located), London Borough of Islington (immediately to the east) and City of London (immediately to the south). Assessments have been presented following the methodology set out in BS 4142:2014.

The assessment presents embedded noise mitigation in the form of acoustic louvres to the plant screen elevations and operational noise limits for the proposed emergency generator.

With this mitigation implemented, the scheme is expected to comply with the requirements of all affected London Boroughs.

As such, it is considered that noise in relation to planning should not pose a material constraint to the operation of the proposed building services plant systems.

Appendix A – Glossary of Acoustic Terminology

Sound is the vibration of particles in a medium, such as air, which may be detected by the human ear. This sound is defined as noise when it is audible and unwanted or undesirable to a listener.

The vibration, or oscillation, of particles about an equilibrium position results in local pressure fluctuations from the normal pressure. These local pressure fluctuations are described as sound pressure, and the number of oscillations per second is described as the frequency.

The human ear responds to an incredibly large range of sound pressure, from 0.00002 Pa to 200 Pa, and the perceived loudness is proportional to the logarithm of the sound pressure squared. For this reason, sound is measured in terms of a logarithmic parameter, the sound pressure level, to approximate the response of the ear. Sound pressure levels are quantified in decibels (dB) relative to the threshold of hearing.

The human ear responds to a wide range of sound frequencies, from the lowest perceptible bass note, around 20 Hz, to the highest perceptible treble note, around 20,000 Hz. The ear does not respond equally to each frequency and is most sensitive to sound within the mid-frequency range of around 600 to 8000 Hz.

The response of the ear to each frequency also varies with the sound pressure level. For very loud sounds the difference in perceived loudness between each frequency is less pronounced than for low level sound.

Acousticians measure sound pressure levels using sound level meters, which incorporate a microphone.

A sound level meter approximates the response of the human ear to sound by using frequency filters. For typical environment sounds, the A-weighting filter is used to approximate the response of the ear at typical sound pressure levels. The sound pressure level, adjusted to approximate the response of the ear, is quantified in A-weighted decibels, dB(A) or dB L_{pA}.

In a typical environment, the A-weighted sound pressure level will vary with time. For this reason, acousticians use statistical measurement parameters to describe the sound environment. The most common measurement parameters are as follows:

- dB $L_{Aeq,T}$: Equivalent continuous A-weighted sound pressure level. This is the energy-average sound pressure level during a measurement period, T.
- dB $L_{AFmax,T}$: Maximum A-weighted sound pressure level. This is the maximum sound pressure level during a measurement period, T, and measured in a way that approximates the time-response of the ear.
- dB $L_{A90,T}$: 90th percentile A-weighted sound pressure level. This is the sound pressure level exceeded for 90% of the measurement period, T, commonly referred to as the background sound level.

Sound pressure levels in typical environments are presented in Table A1. Further definitions of acoustic parameters are presented in Table A2.

Table A1: Sound pressure levels within typical environments	
Sound Pressure Level, dB	Typical Environment or Description
0	Threshold of hearing
15 to 25	A recording studio
25 to 35	A hotel bedroom at night
35 to 45	An unoccupied office
45 to 55	Quiet residential street
55 to 65	Normal conversation, 1 m away TV programme, listener position
65 to 75	Raised voices, 1 m away Urban high street traffic
75 to 85	Busy motorway traffic, on hard shoulder Typical small plant room
85 to 95	High-speed hand-dryer, operator position Inside London underground (average)
95 to 105	Pneumatic hammer, operator position Concert orchestra
105 to 115	Typical nightclub Untreated generator plantroom
115 to 140	Aircraft take-off, close proximity Threshold of pain

Table A2: Definitions of Acoustic Terminology and Parameters	
Wording	Description
Ambient sound level	The total sound pressure level in a given position from all surrounding sources of noise, both near and far. Normally expressed as an equivalent continuous A-weighted sound pressure level, dB LAeq,T.
A-weighting	The process of weighting the observed sound pressure level at each frequency band, to approximate the sensitivity of the human ear to sounds of different frequencies. A-weighted sound pressure levels are expressed as dB(A) or dB LAp.
Decibel	A logarithmic value quantifying the sound pressure at a specified position or sound power. relative to a reference sound pressure or sound power (20 µPa for sound pressure, 10-12 W for sound power).
Façade	A sound monitoring position is a “façade” position when it includes a strong reflection from an adjacent building or structure. This corresponds with a position that is between 1 and 2 metres away from a reflecting building or structure.
Free-field	A sound monitoring position is a “free-field” position when it is not affected by sound reflections from surrounding buildings and structures. This corresponds with a position at least 3.5 metres away from reflecting buildings or structures.
Frequency	The number of oscillations per second of a vibrating particle in a medium, measured in Hertz (Hz) or cycles per second.
$L_{A90,T}$	The A-weighted sound pressure level exceeded during 90% of the time interval, T. Typically used to quantify the background sound level at a specified position.

Table A2: Definitions of Acoustic Terminology and Parameters	
Wording	Description
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level over a time interval, T. This is an energy-average sound pressure level over the specified time period.
$L_{AFmax,T}$	The maximum A-weight sound pressure level during a specified time interval, T. Measured with “fast” time-weighting (which approximates the time-response of the human ear).
Noise	Unwanted or undesirable sounds observed by a listener.
Octave band	A frequency band used in acoustical measurements. An octave is a frequency interval between two sounds where the frequency of the lower sound is half the frequency of the upper sound. The human hearing range is divided into ten logarithmically equal frequency divisions called octave bands, with centre-band frequencies as follows: (16 Hz, 32 Hz,) 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, 16000 Hz.
Rating level, $L_{Ar,Tr}$	The specific sound level plus a correction accounting for acoustic features such as impulses, tones, intermittent features, or any other characteristics that draw more attention to the sound source.
Residual sound level	The equivalent continuous A-weighted sound pressure level of the ambient sound remaining at a specified position when the specific sound source (the sound source being assessed) does not contribute to the ambient sound.
Sound	The vibration, or oscillation, of particles in a medium, such as air, which may be detected by the human ear.
Sound absorption	The reduction of sound energy by transmission through an absorbing medium such an “acoustically soft” material or surface which results in a reduced reflection of incident sound.
Sound power level	A logarithmic measurement that quantifies the total sound power of a source emitted in all directions relative to a reference sound power (Wref = 1 pW or 10-12 W). Equal to 10 log10 (W / Wref) and expressed in decibels.
Sound pressure level (SPL)	A logarithmic measurement that quantifies the sound pressure at a specified position relative to a reference sound pressure (pref = 20 µPa). Equal to 20 log10 (p / pref) and expressed in decibels.
Specific sound level, $L_{As,T}$	The equivalent continuous A-weighted sound pressure level at a specified position due to the specific sound source (the sound source being assessed).
Third-octave band	A higher-resolution frequency band used in acoustical measurements. A third-octave band is equal to one of three logarithmically equal parts of the corresponding octave frequency band. The upper band edge frequency is equal to the lower band-edge frequency multiplied by 21/3.

Appendix B – Policy, Standards and Planning Documents

Legislation

Control of Pollution Act, 1974

Section 60 of the Control of Pollution Act, 1974 (the 'Act'), Part III - Noise enables a local authority to serve a notice on anyone (including a company) who is carrying out, or intending to carry out, works in relation to construction, demolition, road-works, railway maintenance etc. in order to control the noise from those operations. Section 61 of the Act also enables such a person to apply to the local authority for consent in respect of such works.

The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise where significant impacts are likely to occur. BPM essentially means selection of the quietest techniques and equipment, in addition to considering factors such as timing, duration, location and opportunities for acoustic screening or separation, to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defence to enforcement action under nuisance legislation.

National Policy

National Planning Policy Framework

The latest revision to the National Planning Policy Framework (NPPF) was published in December 2024. The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which local plans for housing and other development can be produced.

This document makes reference to mitigating and reducing potential adverse impacts resulting from noise to a minimum but it does not set absolute criteria. In this instance the most relevant National and International standards are referred to within this assessment, which provide definitive guidance on noise impacts.

Noise Policy Statement for England, 2010

The underlying principles and aims of existing noise policy documents, legislation and guidance are clarified in the Noise Policy Statement for England (NPSE). The NPSE sets out the 'Long Term Vision' of Government noise policy as follows: "Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development".

The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

- "Avoid significant adverse impacts 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".

The guidance defines three established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation (WHO):

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

The guidance also states that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations and that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

National Planning Practice Guidance, England

Further guidance in relation to the National Planning Policy Framework and the Noise Policy Statement for England has been published in the National Planning Practice Guidance in England: Noise (NPPG-Noise), which summarises the noise exposure hierarchy, based on the likely average response.

The National Planning Practice Guidance (NPPG) has been revised and updated to be easily accessible and available online.

The Noise Guidance advises on how planning can manage potential noise impacts in new development. It sets out when noise is relevant to planning and outlines the following Observed Effect Levels to determine the noise impact:

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

The document recognises the subjective relationship between noise levels and the impact on those affected and advises on factors which may influence on whether noise could be a concern.

The significance criteria from NPPG-Noise are reproduced in Table B1 below.

Table B1: Significance Criteria from NPPG In England: Noise

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required

Table B1: Significance Criteria from NPPG In England: Noise			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Standards and Guidelines

BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound '

BS 4142:2014+A1:2019 (herein BS 4124) describes the method for assessing the likely impact of noise sources of an industrial, commercial or fixed nature on people residing in the area.

New commercial development can often incorporate plant and processes that have the potential to generate noise, especially if operated at night-time when background noise levels are at their lowest.

Good practice dictates that new developments should be designed to give a cumulative noise rating level ($L_{Ar,Tr}$) of no more than the current prevailing background noise level (L_{A90}) at a distance of 1m from the nearest residential facades, when assessed in accordance with BS 4142 as this is defined as a low impact.

BS 4142 sets out a method to assess the likely impact of noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises on noise-sensitive receptors in the vicinity.

The procedure contained in BS 4142 for assessing the likely impact is to compare the measured or predicted noise level from the source in question, the $L_{Aeq,T}$ 'specific noise level', immediately outside the dwelling with the $L_{A90,T}$ background noise level.

Where the noise contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific noise level to obtain the $L_{Ar,Tr}$ 'rating noise level'. A correction to include the consideration of a level of uncertainty in noise measurements, data and calculations can also be applied, when considered necessary.

BS 4142 states: "*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

Typically, the greater this difference, the greater the magnitude of the impact.

- *A* difference *of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A* difference *of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
- *The* lower *the rating level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context."*

The periods associated with day or night, for the purposes of the standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

Appendix C – Environmental Noise Survey

An environmental noise survey has been undertaken by Sweco UK to determine the prevailing noise levels in the vicinity of the Proposed Development. This survey consisted of long-term unattended measurements at three positions around the site.

Long-term unattended noise monitoring was conducted from Thursday 14th December 2023 until Wednesday 20th December 2023.

Survey Methodology

The environmental noise survey was undertaken using suitable measurement instrumentation configured to log sound pressure levels in each octave frequency band every 125 ms. The noise data was then analysed to determine the following parameters time interval (T):

- $L_{Aeq,T}$ - The A-weighted equivalent continuous sound pressure level over a period of time, T;
- $L_{A90,T}$ - The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Environmental noise measurements were taken at the positions presented in Table C1 and are shown in Figure C1. Long-term unattended measurement positions are referenced as MP1 – MP3.

Table C1: Noise Measurement Positions

Position ref.	Position description	Microphone height above ground level	Condition
MP1	Located on the sixth-floor flat roof area of Charter House along the southern elevation, overlooking Charterhouse Street. The microphone was extended approximately 1m from the roof parapet.	Approx. 24m	Free-field
MP2	Located on the fifth-floor flat roof area of Charter House along the western elevation, overlooking Saffron Hill. The microphone was extended approximately 1m from the roof parapet.	Approx. 20m	Free-field
MP3	Located on the fifth-floor roof terrace of Charter House along the eastern elevation, overlooking Farringdon Road. The microphone was extended approximately 1m from the roof parapet.	Approx. 20m	Free-field

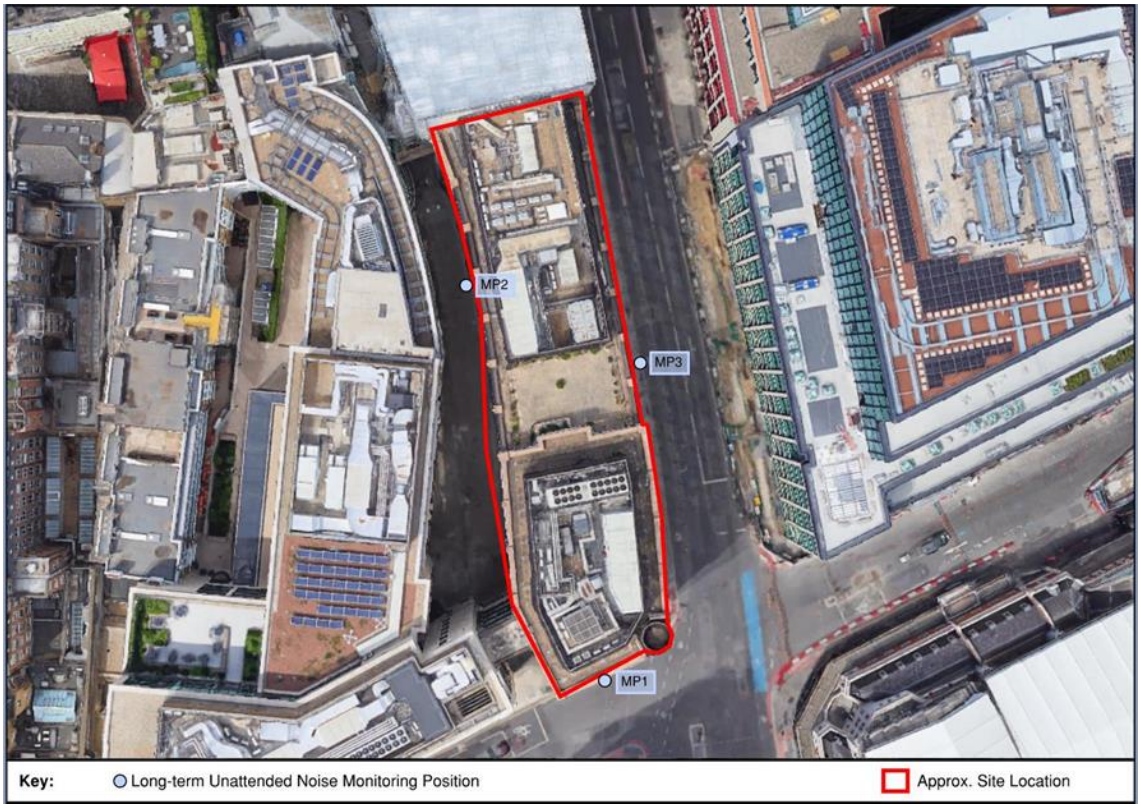

Figure C1: Environmental Noise Survey Locations

Measurement Equipment

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672[11]. Details of the noise measurement instrumentation used are shown in Table C2.

Each meter had been calibrated by a UKAS accredited laboratory within the previous 24 months. The calibration level was also checked at the start and end of the survey using field calibrators (which had been suitably calibrated by an accredited laboratory).

No significant drift in the calibration over the course of the survey (≤0.4 dB). The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements.

The microphones were fitted with protective windshields for the measurements.

[11] British Standard 61672: 2013: Electroacoustics. Sound level meters. Part 1 Specifications. BSI.

Table C2: Inventory of Acoustic Measurement Equipment		
Item	Manufacturer/Model Type	Serial Number
Sound Level Meter	01dB Fusion	11052
Preamplifier	01dB PRE-22N°	-
Microphone	GRAS 40CE	226358
Sound Level Meter	Rion NL-52	00620957
Preamplifier	Rion NH-25	20998
Microphone	Rion UC-59	03875
Sound Level Meter	Rion NL-52	00620901
Preamplifier	Rion NH-25	76417
Microphone	Rion UC-59	13342
Field Calibrator	01dB Fusion	11052

Weather Conditions

The weather conditions were dry with negligible wind during the monitoring period.

Observations

The sources of noise that contributed to environmental noise climate were noted during each measurement. The observations were as follows:

- MP1: Noise at this monitoring position is dominated by the traffic noise along Charterhouse Street and Farringdon Road, and pedestrian movements. Also audible is distant mechanical plant noise from surrounding commercial premises. Distant construction noise was also occasionally audible.
- MP2: Noise at this monitoring position is primarily mechanical plant noise from 17 Charterhouse, occasional activity on Saffron Hill, including waste collection, deliveries and pedestrians. Distant traffic noise from Charterhouse Street and Farringdon Road and faint construction noise was also audible.
- MP3: Noise at this monitoring position is dominated by the traffic noise along Farringdon Road. Distant traffic noise from Charterhouse Street and occasional construction noise was also audible.

Measurement Results Summary

Tables C3 to C6 presents the measurement results obtained during the survey at the unattended receiver positions.

Figures C2 – C4 present the time-history graph at each measurement location.

Table C3: Summary of Measured Noise Levels at MP1						
Date	dB $L_{Aeq,T}$			dB $L_{A90,T}$		
	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00
Thursday 14/12/2023	-	-	67	61	60	57
Friday 15/12/2023	67	67	66	60	59	56
Saturday 16/12/2023	67	-	63	58	59	54
Sunday 17/12/2023	65	-	64	58	57	54
Monday 18/12/2023	68	69	63	60	57	54
Tuesday 19/12/2023	70	71	65	59	58	54

Table C4: Summary of Measured Noise Levels at MP2						
Date	dB $L_{Aeq,T}$			dB $L_{A90,T}$		
	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00
Thursday 14/12/2023	-	-	54	54	54	46
Friday 15/12/2023	58	59	51	54	51	48
Saturday 16/12/2023	51	-	50	49	48	47
Sunday 17/12/2023	50	-	54	48	48	46
Monday 18/12/2023	57	58	52	54	48	57
Tuesday 19/12/2023	56	57	51	54	49	48

Table C5: Summary of Measured Noise Levels at MP3						
Date	dB $L_{Aeq,T}$			dB $L_{A90,T}$		
	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00
Thursday 14/12/2023	-	-	65	58	57	54
Friday 15/12/2023	65	65	63	57	57	52
Saturday 16/12/2023	65	-	62	55	56	53

Table C5: Summary of Measured Noise Levels at MP3						
Date	dB $L_{Aeq,T}$			dB $L_{A90,T}$		
	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00	Daytime hours 07:00-23:00	Office hours 07:00-19:00	Night-time hours 23:00-07:00
Sunday 17/12/2023	62	-	63	54	54	50
Monday 18/12/2023	65	66	63	56	54	51
Tuesday 19/12/2023	66	67	63	57	55	52

The reported background $L_{A90,T}$ background sound levels have been determined on accordance with BS 4142 following statistical analysis of the measurement results.

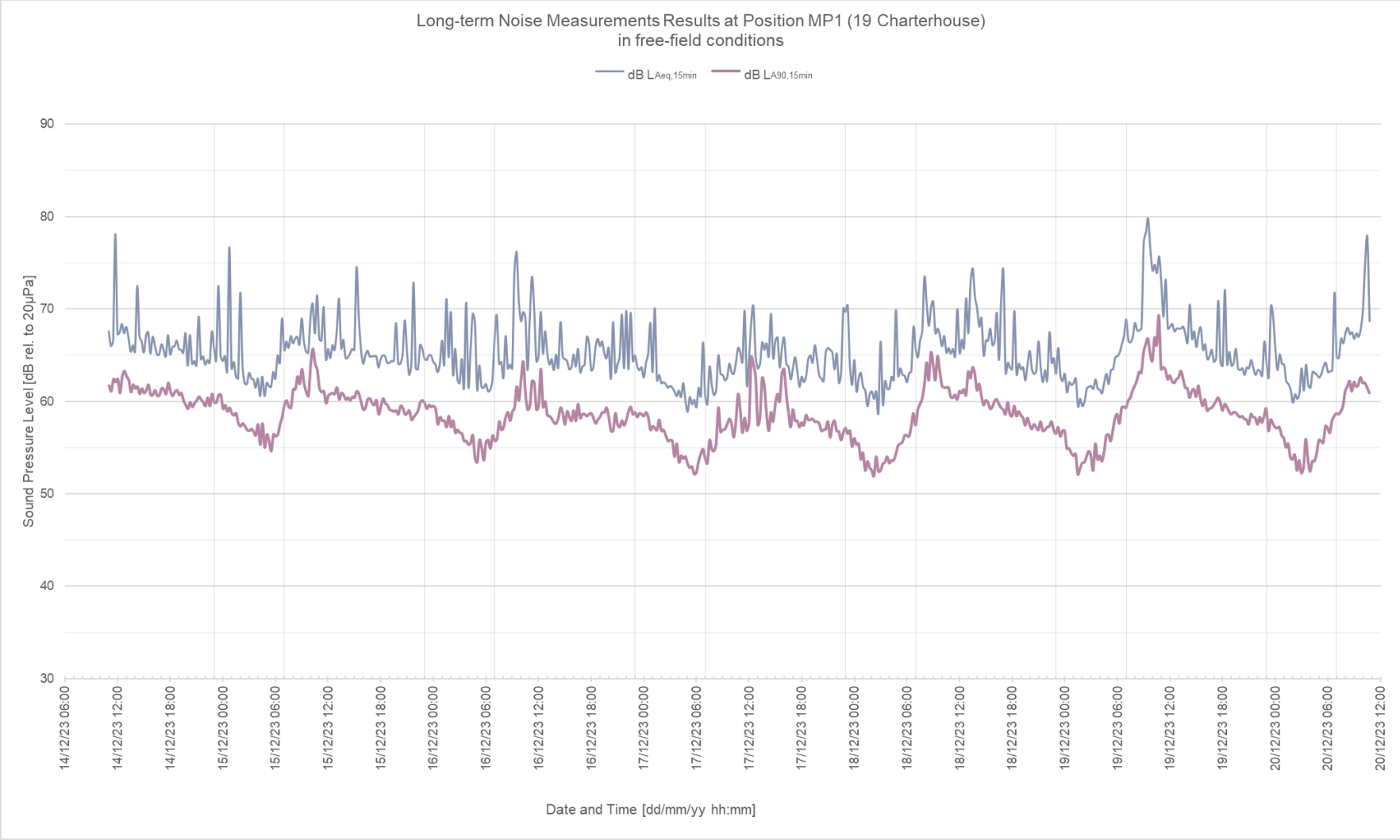

Figure B2: Measurement Position 1 (MP1) Time History Graph

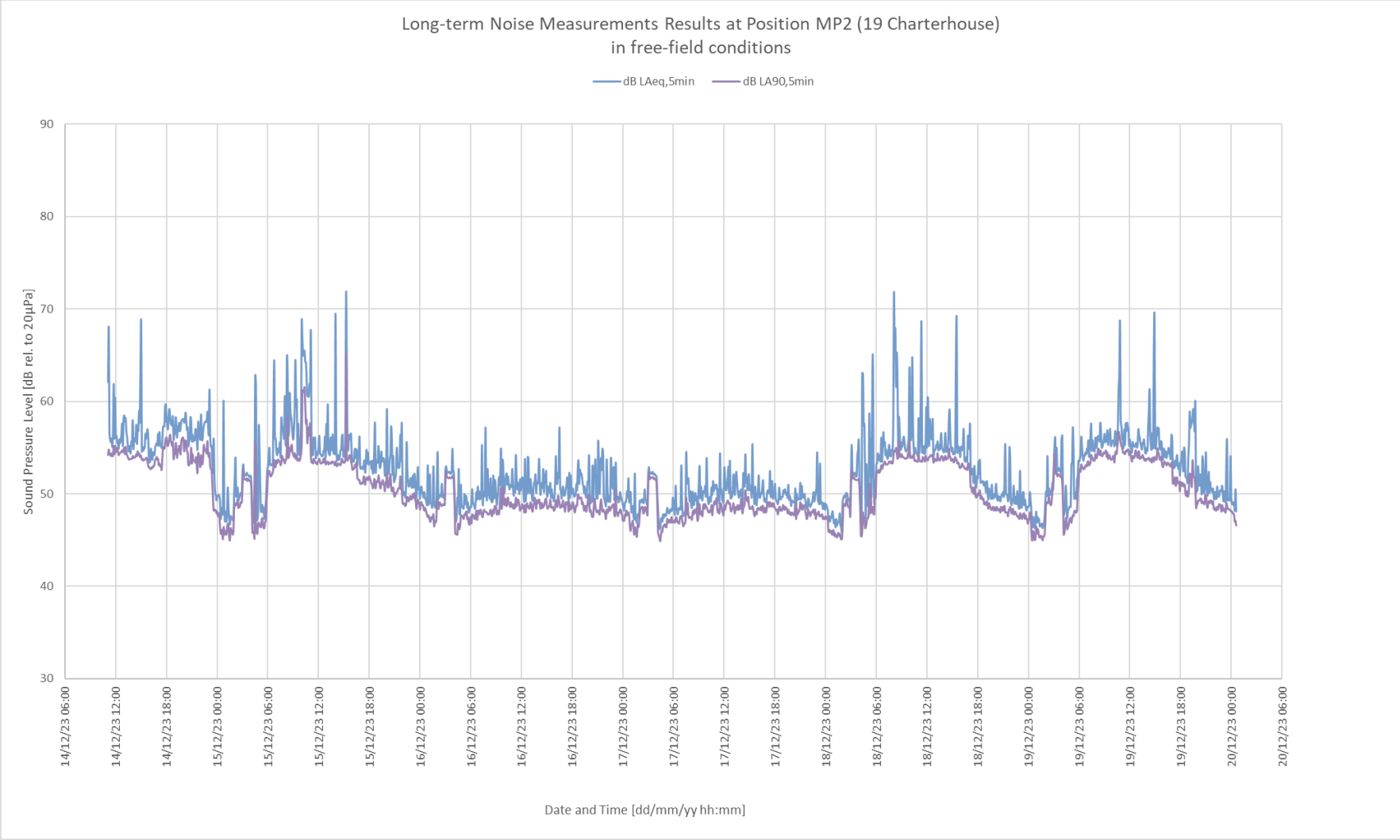

Figure B3: Measurement Position 2 (MP2) Time History Graph

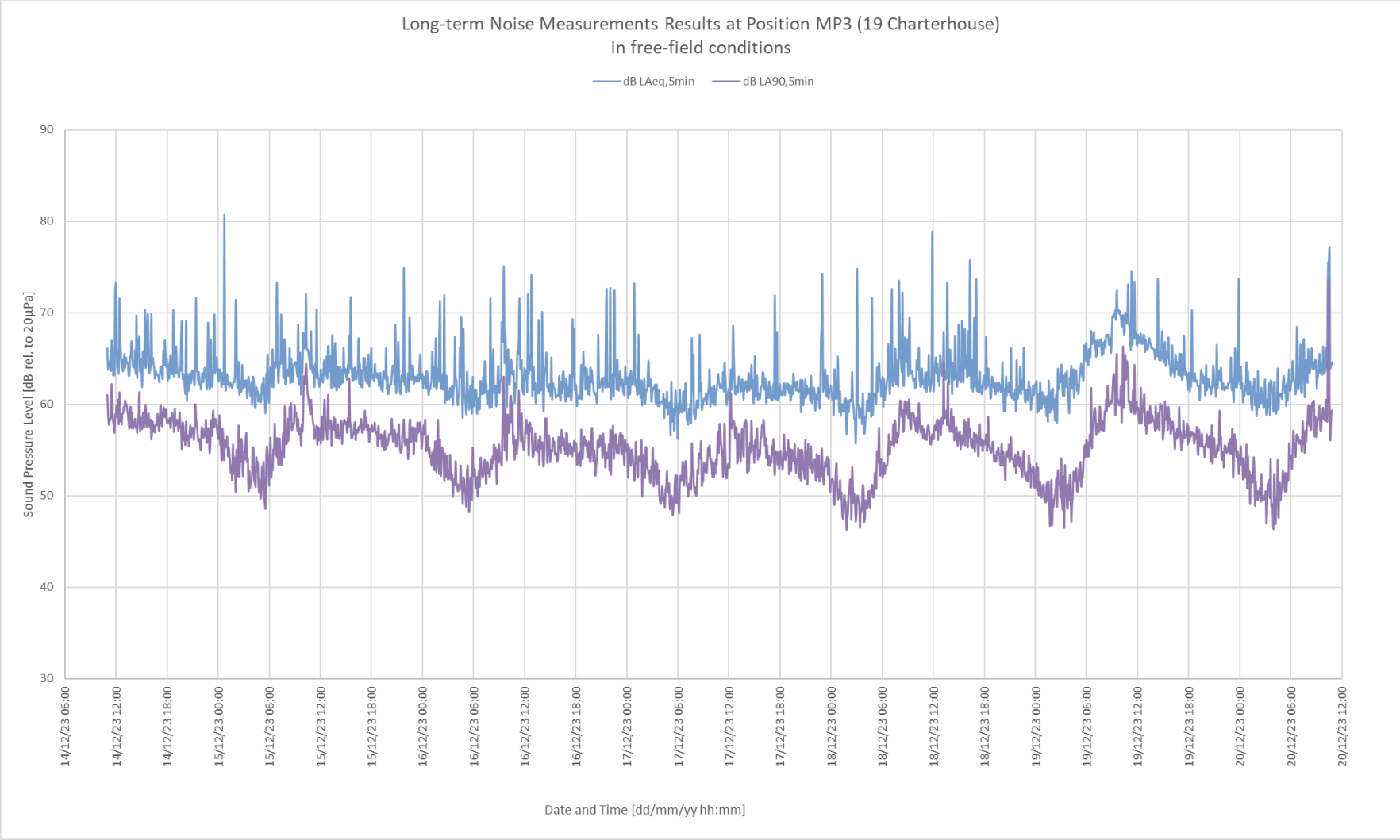

Figure B4: Measurement Position 3 (MP3) Time History Graph