# Westminster House
# Richmond
# TW9 2ND

## Environmental Noise Survey and Noise Impact Assessment Report

31059/NIA1/Rev3

15 December 2023

For:
Baden Properties Ltd
PO BOX 142
The beehive
St. Peter Port

Hann Tucker Associates
Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595
Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041
(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk

Hann Tucker Associates

# Environmental Noise Survey and Noise Impact Assessment Report
# 31059/NIA1/Rev3

## Document Control

| Rev | Date | Comment | Prepared by | Authorised by |
|---|---|---|---|---|
| 3 | 15/12/2023 | Updated drawing references |  |  |
| | | | Stavros Tagios<br>Assistant Consultant<br>MSc | Paul Hill<br>Director<br>BSc(Hons), MIOA |
| 2 | 15/12/2023 | Amended as per client's comments | Stavros Tagios<br>Assistant Consultant<br>MSc | Paul Hill<br>Director<br>BSc(Hons), MIOA |
| 1 | 13/12/2023 | Issue | Stavros Tagios<br>Assistant Consultant<br>MSc | Paul Hill<br>Director<br>BSc(Hons), MIOA |
| 0 | 30/11/2023 | Draft Issue | Stavros Tagios<br>Assistant Consultant<br>MSc | Paul Hill<br>Director<br>BSc(Hons), MIOA |
| | | | | |

Hann Tucker Associates

# Environmental Noise Survey and Noise Impact Assessment Report
# 31059/NIA1/Rev3

## Contents


| | | Page |
|---|---|---|
| 1.0 | Introduction | 1 |
| 2.0 | Objectives | 1 |
| 3.0 | Acoustic Terminology | 2 |
| 4.0 | Site Description | 2 |
| 5.0 | Architectural Assumptions | 4 |
| 6.0 | Planning Policies, Standards & Guidance | 6 |
| 7.0 | Baseline Noise Survey | 9 |
| 8.0 | Existing Industrial / Commercial Noise Impacts | 13 |
| 9.0 | Achieving Internal Noise Levels | 15 |
| 10.0 | External Amenity Area | 22 |
| 11.0 | Operational Noise Impacts | 23 |
| 12.0 | Conclusions | 31 |


## Attachments


Appendix A – Acoustic Terminology

Appendix B – Relevant Planning Policies and Guidance

Appendix C – Time History Graphs

# 1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Baden Properties to undertake a noise assessment for a site in Richmond, London.

Creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development is proposed at Westminster House, Richmond, London, TW9 2ND.

The site is subject to road, rail and air traffic noise from the surrounding road network, Richmond Train Station and Air Traffic.

Baseline noise conditions have been established by means of a detailed noise survey, presented herein. The findings have subsequently been used to assess the suitability of the site for residential and commercial use. Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

# 2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of an unattended 72-hour survey the existing $L_{Amax,}$ $L_{Aeq}$ and $L_{A90}$ environmental road, rail and air traffic noise levels at 3No. secure and accessible on-site positions, using fully computerised noise monitoring equipment.

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.

Based on the results of the unmanned survey, to undertake a noise assessment to assess the suitability of the proposed development for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (ProPG), British Standard BS8233:2014 and Local Authority guidance/requirements.

To present our methodology and findings in a detailed Environmental Noise Survey and Noise Impact Assessment Report to accompany the planning application.

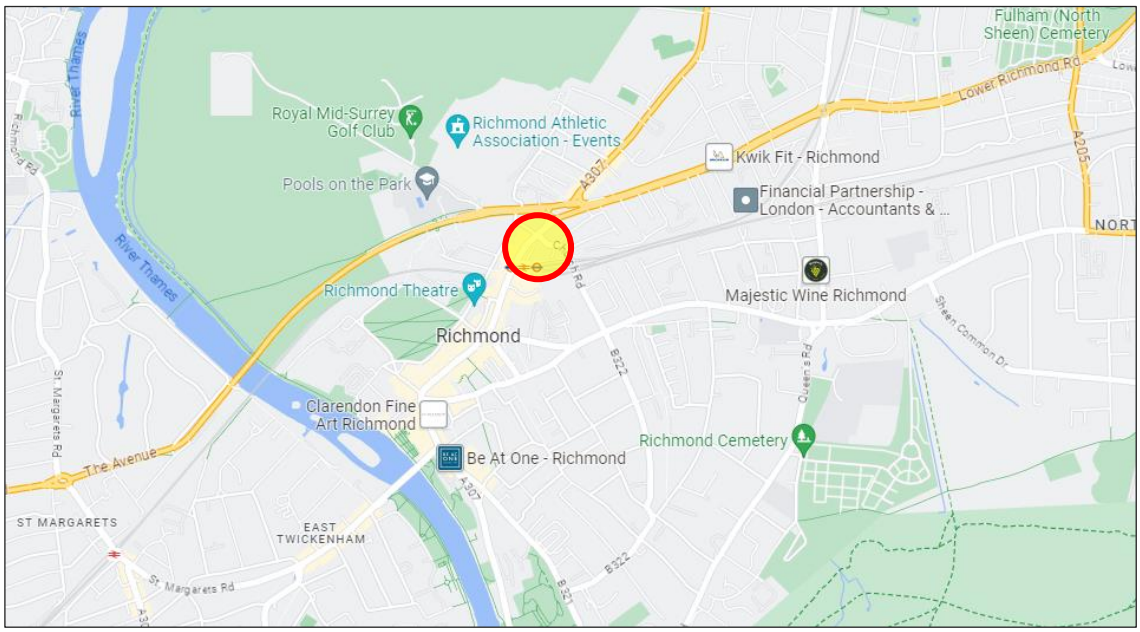
# 3.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

# 4.0 Site Description

## 4.1 Location

The site is located at 19-33 A307, Richmond, London, TW9 2ND. The location is shown in the Location Map below.



Location map, Google © Map data © 2023

The site falls within the jurisdiction of London Borough of Richmond upon Thames.

## 4.2 Description

The existing site is a ground plus 3No. storey building comprising commercial units on ground floor level and offices on the rest of the floors. To the northwest it overlooks “The Quadrant” and to the southwest the entrance to Richmond Train Station. To the southeast and rear of the building is an access road and a car park. Further east attached to the car park are the platforms of Richmond Train Station. On the platforms run trains of The District Line, Overground and various South Western Railway trains as well as Freight Trains. The site can be seen in the site map below:


Site Description, Google © Map data © 2023

| Hatch | Description |
|---|---|
| | Site boundaries |
| | Train Lines |
| | The Quadrant / A307 |
| | Approximate Air Path |
| | Car Park |

# 5.0 Architectural Assumptions

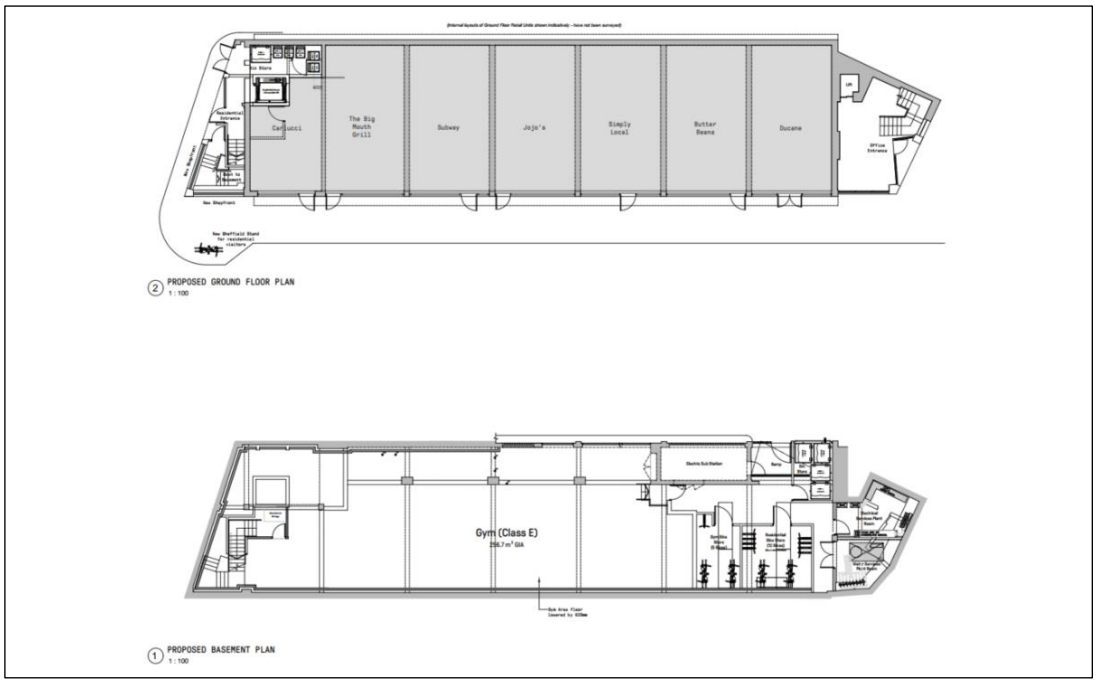
## 5.1 Drawings

Subsequent assessments included in the report have been based on the following drawings sent to Hann Tucker Associates by “Firstplan”.

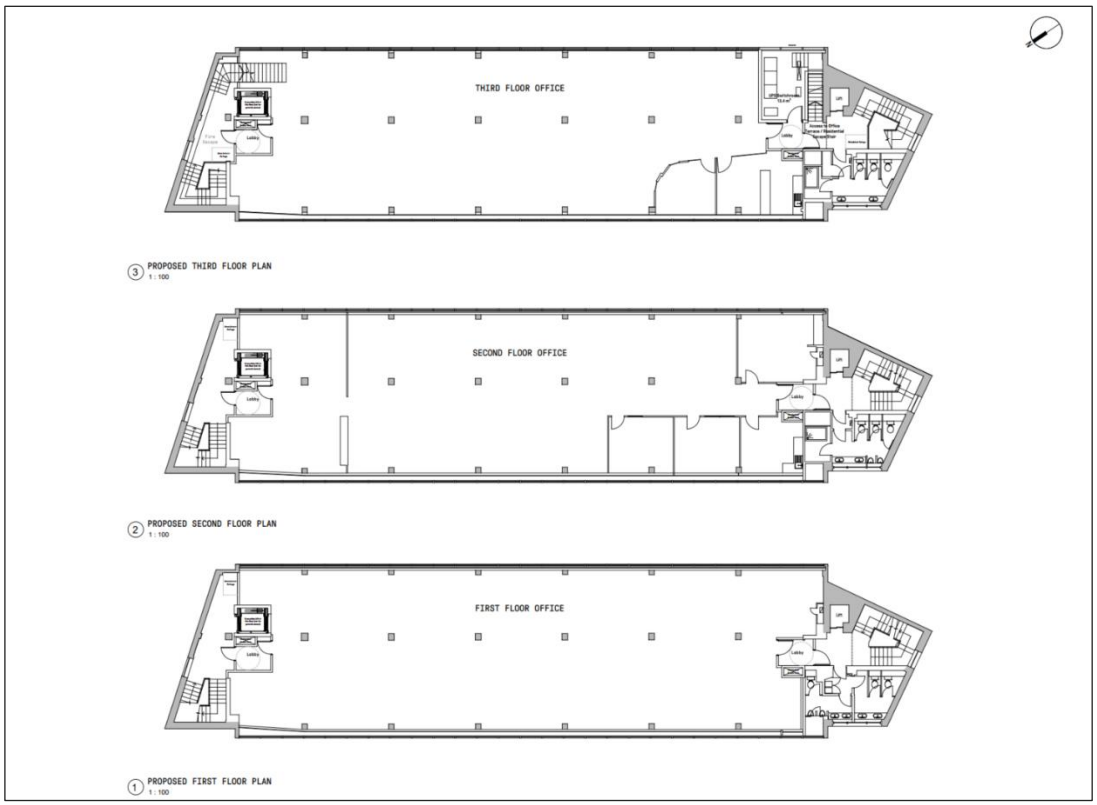
| Drawing Number | Drawing Title | Date |
|---|---|---|
| P22-058_CGL-Z1-00-GA-A-PL0XX1 RevA | Site Location Plan | 06 August 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0XX2 RevA | Block Plan | 06 August 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0001 RevI | Proposed Basement and Ground Floor Plans | 6 June 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0002 RevE | Proposed First Second and Third Floor Plans | 6 June 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0003 RevK | Proposed Fourth, Fifth and Roof Plans | 6 June 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0004 RevG | Proposed Front Elevation | 6 June 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0005 RevC | Proposed Front Elevation | 6 June 2022 |
| P22-058_CGL-Z1-00-GA-A-PL0006 RevA | Proposed Sections | 6 June 2022 |

We understand the project proposals are for Creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development.

The proposals are shown in the following drawings.




Plan showing Project Proposals, snapshot from drawing "P22-058_CGL-Z1-00-GA-A-PL0001 RevI" titled "Proposed Basement and Ground Floor Plans Plans" and dated 6 June 2022




Plan showing Project Proposals, snapshot from drawing "P22-058_CGL-Z1-00-GA-A-PL0002 RevE" titled "Proposed First, Second and Third Floor Plans" and dated 6 June 2022


Plan showing Residential Project Proposals, snapshot from drawing "P22-058_CGL-Z1-00-GA-A-PL0003 RevK" titled "Proposed Fourth, Fifth and Roof Plans" and dated 6 June 2022

### 5.2 Room Finishes

In our calculations we have assumed bedrooms and living areas will have typical furnishings including beds, sofas, chairs etc.

## 6.0 Planning Policies, Standards & Guidance

### 6.1 Policies & Guides

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2023
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019

The above documents highlight the importance of considering the potential noise effects on any new residential development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards, guidance, and Local Authority requirements as summarised below:

- Local Planning Policy: Development Control for Noise Generating and Noise Sensitive Development
- The London Plan (2021)
- London Plan Sustainable Design and Construction SPG
- World Health Organisation: 2018
- British Standard BS8233: 2014
- ProPG : Planning & Noise: 2017
- Building Regulations Approved Document O: 2021
- British Standard 4142:2014 + A1:2019

Detailed information for relevant planning policies and guidance can be found within Appendix B.

## 6.2 Specific Local Authority Criteria

For new developments, London Borough of Richmond Upon Thames makes reference to noise in Section 6.0 of their Local Planning Policy Document to British Standard BS4142:2014.

*"All industrial and commercial development with the potential to generate noise will be assessed and, where relevant, controlled by planning conditions in order to protect residential amenity. Conditions may be used, for example, to restrict noise levels and to control hours of operation. The most relevant standard for assessing new industrial and commercial development is BS4142:2014*"

| Noise Significance Risk | BS4142 Outcome | Planning Advice |
|---|---|---|
| **Minimal** | $L_{A,Tr}$ - $L_{A90,T}$ ≤ -5 | *Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The Borough will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.* |
| **Low** | $L_{A,Tr}$ - $L_{A90,T}$ is > -5 & ≤ 0 | *Where the rating level of noise is equal to, or below the background noise level by up to 5dB, this indicates that the proposed NGD may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects* |
| **Medium** | $L_{A,Tr}$ - $L_{A90,T}$ is > 0 & ≤ +5 | *Where the rating level of noise is equal to, or above the background noise level by up to 5dB, this indicates that the proposed NGD is less likely to be acceptable from a noise perspective and will be context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is typically only applicable to non-sensitive sites or where there are overriding other reasons why development should be considered. It will typically be necessary for the applicant to confirm how adverse impacts from the NGD will be mitigated and minimised. It is less likely that planning consent will be granted.* |
| **High** | $L_{A,Tr}$ - $L_{A90,T}$ > +5 | *Where the rating level of noise is above the background noise level by more than 5dB, this indicates that the proposed NGD is unlikely to be acceptable from a noise perspective and planning consent is likely to be refused on noise grounds* |

**"Internal Noise Levels in Nearby Dwellings**

*In addition to an assessment of external noise, in some cases it will also be necessary to predict internal noise levels at the closest and/ or worse affected noise sensitive premises and to demonstrate the means of achieving suitable internal noise levels within noise sensitive rooms (with windows partially open for ventilation where this is the norm for the building likely to be affected).*

*In some cases, e.g. for steady continuous noise without a specific character, the guidance on suitable internal noise levels found in Table 4 of BS8233 may be relevant. The application should demonstrate that these levels can be complied with. In other cases, it may be necessary to seek to achieve better standards in nearby dwellings, for example where the proposed industrial or commercial development may emit noise with a tonal, impulsive or other discrete characteristics the Borough may consider it appropriate to apply a character correction penalty for internal noise standards"*

# 7.0 Baseline Noise Survey

## 7.1 Procedure

Fully automated environmental noise monitoring was undertaken by Stavros Tagios MSc from approximately 09:45 hours on Friday 20 October 2023 to 11:30 hours on Tuesday October 2024 and from approximately 20:00 hours on Friday 27 October to 11:00 hours on Tuesday 31 October, to establish full daytime and night-time noise levels over a typical weekday and weekend period. Measurements were taken continuously of the A-weighted (dBA) $L_{90}$, $L_{eq}$, and $L_{max}$ sound pressure levels over discrete 2, 15-minute and 60-minute periods.

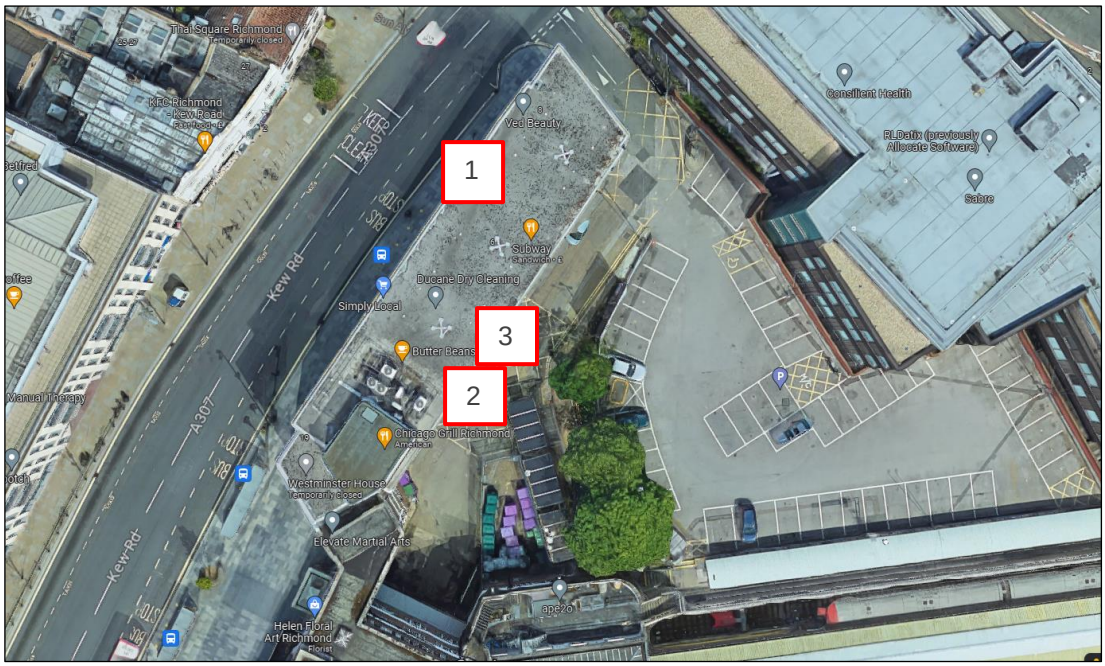
### Measurement Positions

The noise level measurements were undertaken at 3No. positions as described in the table below.

| Position | Type | Dates | Description |
|---|---|---|---|
| 1 | Unattended | 20-24 October | The microphone was mounted to a pole protruding approximately 1m from the first-floor window overlooking The Quadrant/A307. |
| 2 | Unattended | | The microphone was mounted to a pole protruding approximately 1m from the first-floor window overlooking the car park/access road at the rear. |
| 3 | Unattended | 27-31 October | The microphone was mounted to a pole protruding approximately 1m from the third-floor window overlooking the car park/access road at the rear. |

The above positions should be representative to measure the noise climate at the site described in Section 4.2.

The positions are shown on the plan below.




Plan Showing Measurement Positions Google © Map data © 2023

## 7.2 Weather Conditions

For the unattended survey between Friday 20 October 2023 and Tuesday 24 October 2023, local weather reports indicated periods of rainfall on the 20th-21st October, with temperatures ranging from 4 °C (night) to 17 °C (day) and wind speeds less than 5 m/s.

For the unattended survey between Friday 27 October 2023 and Tuesday 31 October 2023, local weather reports indicated only short periods of light rain but no prolonged or heavy rainfall with temperatures ranging from 3 °C (night) to 16 °C (day) and wind speeds less than 5 m/s.

During our time on site, skies were overcast, wind conditions were light from a north-northeastern direction and road surfaces were largely dry.

## 7.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

| Position | Description | Manufacturer | Type | Serial Number | Calibration |
|---|---|---|---|---|---|
| 1 | Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3803 | Calibration on 04/07/2023 |
| | Type 1 ½" Condenser Microphone | Bruel & Kjaer | 4189 | 2470596 | Calibration on 04/07/2023 |
| | Preamp | Larson Davis | PRM902 | 4214 | Calibration on 04/07/2023 |
| 2 | Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3699 | Calibration on 18/07/2023 |
| | Type 1 ½" Condenser Microphone | PCB | 377B02 | 133362 | Calibration on 18/07/2023 |
| | Preamp | Larson Davis | PRM902 | 3318 | Calibration on 18/07/2023 |
| 3 | Type 1 Data Logging Sound Level Meter | Svantek | 971 | 80232 | Calibration on 05/07/2023 |
| | Type 1 ½" Condenser Microphone | ACO Pacific | 7052E | 67976 | Calibration on 05/07/2023 |
| | Preamp | Svantek | SV18 | 71473 | Calibration on 05/07/2023 |
| | Type 1 Calibrator | Bruel & Kjaer | 4230 | 1411668 | Calibration on 27/07/2023 |

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

## 7.4 Results

The results have been plotted on Time History Graphs 31059/TH1 to 31059/TH3 enclosed presenting the 60-minute A-weighted (dBA) $L_{90}$, $L_{eq}$ and $L_{max}$ levels at measurement position 1 and the 15-minute A-weighted (dBA) $L_{90}$, $L_{eq}$ and $L_{max}$ levels at measurement positions 2 and 3 throughout the duration of the survey.

In order to compare the results of our survey with the relevant guidelines it is necessary to convert the measured $L_{Aeq(15\ minute)}$ and $L_{Aeq(60\ minute)}$ noise levels into single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The $L_{A90}$ values presented are the 'representative' levels determined through statistical analysis of the 15-minute readings in line with BS 4142. $L_{Afmax}$ values are the '10th highest' 2-minute value in line with Approved Document O (Part O) requirements on position 3, the "10th highest" 15-minute value on position 2 and the representative highest " 60-minute" value on position 1.

| Position | Day/Period | Daytime (07:00 – 23:00 hrs) | | Night-time (23:00 – 07:00 hrs) | | |
|---|---|---|---|---|---|---|
| | | $L_{Aeq,16hr}$ | $L_{A90}$ | $L_{Aeq,8hr}$ | $L_{A90}$ | $L_{Amax}$ |
| 1 | Friday | 71 | 61 | 65 | 58 | 86 |
| | Saturday | 70 | 61 | 67 | 46 | 85 |
| | Sunday | 69 | 59 | 65 | 55 | 86 |
| | Monday | 70 | 60 | 66 | 45 | 84 |
| | Tuesday | 71 | 61 | - | - | - |
| 2 | Friday | 66 | 63 | 62 | 53 | 71 |
| | Saturday | 65 | 64 | 62 | 57 | 73 |
| | Sunday | 65 | 62 | 60 | 51 | 73 |
| | Monday | 65 | 62 | 61 | 53 | 71 |
| | Tuesday | 64 | 58 | - | - | - |
| 3 | Friday | 64 | 57 | 60 | 56 | 79 |
| | Saturday | 61 | 58 | 60 | 57 | 78 |
| | Sunday | 63 | 58 | 58 | 49 | 76 |
| | Monday | 64 | 58 | 56 | 48 | 70 |
| | Tuesday | 66 | - | - | - | - |

The above levels are as measured at the measurement positions and include local reflections.

### 7.5 Discussion of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by Road traffic and Air traffic at the front of the building (i.e position 2) and by cars in the car park, construction noise, train noise, and air traffic noise at the rear of the building (i.e position 1 and position 3)

## 8.0 Existing Industrial / Commercial Noise Impacts

### 8.1 Overview

This section considers the potential noise impact of the existing adjacent commercial premises and associated activities on proposed residential receptors. The assessment follows methodology set out within BS 4142:2014.

Our assessment has been carried out to 1 m from the worst affected window of the proposed development, and is based on our on-site observations and time tables we have acquired from the TfL website.

To the rear of the building we noted that bin lorries use the access road to load/unload. We have been informed by i-Transport LLP and Mr. Ali Khan that bin collection happens once a week for the offices and for the purposes of this assessment it has been assumed that bin collections happen once a week for the residential units (i.e 2No. total collection per week). On the basis of the frequency of bin collection, noise from bin lorries should not be deemed likely to be the cause of an adverse comment, when the frequency of occurrence is taken into context.

Additionally, there is a car park to the rear that is open 24 hours. Assumptions have been made for night-time use, albeit with less frequency than the cars observed in the car park during day-time.

## 8.2 Car Park Noise Assessment

Based on the measured data and observations made on site, the table below provides an initial BS4142:2014 assessment.

| **Source** | | **Car Park** | | |
|---|---|---|---|---|
| **Event** | | **Passby** | **Manoeuvring In** | **Manoeuvring out** |
| Source Level at 1m (dBA) | | 56 | 53 | 55 |
| On-time (seconds) | | 4 | 20 | 14 |
| SEL (dBA) | | 62 | 66 | 66 |
| No. of events | | 5 | 5 | 5 |
| **$L_{eq}$ at 1m over Assessment Interval (900seconds for night) (dBA)** | | **39** | **43** | **44** |
| Receptor Distance (m) | | 10 | 10 | 10 |
| Distance Loss (dB) | | -10 | -10 | -10 |
| Screening Loss (dB) | | 0 | 0 | 0 |
| **Noise Level at Receptor $L_{eq}$ (dBA)** | | **29** | **33** | **34** |
| Combined Specific Noise Levels $L_{eq}$ (dBA) | | 36 | | |
| Acoustic Feature Correction | | 3 | | |
| BS 4142 Rating Level | | 39 | | |
| Nighttime limit based on Environmental Noise Survey | | 45 | | |
| Excess of rating over background sound level | | -6 | | |
| Assessment indicates likelihood of a significant adverse impact to residents without noise mitigation measures. | | The excess of the rating level over the background level is low, mitigation measures should not therefore be required. | | |
| Uncertainty of the assessment | Low | The background sound level is based on repeatable measurements made over the duration of a number of days. The measurements of noise from the industrial remained consistent throughout measurement period and was subjectively not dominant above road/rail/aircraft sources at proposed development site. | | |
| Local Authority Guidance | | *Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The Borough will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.* | | |

# 9.0 Achieving Internal Noise Levels

There are 3No ventilation conditions applicable to proposed residential dwellings. These are Background Ventilation as described in Approved Document F (Part F), Overheating as described in Approved Document O (Part O), and Purge Ventilation (odour and smells).

## 9.1 Purge Ventilation

It should be noted that the internal noise level guidelines are generally not applicable under *"purge ventilation"* conditions as defined by Part F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).

As such, acoustic conditions are generally not a concern during purge ventilation.

## 9.2 Background Ventilation Condition

### 9.2.1 Criteria

**Areas dominated by noise without character**:

With reference to the acoustic standards and guidelines as reviewed in Appendix B and Section 6.2, the external noise intrusion levels from environmental sources should be controlled so as to not exceed the following criteria. This applies to the front of the building (Position 1) which includes environmental noise (i.e noise without character).

| Activity | Location | Desirable Internal Ambient Criteria | |
|---|---|---|---|
| | | 07:00 – 23:00 | 23:00 – 07:00 |
| Resting | Living Rooms | 35 dB $L_{Aeq,16hour}$ | - |
| Dining | Dining Room/Area | 40 dB $L_{Aeq,16hour}$ | - |
| Sleeping (Daytime Resting) | Bedroom | 35 dB $L_{Aeq,16hour}$ | 30 dB $L_{Aeq,8hour}$<br>45 dB[1] $L_{Amax}$ |

[1] regular noise events such as trains, aircraft (10th highest)

Note: For this site the $L_{Amax}$ parameter needs to be considered given the character of the noise climate we have measured. This is consistent with Section 2.2.2 of The World Health Organisation Environmental Noise Guidelines for the European Region and Note 4 of Section 7.7.2 of BS8233:2014)

**Areas dominated by noise with character:**

The Local Authority Criteria state:

*"In other cases, it may be necessary to seek to achieve better standards in nearby dwellings, for example where the proposed industrial or commercial development may emit noise with a tonal, impulsive or other discrete characteristics the Borough may consider it appropriate to apply a character correction penalty for internal noise standards"*

Therefore, for this assessment, the internal noise criteria have been reduced by 3dB (i.e 3dB more onerous) after the application of the aforementioned penalty, to the following:

| Activity | Location | Desirable Internal Ambient Criteria | |
|---|---|---|---|
| | | 07:00 – 23:00 | 23:00 – 07:00 |
| Resting | Living Rooms | 32 dB $L_{Aeq,16hour}$ | - |
| Dining | Dining Room/Area | 37 dB $L_{Aeq,16hour}$ | - |
| Sleeping (Daytime Resting) | Bedroom | 32 dB $L_{Aeq,16hour}$ | 27 dB $L_{Aeq,8hour}$<br>42 dB[1] $L_{Amax}$ |

[1] regular noise events such as trains, aircraft (10th highest)

### 9.2.2 Outline Specifications

Based on the prevailing noise climate at the site, open windows as a means of background ventilation would not be suitable on any façade across the development. As such, alternative ventilation measures would be required.

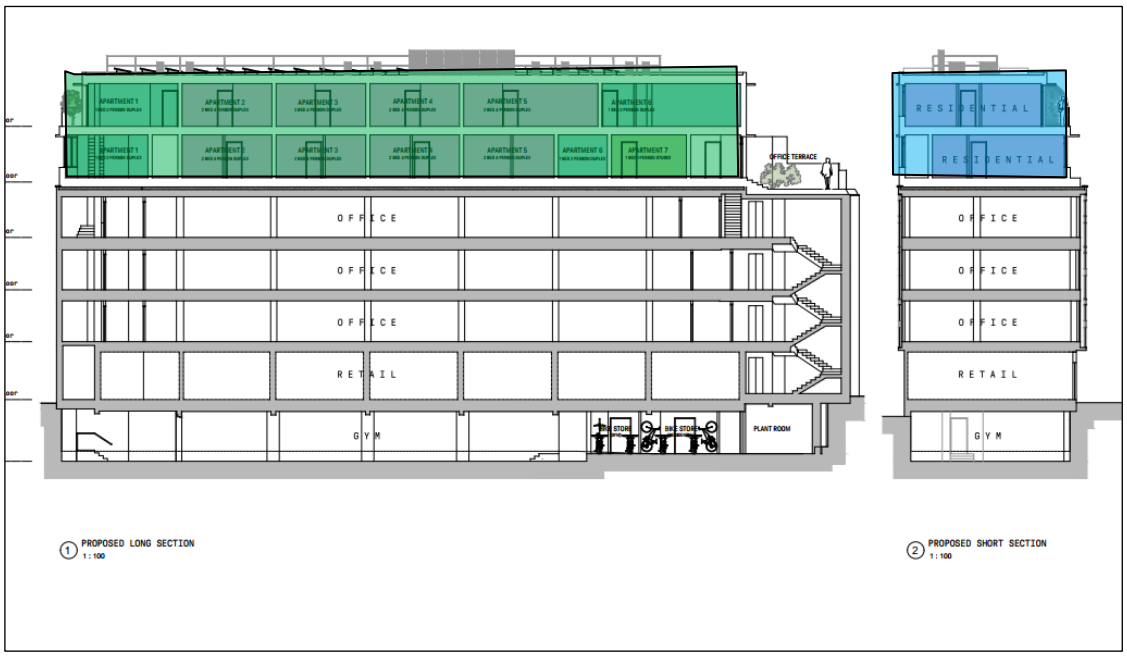
Allowance should be made to provide appropriate sound insulation solutions as required including, where necessary, suitably specified glazing and attenuated ventilators/mechanical ventilation systems. Preliminary calculations have been carried out to determine the likely façade sound insulation performance requirements for each façade. Calculation methods follow those outlined in BS 8233:2014 Section G.2 and are based on the following:

- Conventional brick/block cavity external wall/Insulated SFS with rainscreen cladding/brick slip/Curtain walling
- typical room volume as per latest drawings
- typical window area as per latest drawings
- Reverberation time of 0.5 seconds.

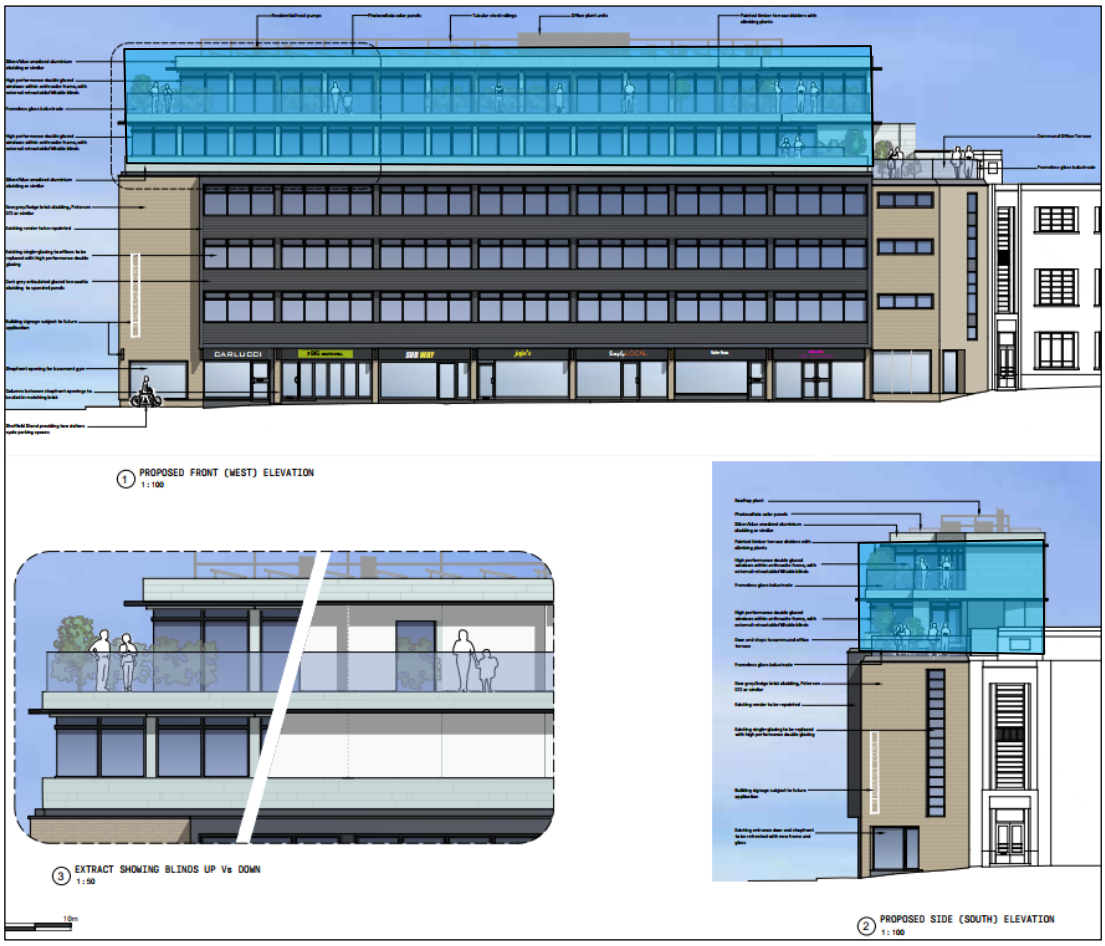
From the results of the assessment, the following minimum preliminary acoustic performance specifications are recommended. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

| Façade Zone | | Façade Element | Preliminary Minimum Sound Reduction Specification |
|---|---|---|---|
| A | Blue | Window | 40 dB Rw + Ctr |
| | | Ventilator | Attenuated Mechanical Ventilation Throughout |
| B | Green | Window | 38 dB Rw + Ctr |
| | | Ventilator | Attenuated Mechanical Ventilation Throughout |

The following plans show the location of each façade zone noted in the table above.




Drawing showing Project Proposals, snapshot from drawing “P22-058_CGL-Z1-00-GA-A-PL0006 RevA” titled “Proposed Sections” and dated 6 June 2022




Drawing showing Project Proposals, snapshot from drawing "P22-058_CGL-Z1-00-GA-A-PL0004 RevG" titled "Proposed Front Elevation" and dated 6 June 2022

### 9.2.3 Example Glazing Configurations

Example glazing configurations commensurate with achieving the sound insulation specifications noted in Section 9.2.2 are given below.

| ZONE | Glazing Specification, Rw + Ctr (dB) | Example Configuration |
|---|---|---|
| A | 40 | Acoustic double glazed system e.g. 10/20/8.8 mm |
| B | 38 | Uprated double glazed system e.g. 6/16/8.8 mm. |

### 9.2.4 Example Ventilation Solutions

Example ventilation solutions commensurate with achieving the elemental sound insulation performances noted in Section 9.2.2 are discussed below.

| ZONE | Example Configuration |
|---|---|
| A | Attenuated Mechanically assisted supply & extract solution (e.g. local MVHR). |

| ZONE | Example Configuration |
|---|---|
| B | Attenuated Mechanically assisted supply & extract solution (e.g. local MVHR). |

## 9.3 Overheating Condition

Approved Document O 'Overheating' (ADO) was released in December 2021 and came into effect in England on 15 June 2022. It sets out the suitable methodologies to limit unwanted solar gains in summer and provide adequate means to remove heat from the indoor environment. Requirement O1(2)(a) contains criteria relating to noise with Sections 3.2 to 3.4 of ADO stating the following:

*"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*

*Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*

a) *40 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*

b) *55 dB $L_{AFmax}$, more than 10 times a night (between 11pm and 7am)."*

Further to the above, the acoustic requirements of ADO relates to bedrooms and night and does not consider daytime hours or other living spaces.

To assess overheating ADO sets out 2No ways this can be done: These are by either using the simplified method or through dynamic thermal modelling (ie a TM59 assessment). For an acoustic assessment suitable to accompany a Planning Application, the simplified method is often used as it splits England into "Moderate" and "High" risk zones depending on the location of the site and provides "minimum free areas" for window openings in bedrooms. These are as follows:

- 13% of the floor area for "High Risk" locations
- 4% of the floor area for "Moderate Risk" locations

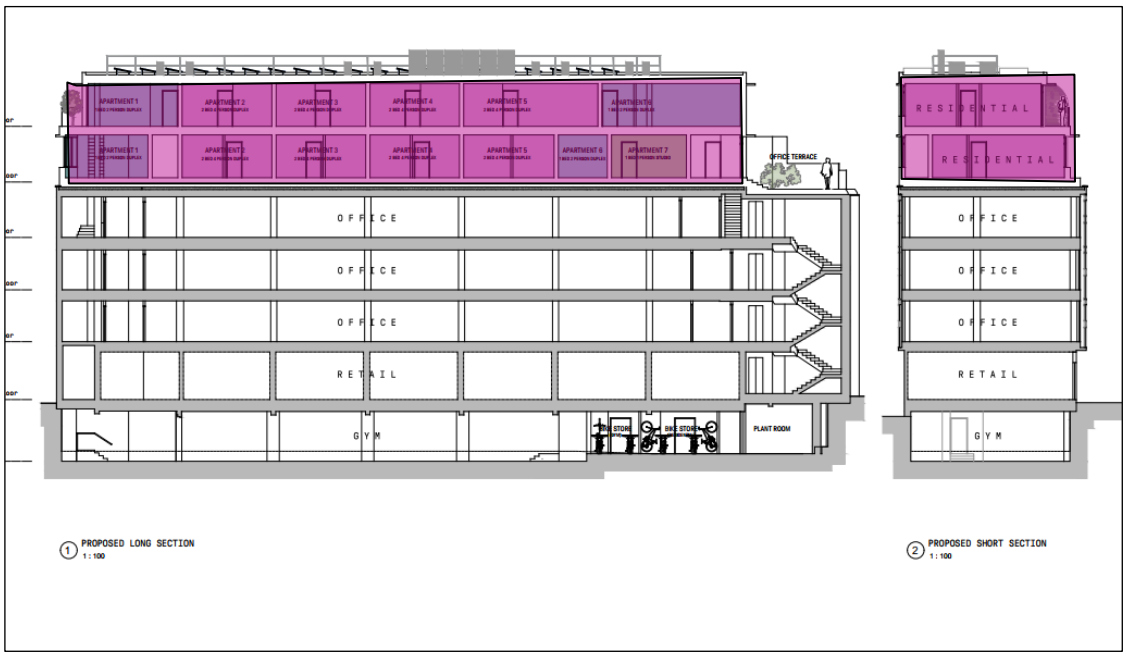
Based on the minimum free areas noted above, the IoA & ANC guidance note "Demonstrating Compliance with the Noise Requirements of Approved Document O" sets out the external noise

levels above which the simplified method cannot be used and alternative overheating strategy should be developed. These are shown below:

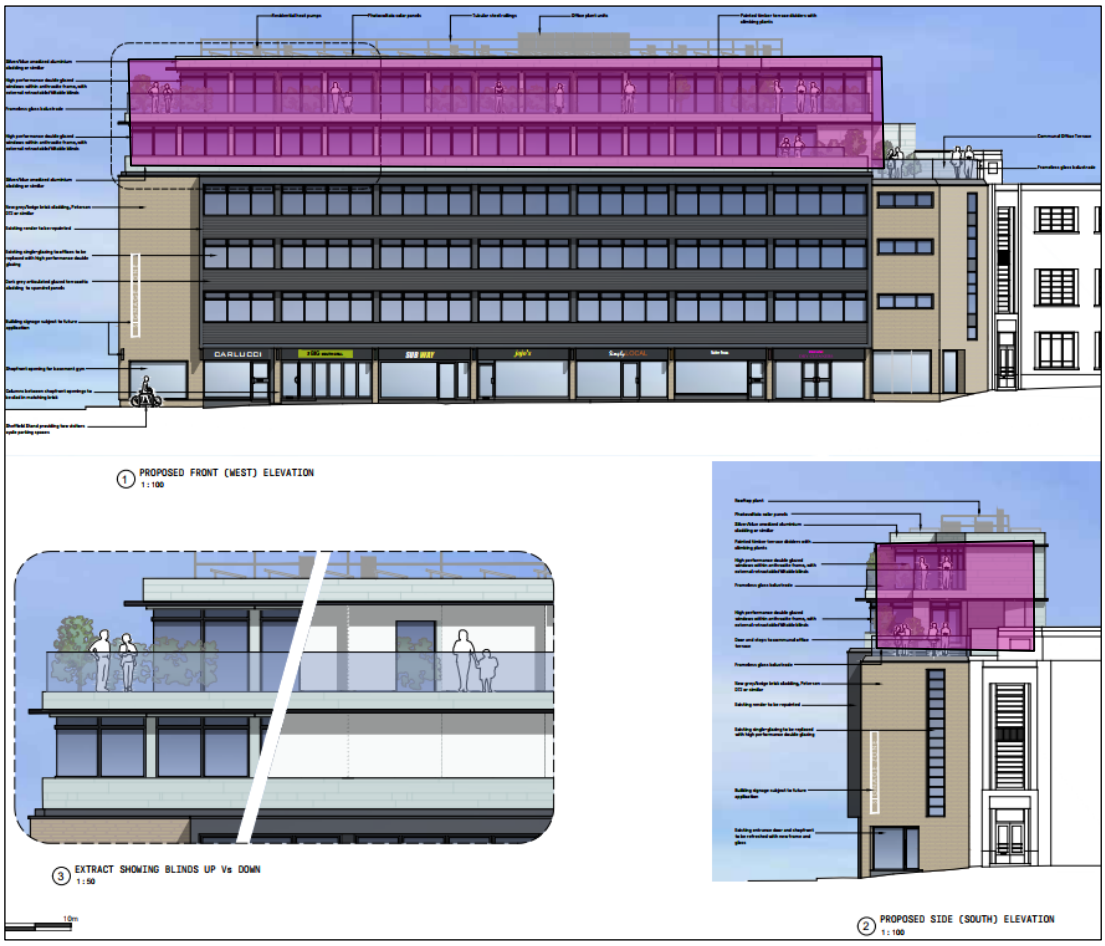
| Zone | Risk Category | Incident Noise Level (dB) | | Notes |
|---|---|---|---|---|
| | | LAeq,8h | LAFmax,2min | |
| Purple | High | >44 | >59 | Open windows based on simplified model not suitable. Detailed modelling via TM59 assessment advised. Limited area opening windows or closed windows may be required to comply with AD-O |
| | Moderate | >49 | >64 | |

The site is located in Richmond, London and therefore falls into the “High” risk category.

Based on the table above, windows across the development are above the point at which the simplified ADO model can be used and detailed modelling thermal modelling and a subsequent acoustic assessment is advisable to show compliance with Requirement O1(2)(a).




Drawing showing Project Proposals, snapshot from drawing “P22-058_CGL-Z1-00-GA-A-PL0006 RevA” titled “Proposed Sections” and dated 6 June 2022




Drawing showing Project Proposals, snapshot from drawing "P22-058_CGL-Z1-00-GA-A-PL0004 RevG" titled "Proposed Front Elevation" and dated 6 June 2022

At this stage, bedrooms should be designed to avoid or restrict the reliance on opening windows to satisfy overheating targets in the **Purple** zones highlighted above. We understand that external blinds are being proposed and this could assist in achieving the above. In addition, mitigation measures in the form of attenuated or plenum windows, attenuated louvres or vents for overheating and sound attenuating balconies may be suitable. These methods for reducing solar gains can be assisted with mechanical ventilation, such as MVHR with a manual summer boost function.

Air conditioning can also be considered. However, the introduction of mechanical solutions should be considered carefully; not only with regard to cost and maintenance, but sustainability and the environment.

## 10.0 External Amenity Area

Noise levels in external amenity areas should ideally not be above the range of 50 to 55 dB $L_{Aeq,16hr}$, as stated in BS8233:2014.

We understand that the following amenity areas are proposed, at the rear of the building, overlooking the Car Park:

| Floor | Proposals |
|---|---|
| 4 | 1No. Private Terrace for Apartment 7 |
| 5 | 6No. Private Terraces for apartments 1-6 |

It is acknowledged that noise levels those terraces may be above this noise level. However It should be noted that BS8233:2014 states: *"In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

Also, ProPG states that where despite following a good acoustic design, adverse noise impacts remain on any private external amenity space (ie garden or balcony), then the impact may be partially off-set if the residents are provided through the design of the development or the planning process, with access to:

> *"a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location)"*

We understand based on a desk-based review of current maps and a walkover survey of the Site that Richmond Green is at close proximity to the site (approximately a 4min walk). Considering that the scheme is in close proximity to a protected amenity space, we would suggest that noise on the private external balconies proposed should not be a reason for refusal.

# 11.0 Operational Noise Impacts

## 11.1 Noise Sensitive Receptors

Around the Site, the neighbouring buildings are predominantly commercial. A desk-based review of current maps, the Development proposals and a walkover survey of the Site and its surroundings has identified potential sensitive receptors which could be affected by noise associated with the Development. The nearest are shown on the plan and described in the table below.


Noise Sensitive Receptor Locations (Map Data © 2023 Google)

| Ref | Type | Description |
|---|---|---|
| A | Existing Hotel | Orange Tree Hotel, 3No. Storeys |
| B | Existing Mixed | Residential Properties as per Council Records and Commercial properties on 21-31 Kew Road |
| C | Existing Commercial | 1 Church Road, commercial properties |

## 11.2 Fixed Plant & Equipment

| Pos. | Noise Sensitive Receptors | BS 4142 Rating Level Limit (dBA) | | |
|---|---|---|---|---|
| | | Daytime (07:00 – 23:00 hours) | Night-time (23:00 – 07:00 hours) | 24 hours |
| A | Orange Tree Hotel, 3No. Storeys | 54 | 40 | 40 |
| B | Residential Properties as per Council Records and Commercial properties on 21-31 Kew Road | 54 | 40 | 40 |
| C | 1 Church Road, commercial properties | 53 | 43 | 43 |

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

It should be noted that the above are subject to the final approval of London Borough of Richmond upon Thames ('LBRT').

## 11.3 Emergency Building Services Plant Noise Emission Criteria

For life safety standby plant, only used in emergencies and occasional testing - e.g. smoke extract fans and life safety generators - relaxations of the internal and external criteria are normally acceptable but should comply with local authority and occupational requirements and must not interfere with internal audible emergency alarms.

## 11.4 Proposed Plant Equipment

The Proposed Development will incorporate numerous items of fixed plant (at the 4$^{th}$ floor terrace, at roof level and within internal plant rooms) which would have the potential to generate noise that could influence the prevailing external background noise climate.

Specific details of the proposed plant equipment that has the potential to influence the prevailing background noise climate has not yet been finalised but such plant will be selected, located and attenuated such that proposed atmospheric plant noise emission criteria (as presented in Section 11.2) are satisfied.

It is likely that the following noise control techniques would be implemented as part of the inherent design of the development to meet these requirements:

- Enclosing noisy plant within the building envelope;
- Selecting suitably quiet 'low noise' plant;
- Positioning air intake/discharge louvres away from noise sensitive receptors;
- Orientating air intake/discharge louvres away from noise sensitive receptors;
- Attenuation of air intake/discharge louvres with duct-mounted attenuators and/or acoustic louvres;
- Sound insulating plant housings/enclosures/rooms; and
- Anti-vibration mounts to control structure-borne noise and vibration

We understand the proposals for new items of plant comprise the following.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Air Source Heat Pump | 5th Floor Flat Roof | 7 | Daikin | Altherma ERGA06EVA |
| Air Source Heat Pump | Flat Roof Office Plant Area | 3 | Daikin | 3MXS52E4V1B2 |
| Mechanical Smoke Fan | 5th Floor Flat Roof | 1 | Systemair | DVV 800D6-XL/F400 IE3 |
| Air Source Heat Pump | Flat Roof Office Plant Area | 6 | Daikin | RXYSQ8-TMY1B |
| Cooling/Heating | 5th Floor Flat Roof | 1 | Daikin | RXYSCQ4TV1 |

## 11.5 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as follows:

| Plant Description | Sound Pressure Level (dBA)per octave band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Altherma ERGA06EVA* | 41 | 45 | 42 | 39 | 34 | 27 | 20 | 16 | 40 |
| 3MXS52E4V1B2** | 52 | 57 | 50 | 43 | 42 | 40 | 38 | 33 | 49 |

*Measured in semi-anechoic chamber at 1m from the unit.
**Measured in anechoic room in accordance with JISC9612

| Plant Description | Sound Power Level, $L_w$ (dBA) per octave band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| DVV 800D6-XL/F400 IE3 Inlet | 67 | 68 | 76 | 79 | 81 | 85 | 79 | 71 | 88 |
| DVV 800D6-XL/F400 IE3 Outlet | 68 | 70 | 78 | 80 | 82 | 86 | 80 | 72 | 89 |

| Plant Description | Sound Power Level, $L_w$ (dBA) per octave band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| RXYSQ-TMY1B* | - | 67 | 67 | 65 | 64 | 59 | 54 | 43 | 68 |
| RXYSCQ4TV1* | - | 70 | 67 | 67 | 64 | 55 | 49 | 43 | 68 |

*Measured according to ISO 3744

## 11.6 Location of Plant

The plant is proposed to be installed in the locations as shown in the drawing below:


Snapshot from drawing titled “BCL138_SK020 and dated 22 August 2023 provided to Hann Tucker by BOCCA Consulting

| Type | Description |
|---|---|
| A | Residential Heat Pump Daikin Altherma ERGA06EVA |
| B | Office Heat Pumps for space conditioning + Heat Pumps for Data/Comms room cooling 3x(2No. Daikin RXYSQ8TMY1B and 1No. Daikin 3MXS52E4V1B2) |
| C | Residential Corridor Cooling/Heating |
| D | Smoke Extract Fans: Rear Discharge VD: Vertical Discharge |

Based on the above drawing we understand that items of Type B are shown to be enclosed in a plant compound on the flat roof.

## 11.7 Plant Noise Impact Assessment

We understand that the proposed units will be operational as follows:

| Type | Operating Hours |
|---|---|
| A | 24Hours |
| B | 09:00-17:30 |
| C | 24 Hours |
| D | 24 Hours |

The tables in the following sub-sections summarise our predictions of atmospheric noise emissions from the louvres to the nearest noise sensitive window.

To the best of our knowledge the nearest noise sensitive window belongs to the Residential Properties as per Council Records marked below in blue, which is approximately 23m away from the west side of the 5th floor flat roof.

Plan showing proposed plant location and nearest noise sensitive and commercial receptors

### 11.7.1 Daytime (07:00-23:00)

| | Noise Level at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | |
| Altherma ERGA06EVA Sound Pressure Level @1m | 41 | 45 | 41 | 39 | 34 | 27 | 20 | 16 | 40 |
| Correction for 7No. | +8 | +8 | +8 | +8 | +8 | +8 | +8 | +8 | |
| Distance Correction | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | |
| Façade Correction | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **28** | **32** | **28** | **26** | **21** | **14** | **7** | **3** | **27** |
| | | | | | | | | | |
| 3MXS52E4V1B2 Sound Pressure Level @1m | 52 | 57 | 50 | 43 | 42 | 40 | 38 | 33 | 49 |
| Correction for 3No. | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| Distance Correction | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | |
| Façade Correction | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **36** | **41** | **34** | **27** | **26** | **24** | **22** | **17** | **33** |
| | | | | | | | | | |
| DVV 800D6-XL/F400 IE3 Outlet Sound Power Level | 68 | 70 | 78 | 80 | 82 | 86 | 80 | 72 | 89 |
| Directivity (Vertical Discharge) | 0 | 0 | 0 | -4 | -7 | -7 | -7 | -7 | |
| Distance Correction ($L_w$ to $L_p$) | -38 | -38 | -38 | -38 | -38 | -38 | -38 | -38 | |
| **Calculated Noise Level at Receptor** | 27 | 32 | 41 | 39 | 38 | 42 | 36 | 28 | 46 |
| | | | | | | | | | |
| RXYSQ-TMY1B Sound Power Level | - | 67 | 67 | 65 | 64 | 59 | 54 | 43 | 78 |
| Correction for 6No. | - | +8 | +8 | +8 | +8 | +8 | +8 | +8 | |
| Distance Correction ($L_w$ to $L_p$) | - | -39 | -39 | -39 | -39 | -39 | -39 | -39 | |
| Façade Correction | - | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **-** | **39** | **39** | **37** | **36** | **31** | **26** | **15** | **40** |
| | | | | | | | | | |
| RXYSCQ4TV1 Sound Power Level | - | 70 | 67 | 67 | 64 | 55 | 49 | 43 | |
| Distance Correction ($L_w$ to $L_p$) | - | -39 | -39 | -39 | -39 | -39 | -39 | -39 | |
| Façade Correction | - | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **-** | **31** | **28** | **28** | **25** | **16** | **10** | **4** | **29** |
| | | | | | | | | | |
| **Cumulative Noise level at 1m from the nearest noise sensitive receptor** | **39** | **44** | **44** | **42** | **41** | **42** | **37** | **29** | **47** |

Our calculations indicate that the proposed plant is within the limits outlined in Section 11.2 for daytime operation.

### 11.7.2 Night-time (23:00-07:00)

We understand that Plant items of Type B are proposed to serve the offices and should not be operational during night time hours.

| | Noise Level at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | |
| Altherma ERGA06EVA Sound Pressure Level @1m | 41 | 45 | 41 | 39 | 34 | 27 | 20 | 16 | 40 |
| Correction for 7No. | +8 | +8 | +8 | +8 | +8 | +8 | +8 | +8 | |
| Distance Correction | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | |
| Façade Correction | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **28** | **32** | **28** | **26** | **21** | **14** | **7** | **3** | **27** |
| | | | | | | | | | |
| DVV 800D6-XL/F400 IE3 Outlet Sound Power Level | 68 | 70 | 78 | 80 | 82 | 86 | 80 | 72 | 89 |
| Directivity (Vertical Discharge) | 0 | 0 | 0 | -4 | -7 | -7 | -7 | -7 | |
| Distance Correction ($L_w$ to $L_p$) | -38 | -38 | -38 | -38 | -38 | -38 | -38 | -38 | |
| **Calculated Noise Level at Receptor** | **27** | **32** | **41** | **39** | **38** | **42** | **36** | **28** | **46** |
| | | | | | | | | | |
| RXYSCQ4TV1 Sound Power Level | - | 70 | 67 | 67 | 64 | 55 | 49 | 43 | |
| Distance Correction ($L_w$ to $L_p$) | -39 | -39 | -39 | -39 | -39 | -39 | -39 | -39 | |
| Façade Correction | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | |
| **Calculated Noise Level at Receptor** | **31** | **31** | **28** | **28** | **25** | **16** | **10** | **4** | **29** |
| | | | | | | | | | |
| **Cumulative Noise level at 1m from the nearest noise sensitive receptor** | **34** | **37** | **41** | **40** | **38** | **42** | **36** | **28** | **46** |

Our calculations indicate that the proposed plant exceeds the limits outlined in Section 11.2 during night-time by 6dB. Mitigation measures will therefore be required.

## 11.8 Mitigation Measures

### 11.8.1 Smoke Extract Fan

In order to control plant noise emissions in line with the proposed criterion we recommend the Smoke Fan Discharge (Outlet) be fitted with attenuators capable of achieving the minimum following insertion losses:

| | Minimum Insertion Losses per Octave band Centre Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Mechanical Smoke Fan Vertical Discharge | 1 | 2 | 7 | 10 | 11 | 9 | 8 | 7 |

The aforementioned insertion losses could be achieved by a 50% free area 600mm length attenuator.

### 11.8.2 Plant Items Serving the 1st, 2nd and 3rd Floor Offices

We have been informed that the proposed operational hours for the plant are 09:00-17:30.

Our calculations indicate that plant items of Type B are in line with the daytime plant noise emission criteria outlined in Section 11.2.

### 11.8.3 Plant Noise Impact Assessment After Mitigation

| Plant Description | Noise Level at Octave Band Centre Frequency (Hz) After Mitigation Measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dBA |
| Altherma ERGA06EVA | 28 | 32 | 28 | 26 | 21 | 14 | 7 | 3 | 27 |
| Smoke Fan DVV 800D6 Outlet | 26 | 30 | 34 | 29 | 27 | 33 | 28 | 21 | 37 |
| EXYSCQ4TV1 | 31 | 31 | 28 | 28 | 25 | 16 | 10 | 4 | 29 |
| **Cumulative Noise level at 1m from the nearest noise sensitive receptor** | **34** | **36** | **36** | **33** | **30** | **33** | **28** | **21** | **38** |

Based on our calculations the proposed plant items with the proposed mitigation measures should be in line with the plant noise emission criteria outlined in Section 11.2.

### 11.9 Existing Commercial Unit Operations

At third floor level a currently vacant commercial office space is being retained as part of the development. Considering the prevailing environmental noise climate at the site, we would expect that noise egress via the unit frontage from most offices should be readily controllable. The occupants and uses of the offices are not known. However, for completeness we advise that operational noise break-out from any proposed use (including use of the communal terrace) is controlled to no more than 5 dB below the existing background noise level at 1m from the nearest noise sensitive occupier's window as follows:

| Period | Commercial noise break-out Limit, $L_{Aeq}$ (dB) |
|---|---|
| Daytime (07:00-23:00) | 54 |
| Night-time (23:00-07:00) | 40 |

1Should the operation include music noise, we advise that the above limits are reduced by a further 5dB
2 Established based on achieving suitable internal noise levels within noise sensitive premises.

Furthermore, noise transfer through the separating floor structure (and associated flanking paths) from the third floor office to fourth floor apartments will need to be considered. Once final uses / occupancy have been confirmed for each unit, an assessment of noise transfer to structurally connected habitable rooms shall be carried out which considers typical noise levels within the commercial unit and the sound insulation performance of the separating construction.

In addition to meeting at least the minimum requirements of Approved Document E between residential and commercial areas, for noise transfer to apartments above, the design intent should be to ensure operational $L_{max}$ noise transfer to apartments does not exceed a level at least 5 dB lower than the anticipated background $L_{90}$ noise level in each octave band.

## 12.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

The environmental noise impact upon the proposed dwellings has been assessed in the context of building regulations, and national and local planning policies.

Appropriate target internal noise levels have been proposed. These are achievable using acoustically high-performing mitigation measures.

Preliminary acoustic performance specifications for the external building fabric elements have been recommended such that appropriate internal noise levels should be achieved. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window and appropriate mitigation measures have been proposed.

The assessment shows the site, subject to appropriate mitigation measures, is suitable for residential development in terms of noise.

# Appendix A

## Acoustic Terminology

The acoustic terms used in this report are defined as follows:

dB — Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

$L_{90,T}$ — $L_{90}$ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

$L_{max}$ — $L_{max}$ is the maximum sound pressure level recorded over the period stated. $L_{max}$ is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the $L_{eq}$ noise level.

$L_p$ — Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of $2 \times 10^{-5}$ Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

$L_w$ — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually $10^{-12}$ W).

# Appendix B

# Planning Policies, Standards & Guidance

## B.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

*"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

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

- *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 Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

**NOEL – No Observed Effect Level**
This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

**LOAEL – Lowest Observable Adverse Effect Level**
This is the level above which adverse effects on health and quality of life can be detected.

**SOAEL – Significant Observed Adverse Effect Level**
This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

## B.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published September 2023):

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

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

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

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

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

Paragraph 185 also references the Noise Policy Statement for England (NPSE). This document does not refer to specific noise levels but instead sets out three aims:

- "Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

## B.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at http://planningguidance.planningportal.gov.uk/blog/guidance/. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

| Perception | Examples of Outcomes | Increasing effect level | Action |
|---|---|---|---|
| Not noticeable | No effect | No Observed Effect | No specific measures required |
| 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 | |

| Perception | Examples of Outcomes | Increasing effect level | Action |
|---|---|---|---|
| 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. | Observed Adverse Effect | Mitigate and reduce to a minimum |
| | | Significant Observed Adverse Effect Level | |
| 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 hard, e.g. auditory and non-auditory. | Unacceptable Adverse Effect | Prevent |

## B.4 World Health Organisation

The current Environmental Noise Guidelines 2018 for the European Region (ENG) supersede the Guidelines for Community Noise from 1999 (CNG). Nevertheless, the ENG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

A summary of the guidance from the ENG and CNG is shown in the table below.

| Source | CNG guideline indoors all sources | ENG guideline outdoors noise from specific source only |
|---|---|---|
| Road traffic noise | 35 $L_{Aeq,\ 16h}$ | 53 dB $L_{den}$ |
| | 30 $L_{Aeq,\ 8h}$ | 45 dB $L_{night}$ |
| Railway noise | 35 $L_{Aeq,\ 16h}$ | 54 dB $L_{den}$ |
| | 30 $L_{Aeq,\ 8h}$ | 44 dB $L_{night}$ |
| Aircraft noise | 35 $L_{Aeq,\ 16h}$ | 45 dB $L_{den}$ |
| | 30 $L_{Aeq,\ 8h}$ | 40 dB $L_{night}$ |

With regard to single-event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 state:

*"In many situations, average noise levels like the $L_{den}$ or $L_{night}$ indicators may not be the best to*

*explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ($L_{A,max}$) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."*

## B.5 British Standard BS8233: 2014

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" provides guidance for the control of noise in and around buildings.

**Internal Areas**

BS8233:2014 Section 7.7.2 titled "Internal ambient noise levels for dwellings" states:

*"In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:*

| ***Activity*** | ***Location*** | ***Desirable Internal Ambient Criteria*** | |
|---|---|---|---|
| | | ***07:00 – 23:00*** | ***23:00 to 07:00*** |
| *Resting* | *Living Rooms* | *35 dB $L_{Aeq,16hour}$* | - |
| *Dining* | *Dining Room/Area* | *40 dB $L_{Aeq,16hour}$* | - |
| *Sleeping (Daytime Resting)* | *Bedroom* | *35 dB $L_{Aeq,16hour}$* | *30 dB $L_{Aeq,8hour}$* |

*Note 1 The above table provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.*

*Note 2 The levels shown in the above table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the above table.*

*Note 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks nigh or News Year's Eve.*

*Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and*

*number of events per night. Sporadic noise events could require separate values.*

*Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.*

*If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.*

*Note 6 Attention is drawn to the Building Regulations.*

*Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."*

### External Amenity Areas

BS8233:2014 Section 7.7.3.2 titled "Design criteria for external noise" states:

*"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$[1], with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*

*Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens, and terraces, which might be intended to be used for relaxation. In high-noise areas consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."*

## B.6 ProPG : Planning & Noise : 2017

The primary goal of the ProPG is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise

from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is “not dominant”.

This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The two sequential stages of the overall approach are:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “Good Acoustic Design Process”;
- Element 2 – observing internal “Noise Level Guidelines”;
- Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
- Element 4 – consideration of “Other Relevant Issues”.

The ProPG considers suitable guidance on internal noise levels found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”.Table 4 in Section 7.7.2 of the standard suggests that “in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”. The standard states (Section 7.7.1) that “occupants are usually more tolerant of noise without a specific character” and only noise without such character is considered in Table 4 of the standard.

| Activity | Location | 07:00 – 23:00 Hours | 23:00 – 07:00 Hours |
|---|---|---|---|
| Resting | Living Room | 35dB $L_{Aeq,16hr}$ | - |
| Dining | Dining Room / Area | 40dB $L_{Aeq,16hr}$ | - |
| Sleeping (daytime resting) | Bedroom | 35dB $L_{Aeq,16hr}$ | 30dB $L_{Aeq,16hr}$<br>45dB $L_{Amax,F}$ |

*NOTE 1 the Table provides recommended internal $L_{Aeq}$ target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources.*

*Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.*

*NOTE 2 The internal $L_{Aeq}$ target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the $L_{Aeq}$ target levels recommended in the Table.*

*NOTE 3 These internal $L_{Aeq}$ target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.*

*NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).*

*NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal $L_{Aeq}$ target levels should not normally be exceeded, subject to the further advice in Note 7.*

*NOTE 6 Attention is drawn to the requirements of the Building Regulations.*

*NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal $L_{Aeq}$ target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal $L_{Aeq}$ levels start to exceed the internal $L_{Aeq}$ target levels by more than 5dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be*

*required to show how the relevant number of rooms affected has been kept to a minimum. Once internal $L_{Aeq}$ levels exceed the target levels by more than 10dB, they are likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (See Section 3.D).*

## B.7 Building Regulations Approved Document O

Building Regulations Approved Document O relates to setting standards for overheating in new residential buildings. It aims to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Requirement O1 of Approved Document O is met by designing and constructing the building to achieve both of the following:

a. Limiting unwanted solar gains in summer.

b. Providing an adequate means of removing excess heat from the indoor environment.

Sections 3.2 to 3.4 of this document relate to noise and state the following:

*"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*

*Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*

*a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*

*b. 55dB $L_{AFmax}$, more than 10 times a night (between 11pm and 7am).*

*Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.*

***NOTE:** Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).*

## B.8 British Standard 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 "*Methods for rating and assessing industrial and commercial sound".*

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level".

BS 4142 states that: *"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 sound 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 sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014+A1:2019. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of "low impact".

# Appendix C

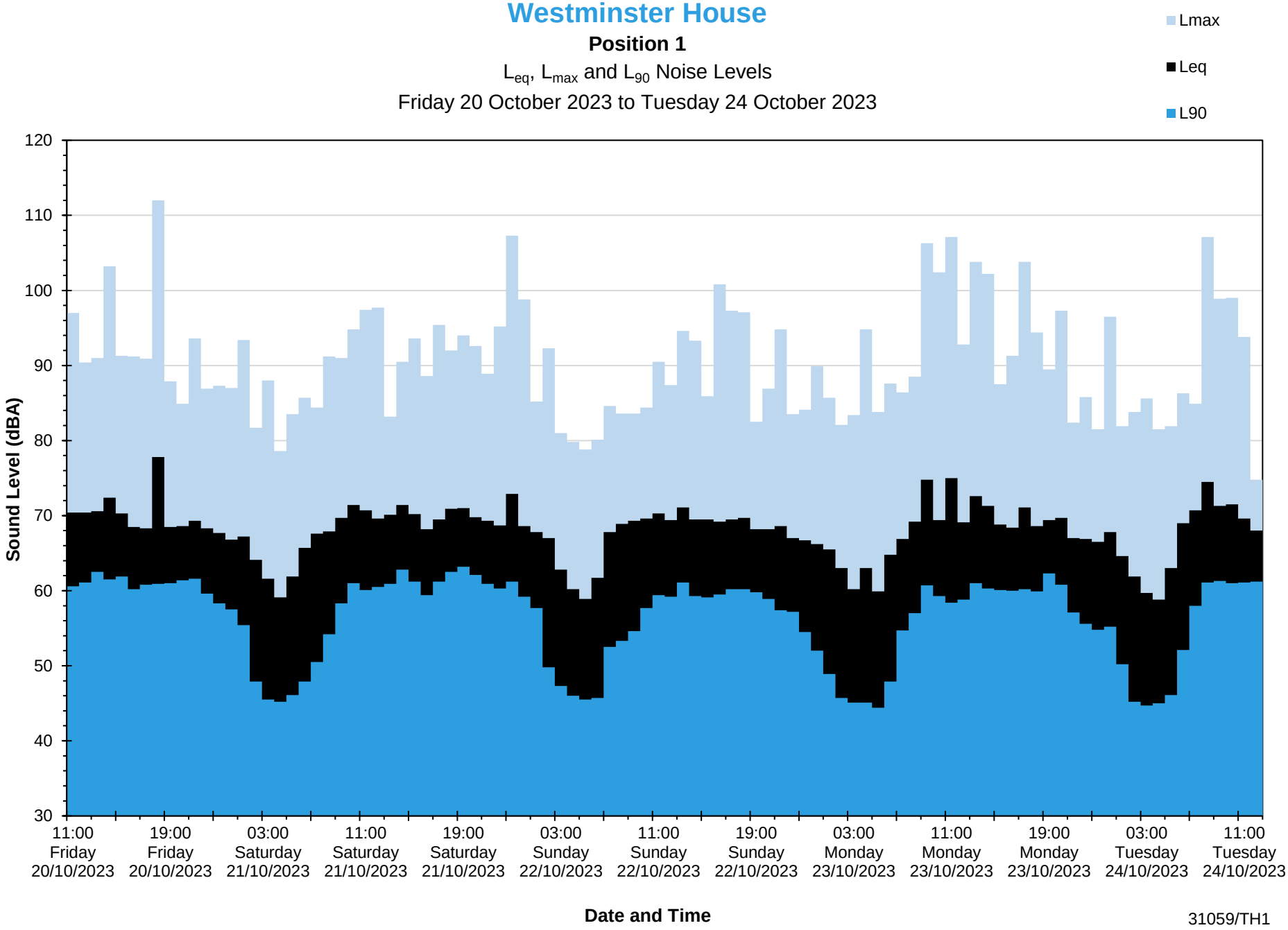
## Time History Graphs

# Westminster House

**Position 1**

$L_{eq}$, $L_{max}$ and $L_{90}$ Noise Levels

Friday 20 October 2023 to Tuesday 24 October 2023



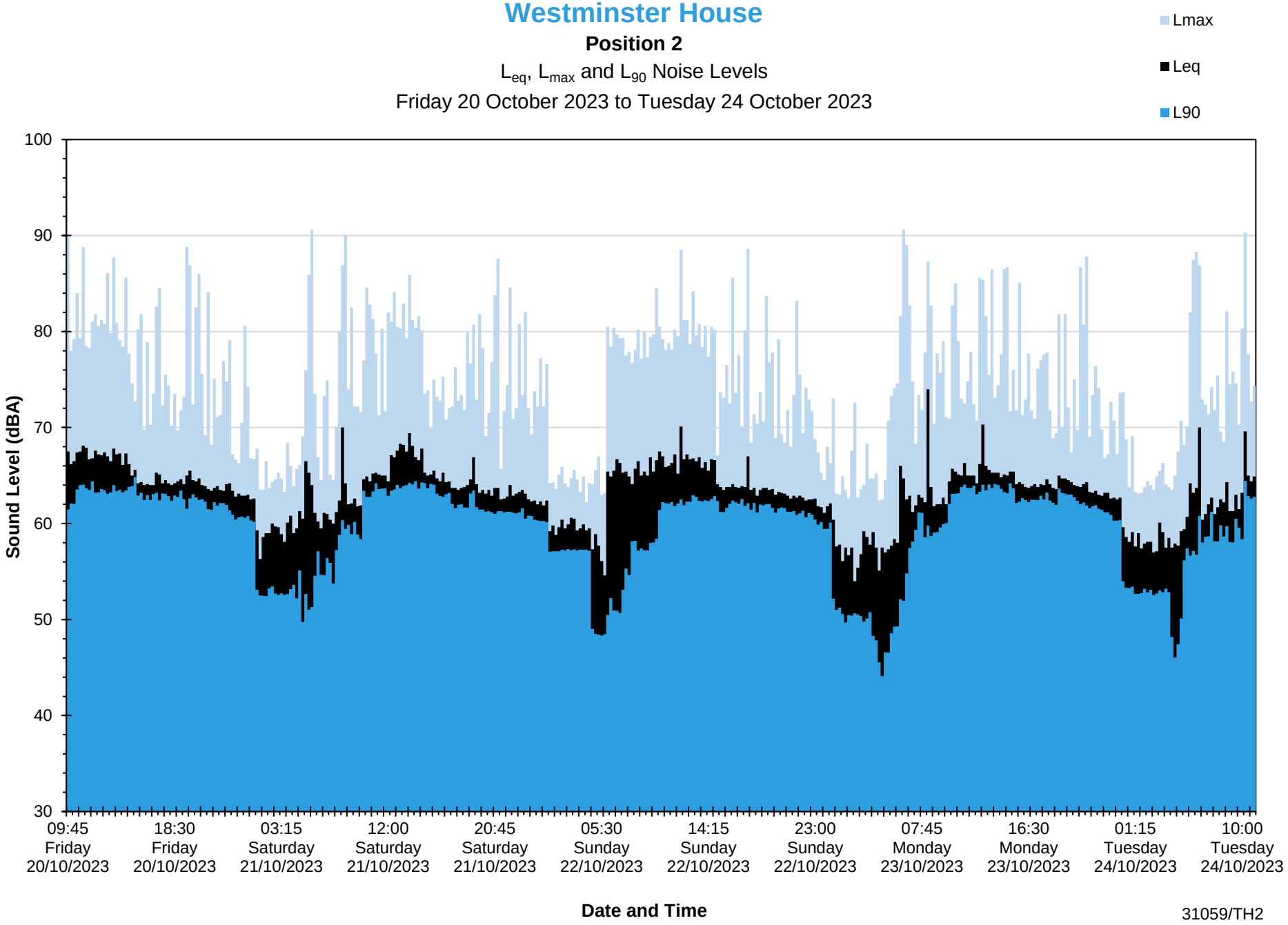

31059/TH1

# Westminster House

**Position 2**

$L_{eq}$, $L_{max}$ and $L_{90}$ Noise Levels

Friday 20 October 2023 to Tuesday 24 October 2023



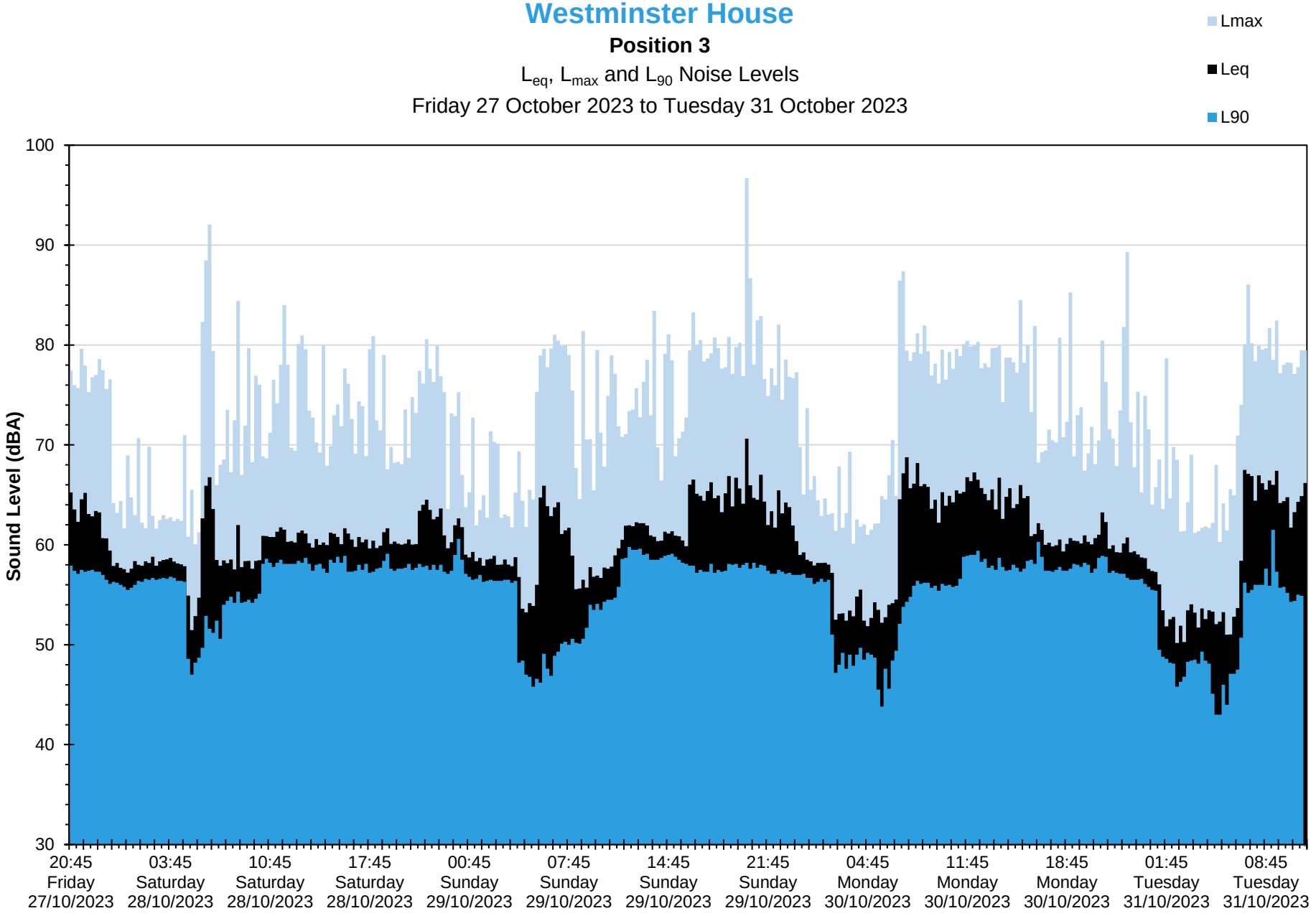

31059/TH2

# Westminster House

**Position 3**

$L_{eq}$, $L_{max}$ and $L_{90}$ Noise Levels

Friday 27 October 2023 to Tuesday 31 October 2023




31059/TH3