# Project Anatomy
# 85 Grays Inn Road
# London

## Environmental Noise Survey and Plant Noise Assessment

28809/PNA1/Rev1

07 July 2021

For:

Clearbell Capital LLP

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Hann Tucker Associates

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## Document Control

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# Environmental Noise Survey and Plant Noise Assessment Report 28809/PNA1/Rev1

## Contents



## Attachments

# 1.0 Introduction

Clearbell Capital LLP on behalf of Grays Property Holdings have acquired 85 Grays Inn Road, and are proposing to undertake a substantial package of refurbishment and reconfiguration works in order to reposition the building to meet the growing needs of the life sciences sector.

Hann Tucker Associates have been appointed to undertake a noise survey to establish the existing environmental noise levels around site, determine the limiting plant noise criteria in accordance with the Local Authority criteria, BREEAM, and to undertake a preliminary review of the proposed building services plant items.

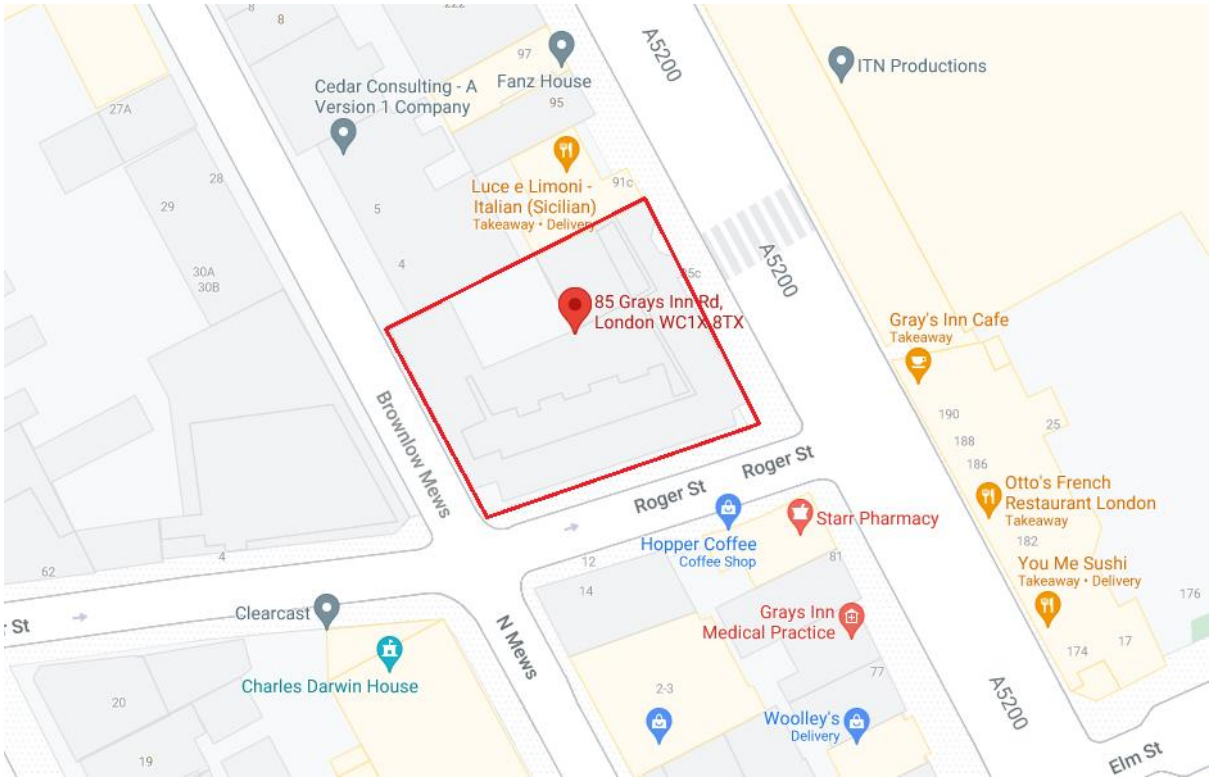
This report presents the methodology and findings of our noise survey, provides a plant noise assessment with regards to achieving the desired criteria and proposes acoustic mitigation measures was appropriate.

# 2.0 Site Description

The building is set within the Bloomsbury conservation area at the junction of Grays Inn Road and Roger Street in the London Borough of Camden.

85 Grays Inn Road is a commercial office building set over 6 storeys from basement, ground and up to Level 4. It currently has extensive building services plant located at roof level with a large louvred perimeter screen.

The approximate site boundary is outlined red on the plan below.

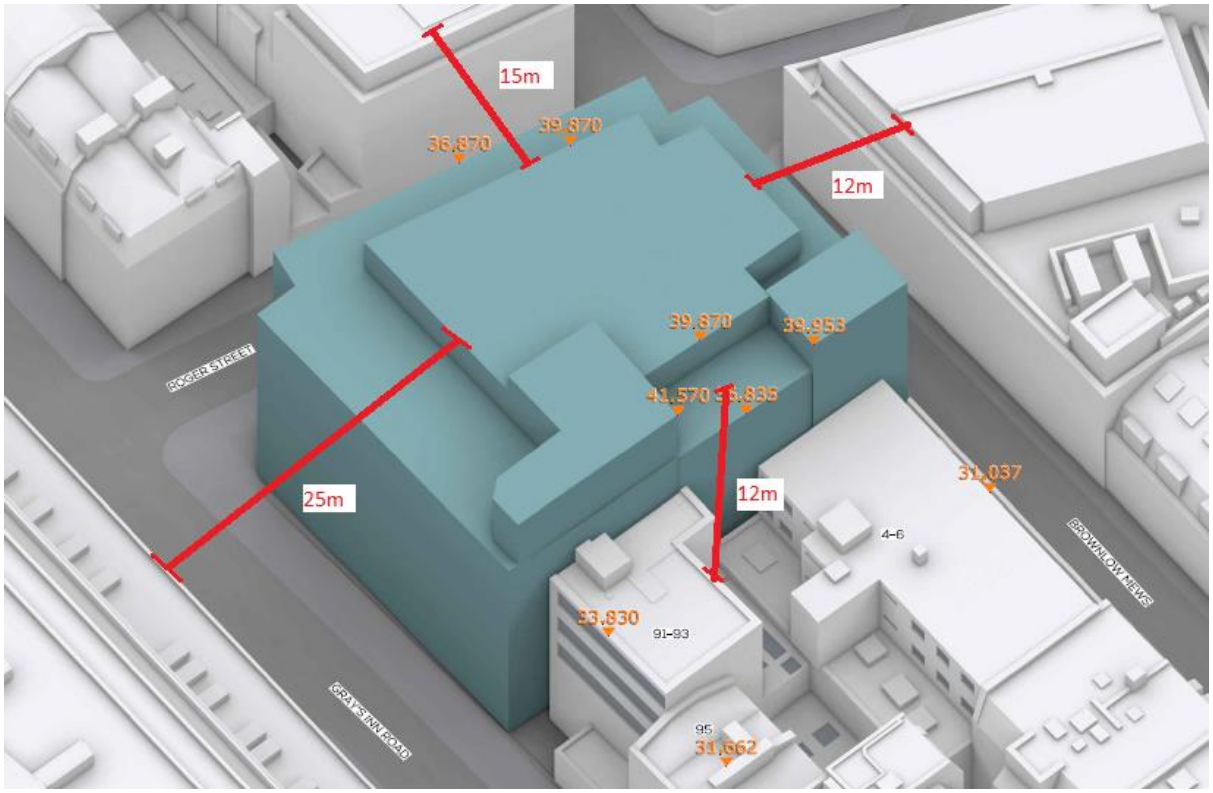



Location Map (maps.google.co.uk)

To the north is predominantly residential property up to 5-storeys in height with commercial/retail use at ground floor. To the west the closest property is a 3-storey office building on the opposite side of Brownlow Mews. To the east is a mixture of residential, commercial, and retail property up to around 6-streys in height, and the ITV Studios is a large office building of 8-storeys in height. To the south is a 4-storey residential building on the opposite side of Roger Street.

The proposed refurbishment works at roof level will make the building services plant on 85 Grays Inn Road, at least two storeys higher than the closest neighbouring residential buildings.

The site plan below provides an approximate illustration of the horizontal distances around site to neighbouring buildings.




Site Plan (Gordon Ingram Associates)

# 3.0 Methodology

## 3.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:00 hours on 26/04/2021 to 13:00 hours on 27/04/2021.

Owing to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, at the beginning and end of the survey period the wind conditions were calm, and the sky was generally clear with no rain. We understand that throughout the survey period the weather conditions were similar to this and as such are deemed suitable for measurement purposes.

Measurements were taken continuously of the A-weighted (dBA) $L_{90}$, $L_{eq}$ and $L_{max}$ sound pressure levels over 15-minute periods.

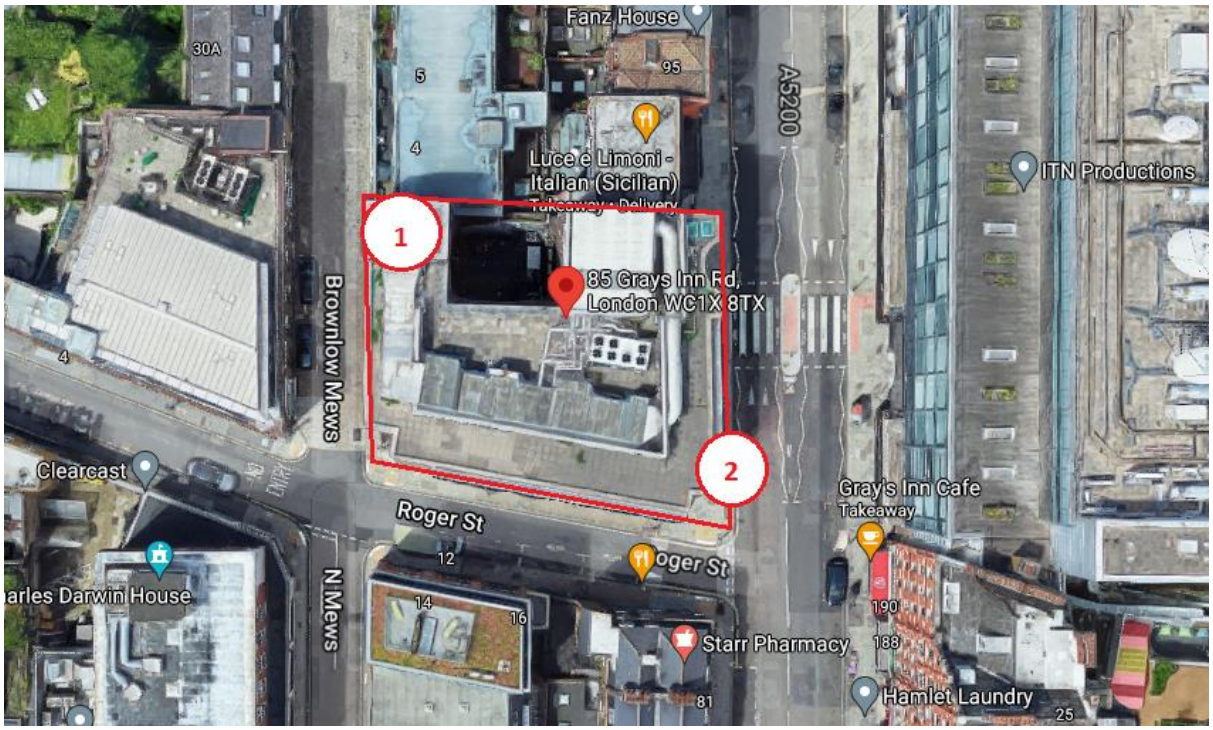
For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

## 3.2 Measurement Positions

The noise level measurements were undertaken at two positions around the development site. The positions are described in the table below:

| Position No. | Description |
|---|---|
| 1 | The sound level meter was located at roof level to towards the north west corner. The microphone was attached to an extension pole which was attached to the roof level perimeter railings overlooking the quietest rear area of site. |
| 2 | The sound level meter was located at 2nd floor level to the east of site. The microphone was attached to an extension pole which protruded out of a 2nd floor window overlooking Grays Inn Road. |

The approximate measurement locations are shown on the plan below.




Plan Showing Unmanned Measurement Positions (maps.google.co.uk)

## 3.3 Instrumentation

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

| Description | Manufacturer | Type | Serial Number | Lab Calibration |
|---|---|---|---|---|
| Type 1 ½" Condenser Microphone | PCB | 377B02 | 135744 | 20/01/2020 |
| Preamp | PCB | PRM902 | 4812 | 21/01/2020 |
| Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3700 | 21/01/2020 |
| Type 1 ½" Condenser Microphone | ACO Pacific | 7052E | 50282 | 19/10/2020 |
| Preamp | Larson Davis | PRM902 | 4158 | 19/10/2020 |
| Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3804 | 19/10/2020 |

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable, and each microphone was fitted with a windshield. Each sound level meter with extension cable was spot calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.1 dB).

# 4.0 Results

The results have been plotted on Time History Graph 28809/TH1 and 28809/TH2 enclosed, presenting the 15-minute A-weighted (dBA) $L_{90}$, $L_{eq}$ and $L_{max}$ levels at each measurement position throughout the duration of the survey.

The following table presents the lowest measured dBA $L_{90}$ background noise levels during the survey:

| Position | Lowest measured $L_{90}$ background noise level (dB re 2.0 x $10^{-5}$ Pa) | |
|---|---|---|
| | Daytime (07:00-23:00) | Night-Time (23:00 – 07:00) |
| 1 | 41 dBA | 40 dBA |
| 2 | 45 dBA | 42 dBA |

The daytime $L_{eq(16\text{-}hour)}$ and night-time $L_{eq(8\text{-}hour)}$ dBA noise levels for each position are presented in the table below.

| Position | Daytime $L_{eq(16\text{-}hour)}$ | Night-Time $L_{eq(8\text{-}hour)}$ |
|---|---|---|
| 1 | 68 dBA | 60 dBA |
| 2 | 54 dBA | 46 dBA |

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the dominant noise source was noted to be road traffic from Gray's Inn Road and the surrounding area.

We note there were some roadwork activities on Grays Inn Road during the survey period and with consideration for the current Covid-19 pandemic, we have compared our measurements to historic data obtained from working on 154 Grays Inn Road in 2019. We note these measurements are within around 2dB of the relevant parameters compared to the site located around 100m further south along Gray Inn Road.

## 5.0 Plant Noise Criteria

The site lies within London Borough of Camden's jurisdiction. We understand they would usually impose a planning condition to control plant noise as follows.

*"Noise levels at a point 1 metre external to sensitive facades shall be at least 10dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A).*

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

On the basis of the above guidance, together with the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest, noise sensitive residential windows with all plant operating simultaneously.

| Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa) | | |
|---|---|---|
| **Position** | **Daytime (07:00 – 23:00 hours)** | **Night-time (23:00 – 07:00 hours)** |
| 1 | 31 dBA | 30 dBA |
| 2 | 35 dBA | 32 dBA |

It should be noted that BREEAM plant noise emission criteria is less stringent than that of Camden Council. Therefore by achieving the above criteria the associated BREEAM credits should also be achieved.

## 6.0 Plant Noise Assessment

KJ Tait Engineers have provided us with preliminary plant selections, manufacturer's noise data and site layout drawings. At this early stage of the project, our report aims to provide suitable guidance for controlling plant noise emissions. As the project evolves plant selection and layouts could change so this report will be updated and reissued when necessary.

The proposed refurbishment works at roof level will make the building services plant on 85 Grays Inn Road roof around two storeys higher than the closest neighbouring residential buildings. Our calculations consider this along with the approximate horizontal measurements shown on the site plan above.

Where our assessment describes an acoustic louvered perimeter screen, it should be noted we have used the acoustic data from a 300mm thick IAC SL300 louver in our calculations. The product data sheet link is provided below, though other manufacturers should be able to provide acoustically similar products if necessary.

https://iacacoustics.global/wp-content/uploads/Model-SL-300-Slimshield-Acoustic-Louvres.pdf

Our report also advises where it might be necessary to provide areas of solid imperforate barrier. The construction of which would usually comprise sheet steel or plywood material with minimum mass per unit area of 10kg/$m^2$. This of course would need to be weatherproof and fireproof etc. The height of acoustic louver or solid screening should initially be shown 500mm taller than the tallest items of plant that require screening. It should also be noted that in the most stringent areas a thicker solid barrier may be required which comprises an acoustically absorbent inner lining. The exact details of the above can be established during more detailed design stage.

Discussions with the design team have suggested the courtyard rear area of the building could

be infilled with a full height wall, such that noise from items of building services plant positioned on various gantry floors above the courtyard can be suitably attenuated. For now we have assumed the acoustic performance of the solid wall is sufficient to attenuate plant noise from within the gantry/courtyard locations to the nearest residential dwellings, and all air moving plant will be ducted to roof level. We do not envisage the acoustic performance of the solid wall to be particularly onerous and this will be determined at a later date.

## 6.1 Primary Heating & Cooling Plant - Roof Level

We understand the following items of plant are proposed at roof level.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Air Source Heat Pumps (ASHP) | Roof | 2 | Daikin | EWYT265B-XRA2 |

The manufacturers data sheets state the following sound pressure levels measured at 1m.

| Plant Description | Sound Pressure Level (dB re $2x10^{-5}$ Pa) at 1 metre at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Daikin ASHP | 65 | 68 | 63 | 63 | 61 | 61 | 54 | 45 | 66 |

These plant items are proposed to be located at the south side of the roof level at least 15m away from neighbouring residential buildings. The building will be 2-storeys taller than the neighbouring buildings, and the roof plant area appears to be set back far enough such that the edge of the building would provide line of sight screening of around -5dB.

The distance loss, the acoustic louvered perimeter screen and the building edge screening has been considered in our calculations. The table below presents the predicted noise level due to the ASHP at the nearest residential windows.

| Description | Sound Pressure Level (dB) at Octave Band Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Daikin EWYT265B-XRA2 | 65 | 68 | 63 | 63 | 61 | 61 | 54 | 45 | 67 |
| 2x Units | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 | +3 |
| Distance loss 15m | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 |
| Line of sight building edge screening | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 |
| IAC SL300 louver | -6 | -7 | -10 | -12 | -18 | -18 | -14 | -13 | -14 |
| At residential | 33 | 35 | 27 | 25 | 17 | 17 | 14 | 6 | 27 |

The calculations above suggest a noise level of approximately 27dBA would be incident at the nearest residential windows. This value complies with the night-time criteria of 30dBA, however, the cumulative effect of all items of plant will need to be considered and is discussed later in this report.

## 6.2 Standby Generator - Roof Level

We understand the following generator is proposed at roof level.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Standby Generator with Acoustic Enclosure Package | Roof | 1 | FG Wilson | 275-2 |

The generator is proposed to be located in the tenant area. The manufacturers data sheet states the following sound pressure levels (dBA) measured at various distances and % load.

| FG Wilson 275-2 | | | | | | |
|---|---|---|---|---|---|---|
| Measurement Distance | 15m | 15m | 7m | 7m | 1m | 1m |
| Load | 75% | 100% | 75% | 100% | 75% | 100% |
| dBA | 61 | 62 | 67 | 68 | 75 | 76 |

The generator is 62dBA if measured 15m away at 100% load. The loss from an acoustic louvre would be around -14dBA, and the edge of building screening loss could be around -5dBA. As a result the predicted noise level would be 43dBA at 15m. This exceeds the criteria by at least 13dBA.

To suitably reduce the noise by an additional 13dBA the design will need to consider taller solid barrier screening around it, possibly with acoustically absorbent inner lining, and maybe need to move it further away from the nearest residential building. For the purposes of planning this is not particularly onerous and can be dealt with during detailed design stage.

## 6.3 Core Air Handling Unit - Roof Level

We understand the following AHU is proposed at roof level.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Air Handling Unit (AHU) | Roof | 1 | Swegon Gold | FRX050 |

The manufacturers data sheets state the following sound levels.

| Plant Description | Sound Power Level (dB) at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| To supply air duct | 72 | 63 | 54 | 56 | 53 | 56 | 56 | 57 | 63 |
| To outdoor air duct | 69 | 64 | 55 | 45 | 37 | 39 | 37 | 41 | 52 |
| To extract air duct | 73 | 64 | 57 | 60 | 57 | 61 | 61 | 62 | 67 |
| To exhaust air duct | 68 | 60 | 53 | 57 | 42 | 41 | 38 | 41 | 56 |
| To surroundings | 68 | 60 | 53 | 57 | 42 | 41 | 38 | 41 | 56 |

This AHU is proposed to be located in a central position towards the north roof level at least 15m away from neighbouring residential buildings. The plant will be 2-storeys higher than the neighbouring buildings and a solid barrier is possible along the north perimeter boundary of this area.

The breakout sound power level shown above ('To surroundings') has been converted to sound pressure level at 1m. The additional distance loss and barrier screening has been considered in our calculations. The table below presents the predicted noise level due to the Core-AHU breakout at the nearest residential windows.

| Description | Sound Pressure Level (dB) at Octave Band Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Breakout to 1m | 50 | 42 | 35 | 39 | 24 | 23 | 20 | 23 | 38 |
| Barrier loss at least | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 |
| Distance loss to 15m | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 |
| At neighbours | 16 | 8 | 1 | 5 | 0 | 0 | 0 | 0 | 4 |

The calculations above suggest an AHU breakout noise level of approximately 4dBA would be incident at the nearest residential windows. This value comfortably complies with the night-time criteria of 30dBA, however, we must also consider noise from the atmospheric fresh air intake and exhaust discharge duct terminations.

Our calculations have initially considered these air paths are located outside of the effective zone of the perimeter barrier, i.e. they may need to penetrate the barrier to the north for air flow reasons. As such we have calculated preliminary requirements for atmospheric induct attenuators as follows.

| Description | Minimum Insertion loss (dB) at Octave Band Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| Exhaust discharge | 3 | 7 | 14 | 21 | 27 | 26 | 17 | 12 |
| Fresh intake | 2 | 5 | 11 | 17 | 20 | 19 | 12 | 10 |

We would suggest the above attenuators are not particularly onerous and once exact positioning is determined might be able to be reduced or omitted, especially if they can be located inside the effective zone of the perimeter solid barrier.

## 6.4 Fume Extract Fans - Roof Level

We understand the following extract fans are proposed at roof level.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Fume Extract Fans | Roof | 6 | Central Fans | CMVeco 160/160 |

The manufacturers data sheet states the following sound data.

| Plant Description | Sound Level (dB) at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| Induct sound power | 63 | 66 | 73 | 76 | 72 | 68 | 64 | 53 | 77 |
| Breakout SPL at 1m | Frequency data unknown | | | | | | | | 61 |

These plant items are currently proposed to be a horizontal distance of approximately 15m away from neighbouring residential buildings.

The plant area will be 2-storeys higher than the neighbouring buildings and we understand a solid barrier can be located adjacent to the fume fans, such that significant acoustic attenuation can be provided.

The distance loss, the solid barrier perimeter screen and the building edge effect has been considered in our calculations. The table below presents the predicted noise level due to the breakout noise from the Fume Fans at the nearest residential windows.

| Description | Sound Pressure Level (dB) at Octave Band Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Breakout SPL at 1m | Frequency data unknown | | | | | | | | 61 |
| 6x Units | " | | | | | | | | +8 |
| Distance loss 15m | " | | | | | | | | -24 |
| Barrier and edge loss at least | " | | | | | | | | -20 |
| At neighbours | " | | | | | | | | 25 |

The calculations above suggest a noise level of approximately 25dBA would be incident at the nearest residential windows due to the breakout noise from the fume fans. This value comfortably complies with the night-time criteria of 30dBA, however, the cumulative effect of all items of plant will need to be considered and is discussed later in this report.

In addition, we must also consider noise from the atmospheric discharge flue terminations which are proposed to be around 8m higher than normal roof level. We estimate the vertical discharge flues would be a total distance of around 25m away from any residential windows.

Our preliminary calculations suggest the noise from the fume flues would significantly exceed the criteria by circa 20dBA. Therefore, induct attenuators would be required with the following minimum insertion losses.

| Description | Minimum Insertion loss (dB) at Octave Band Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| Fume flue discharge | 3 | 7 | 14 | 21 | 27 | 26 | 17 | 12 |

The above attenuator performance should easily be achieved with 1200mm long normal attenuators for air handling units. For fume extract fans we understand the construction and therefore acoustic performance is quite different to 'normal' attenuators, and as such they could be considerably larger.

An additional benefit that might need to be considered is splitting the location of the 6 flues. If 3 flues could be located far enough away from the other flues a reduction of 3dB attenuation could probably be considered.

Initially it might be most productive for KJ Tait to see if the above attenuation can be achieved and integrated into the system. Following this we would be happy to consider alternative mitigation measures.

## 6.5 Tenant Roof Plant Area

Currently an area has been designated at roof level to house potential future tenant building services plant items and the generator described above.

The tenant plant is unknown at this stage and is anticipated to include external condenser units for cooling purposes. Whilst condenser units located within designated plant areas with acoustic louvered screening is usually suitable, the cumulative contribution of all landlord and tenant plant noise will need to be considered together and be shown to comply with Local Authority plant noise emission criteria.

As such it is probably useful for KJ Tait to suggest a selection of potential 'worst case' items such that we can determine if the acoustic louvered perimeter screen area is likely sufficient, or if there would be a need to provide a solid barrier which of course may have implications for the required airflow.

It might also be productive if KJ Tait could show areas along the perimeter barrier that they believe could be solid and not detrimental to airflow to nearby plant items. Note, acoustically a solid barrier has greater attenuation than louvered screen etc. This might help us to proposed areas to relocate certain plant items.

## 6.6 Lab AHUs at 1st and 4th Floor Gantry

We understand the following AHUs are proposed at 1st and 4th floor of the infill/gantry area.

| Plant Description | Location | Qty | Plant Make | Model Number |
|---|---|---|---|---|
| Air Handling Unit (AHU) | 1st and 4th floor | 2 | Swegon Gold | FRX060 |

The manufacturers data sheet states the following sound levels.

| Plant Description | Sound Power Level (dB) at Octave Band Centre Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| To supply air duct | 80 | 75 | 75 | 76 | 73 | 71 | 69 | 69 | 79 |
| To outdoor air duct | 77 | 76 | 76 | 65 | 57 | 54 | 50 | 53 | 69 |
| To extract air duct | 80 | 79 | 80 | 68 | 60 | 58 | 57 | 60 | 73 |
| To exhaust air duct | 85 | 80 | 82 | 84 | 81 | 80 | 78 | 78 | 87 |
| To surroundings | 76 | 68 | 61 | 65 | 50 | 49 | 46 | 49 | 64 |

The two AHUs are proposed to be located on gantry platforms above the courtyard area. This gantry/courtyard area is proposed to be enclosed/infilled by a full height wall. The horizontal distance from an AHU to the nearest residential windows is approximately 10m.

The breakout sound power level shown above ('To surroundings') has been converted to sound pressure level at 1m. The additional distance loss and barrier screening is considered in our calculations. The table below presents the predicted noise level due to the Lab AHUs breakout noise at the nearest residential windows.

| Description | Sound Pressure Level (dB) at Octave Band Frequency (Hz) | | | | | | | | dBA |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Breakout at 1m | 58 | 50 | 43 | 47 | 32 | 31 | 28 | 31 | 46 |
| 2x Units + reverberant space correction | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Distance loss to 10m | -20 | -20 | -20 | -20 | -20 | -20 | -20 | -20 | -20 |
| Barrier loss | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 |
| At residential | 34 | 26 | 19 | 23 | 8 | 7 | 4 | 7 | 22 |

The calculations above suggest an AHU breakout noise level of approximately 22dBA would be incident at the nearest residential windows. This value comfortably complies with the night-time criteria of 30dBA, however, we must also consider noise from the atmospheric fresh air intake and exhaust discharge duct terminations discussed later in this report.

In addition to the breakout noise we must also consider the noise from the atmospheric terminations located at roof level.

Our calculations have initially considered these air paths are located outside of any effective zone of an acoustic barrier. As such we have calculated preliminary requirements for atmospheric induct attenuators as follows.

| Description | Minimum Insertion loss (dB) at Octave Band Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| Exhaust discharge | 8 | 16 | 28 | 43 | 47 | 47 | 39 | 22 |
| Fresh intake | 6 | 13 | 23 | 37 | 43 | 44 | 35 | 20 |

The above attenuators can be reviewed once exact positioning is determined. The performance of which might be able to be greatly reduced, especially if they can be located inside the effective zone of a perimeter barrier or behind acoustic louvered space.

### 6.7 Cumulative Plant Noise

Our assessment and calculations have included for the cumulative effects of all plant operating at the same time in the approximate locations shown on the preliminary KJ Tait and BMJ drawings.

Once the design team have had chance to consider the implications of the acoustic mitigation measures proposed, we would be happy to review in more detail proposals for alternative locations and configurations.

As the design drawings evolve we will be able to determine more accurate distances and screening effects and thus update this report.

In most instances moving items of plant further away from residential property will increase the distance loss and to some extent increase the acoustic attenuation available from barrier screening.

## 7.0 Conclusions

A daytime and night-time environmental noise survey has been undertaken in order to determine the plant noise emission criteria for planning purposes.

Based on the results of the survey plant noise emission criteria have been presented with reference to Local Authority requirements. We have also reviewed the manufacturers plant noise data to determine the likely plant noise emissions at the nearest residential noise sensitive windows.

The preliminary assessment indicates that various items of plant would not achieve the requirements of the Local Authority without suitable acoustic mitigation measures.

We have therefore proposed various acoustic mitigation measures, including acoustic louvered perimeter screening, solid barriers, infill walls and induct attenuators, which are to be included in the design.

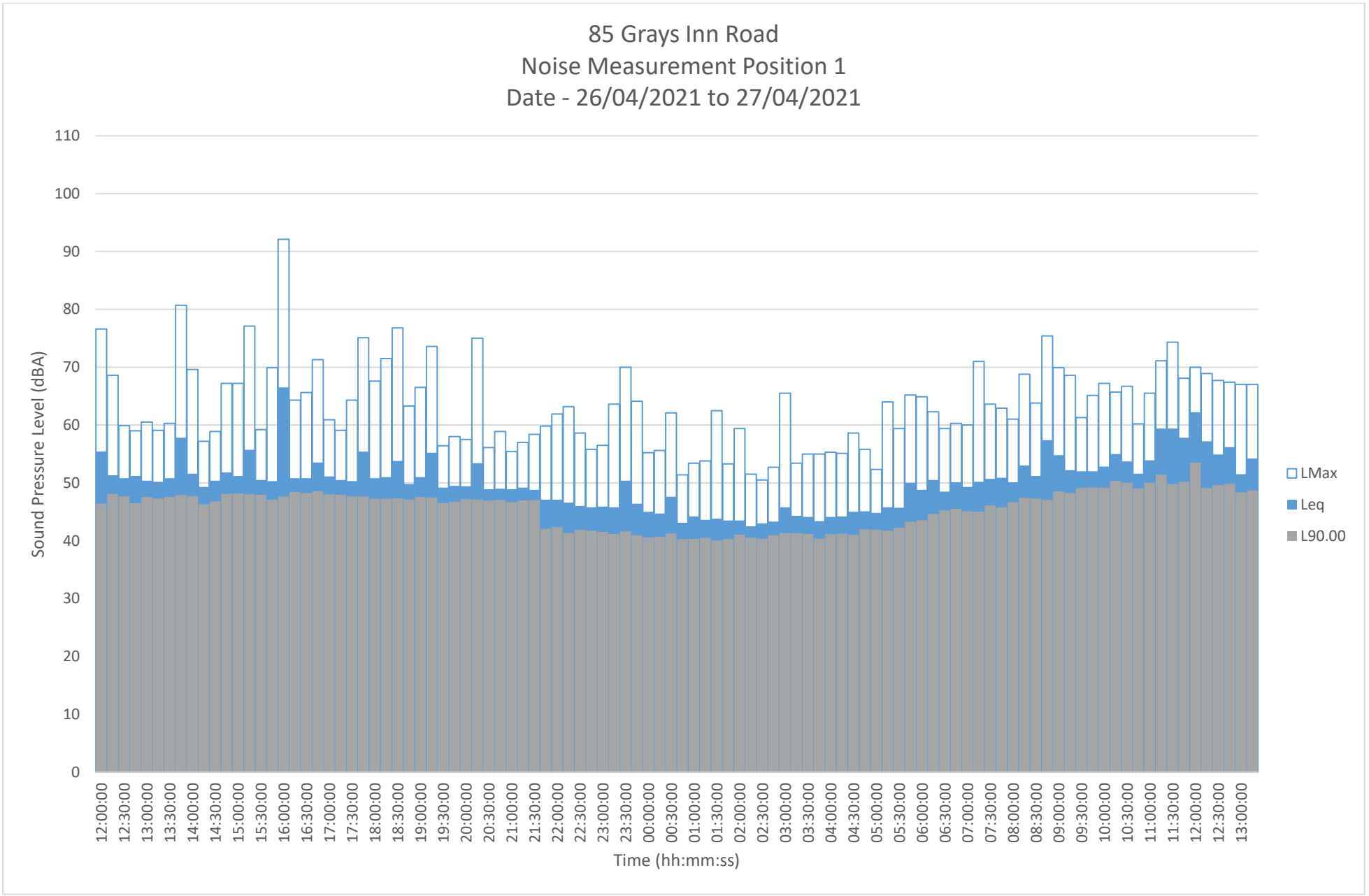
We believe with the proposed mitigation measures the plant noise would be compliant with Camden Council requirements. It should be noted that BREEAM plant noise emission criteria are less stringent than that of Camden Council. Therefore, by achieving the council criteria the associated BREEAM credits should also be achieved.

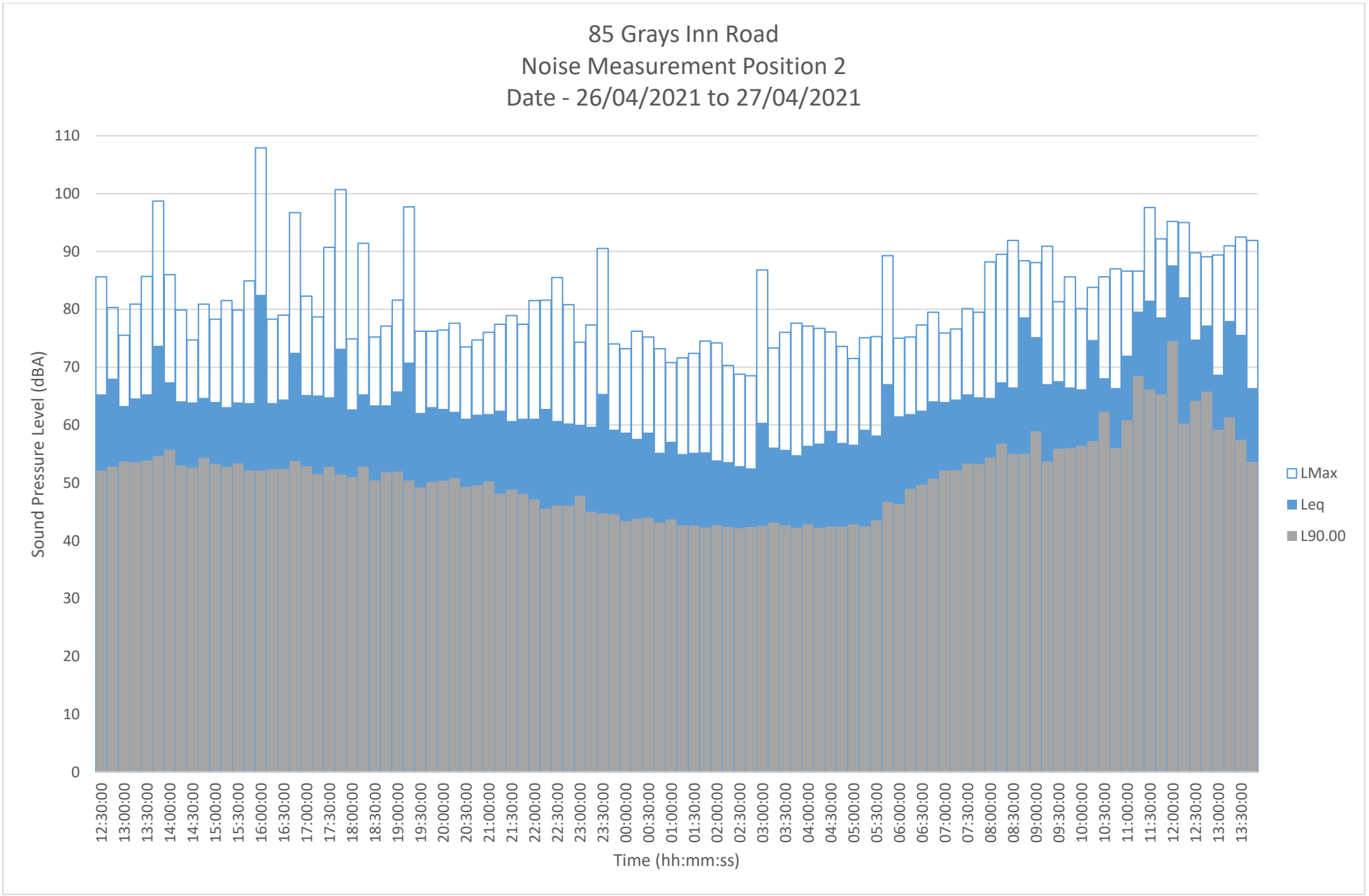
As the project proposals and layout drawings evolve we would be happy to consider any changes and update this report.

# Appendix A

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). |


85 Grays Inn Road
Noise Measurement Position 1
Date - 26/04/2021 to 27/04/2021
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
10
0
12:00:00
12:30:00
13:00:00
13:30:00
14:00:00
14:30:00
15:00:00
15:30:00
16:00:00
16:30:00
17:00:00
17:30:00
18:00:00
18:30:00
19:00:00
19:30:00
20:00:00
20:30:00
21:00:00
21:30:00
22:00:00
22:30:00
23:00:00
23:30:00
00:00:00
00:30:00
01:00:00
01:30:00
02:00:00
02:30:00
03:00:00
03:30:00
04:00:00
04:30:00
05:00:00
05:30:00
06:00:00
06:30:00
07:00:00
07:30:00
08:00:00
08:30:00
09:00:00
09:30:00
10:00:00
10:30:00
11:00:00
11:30:00
12:00:00
12:30:00
13:00:00
Time (hh:mm:ss)
LMax
Leq
L90.00


85 Grays Inn Road
Noise Measurement Position 2
Date - 26/04/2021 to 27/04/2021
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
10
0
12:30:00
13:00:00
13:30:00
14:00:00
14:30:00
15:00:00
15:30:00
16:00:00
16:30:00
17:00:00
17:30:00
18:00:00
18:30:00
19:00:00
19:30:00
20:00:00
20:30:00
21:00:00
21:30:00
22:00:00
22:30:00
23:00:00
23:30:00
00:00:00
00:30:00
01:00:00
01:30:00
02:00:00
02:30:00
03:00:00
03:30:00
04:00:00
04:30:00
05:00:00
05:30:00
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07:30:00
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08:30:00
09:00:00
09:30:00
10:00:00
10:30:00
11:00:00
11:30:00
12:00:00
12:30:00
13:00:00
13:30:00
Time (hh:mm:ss)
LMax
Leq
L90.00