BELSIZE LANE

34 BELSIZE LANE, BELSIZE PARK

Environmental Noise Survey Report & Plant Noise Impact Assessment

26 March 2024

Client: 34 Belsize Lane Limited

34 Belsize Lane
Belsize Park
NW3 5AS

QA24091/PNIA

Document Control

Document Information

Information	Description
Reference	QA24091/PNIA

Document History

Revision	Issue Date	Changes
0	26 March 2024	-

Document Approvals

Role	Name	Signature	Date
Preparation	**Sarah Banes** Assistant Acoustic Consultant BA, AMIOA		26/03/2024
Approval	**Andrew Fermer** **Director** BSc(Hons) MIOA		26/03/2024

For Information

Please Note
Quantum Acoustics Ltd have prepared this report with generally accepted acoustic consultancy principles, using all reasonable skill, care and diligence. This is as per the terms agreed between Quantum Acoustics Ltd and our Client. Information referred to herein which may have been provided by third parties should not be assumed to have been checked and verified by Quantum Acoustics Ltd, unless specifically confirmed to the contrary. Both confidential and commercially sensitive information is contained within this document, and as such it should not be disclosed to third parties. Any third party choosing to rely on this document does so at their own risk.

Contents

1.0 INTRODUCTION

Quantum Acoustics Ltd have been appointed to undertake an environmental background noise survey to establish appropriate plant noise emission criteria and subsequently assess the acceptability of atmospheric noise emissions from the proposed plant.

The Grade 2 listed property at 34 Belsize Lane, Belsize Park, NW3 5AS is under consideration for the addition of plant units. This will involve installing new items of cooling plant externally.

This report presents our survey methodology and assessment findings.

A glossary of terms is in Appendix A.

2.0 SITE DESCRIPTION

The proposed site is located in Hamstead within the jurisdiction of London Borough Council of Camden.

Towards the north, the site is adjacent to residential dwellings, and a primary school with an outdoor sport ground. Towards the east there are primarily residential units which bounds Ornan Road leading to hotels, shops and a hospital. Towards the south and west the site is surrounded by residential dwellings.

The nearest residential receptors are located within adjacent residential buildings to the south.

The location of site is shown below, outlined in red.

Figure 1: Site Plan (Google Imagery 2024, The GeoInformation Group)

3.0 ENVIRONMENTAL NOISE SURVEY

An automated environmental noise survey was undertaken from approximately 15:15 hours on 19th March 2024 to approximately 15:15 hours on 20th March 2024.

Weather conditions were mainly dry and with light winds. The conditions were therefore deemed generally suitable for the measurement of environmental noise.

3.1 Measurement Procedure

Noise monitoring equipment was located at the following locations:

Position	Description
Position A	This meter was positioned at a height of approximately 1.5m above ground level within the garden under free field conditions.
Position B	This meter was positioned at a height of approximately 2m above ground level in free field conditions. This location is representative of the southern receptors at 1 and 2 Belsize Lane.

These locations are shown on the following plan.

Figure 2. Measurement Location Plan (Google Imagery 2024, The GeoInformation Group)

3.2 Equipment

Details of the equipment used for the survey are summarized in the following table:

Description	Manufacturer	Type	Serial Number
Type 1 Sound Level Meter	Svantek	971A	127617
Type 1 Sound Level Meter	Convergence	NSRT M4K	CttUJl0Q0VcfCJtQ62r5vD

Calibration certificates for the equipment, traceable to national standards, used in this survey are available upon request.

Calibration checks were carried out prior to and on completion of the survey, with no significant calibration drift observed.

4.0 SURVEY FINDINGS

The following section uses the following acoustic terms:

A-weighted noise levels are frequency-weighted in a way that approximates the frequency response of the human ear and allows sound levels to be expressed as a single figure value. The A-weighted level is therefore a measure of the subjective loudness, rather than physical amplitude.

L_{90} is the noise levels that is exceeded for 90% of the measurement period. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is often used as a basis for setting noise emission criteria.

L_{eq} is the level of a notional continuous sound that would deliver the same sound energy as the actual fluctuating sound over the measurement period. This may be thought of as the "average" level during the measurement period.

L_{max} is the maximum noise level during the measurement period.

4.1 Noise Level Results

The noise survey results are presented in the graph, showing the A-weighted L_{90}, L_{eq} and L_{max} noise levels measured during each consecutive 15-minute period of the survey. A time history graph for each location is presented Appendix B.
Due to short term local disturbance measurements taken at Position B has been omitted from the survey. These disturbances have affected the nighttime $L_{Aeq\ (8\ hour)}$ results.

The measured modal background (L_{A90}) noise levels are presented in the table below:

Position	Modal Background L_{A90} dB re2x10-5Pa	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position A	44	32
Position B	42	33

The measured daytime $L_{Aeq\ (16\ hour)}$ and night-time $L_{Aeq\ (8\ hour)}$ are presented in the table below:

L_{Aeq} Noise Levels		
Position	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position A	46	44

4.2 Noise Climate

During the periods that we were present at site, the predominant noise sources were attributed to light road traffic noise, school playground from the multiuse games space and pedestrians passing by. During the survey it was noted some domestic construction was being undertaken towards the south of the development.

5.0 RELEVANT PLANNING POLICIES AND NOISE ASSESSMENT GUIDANCE

5.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the primary statement of noise policy for England and applies to all forms of noise other than occupational noise. The NPSE sets 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."*
>
> *"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 introduces guidance to assist in defining the adverse impacts:

> **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. These categories are further discussed in the Planning Practice Guidance section below. The NPSE acknowledges that it is not possible to have a single objective noise level-based measure that is mandatory and applicable to all sources of noise in all situations.

5.2 Planning Practice Guidance

The government's Planning Practice Guidance is a web-based resource and provide advice on various issues, including noise (https://www.gov.uk/guidance/noise--2). The advice (March 2014, latest update July 2019) states in the context of considering when noise is relevant to planning, "noise needs to be considered when new development may create additional noise or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)."

The Planning Practice Guidance pages also include more explanation of the effect level categories noted above, providing an explanatory Noise Exposure Hierarchy Table, which explores how actions such as a requirement for noise mitigation, or prevention of a development, might be assessed with respect to whether noise levels are considered above the category thresholds.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
Present 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			
Present 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			
Present 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
Present 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,	Unacceptable Adverse Effect	Prevent

	significant, medically definable hard, e.g. auditory and non-auditory.		

5.3 National Planning Policy Framework

The following paragraph is from the National Planning Policy Framework (NPPF). The NPPF was revised in December 2023.

> *'191. 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'*

5.4 Local Authority Requirements

The site lies within the jurisdiction of London Borough Council of Camden.

London borough council of Camden local plan adopted 2017 states the following under Appendix 3.

"Industrial and Commercial Noise Sources A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required."

5.5 BS 4142:2014

BS 4142:2014+A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" addresses the likelihood of adverse impact from noise generated by plant equipment. A noise rating is determined and compared with the existing local background sound level, and several cumulative acoustic feature corrections to the noise rating are available to apply where appropriate. For example if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic.

BS 4142:2014 seeks to determine a "representative" background sound level, stating that "…the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods".
The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level, while considering the following points:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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.

6.0 PLANT NOISE EMISSION CRITERIA

As shown in Section 4.1 the modal background noise level measured on site closest to the receptor is 32-33dB(A) at night. The guidance for a 'Rating Level' of 10 dB below background as provided by the local authority would require a specific noise level of 22-23dB(A) at receptor which is quite onerous for plant within this context.

In order to achieve the local authority's requirement if -10dB background the required attenuation is not always feasible. We therefore draw on the following guidance.

Our approach to determining a "typical" background sound level for use in our assessment aligns with the guidance of BS 4142, includes the principles relating to the need for a representative background level. Paragraph 8.1.4 of BS 8233: 2014 +A1: 2019 states:

"The monitoring duration should reflect the range of background sound levels for the period being assessed. In practice, there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed.
Note 1: To obtain a representative background sound level a series of either sequential or disaggregated measurements should be carried out for the period(s) of interest, possibly on more than one occasion. A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value."

Section 11 of BS 4142 follows on to state:

"The significance of sound of an industrial and/or commercial nature depended upon both the margin by which the rating level of the specific sound source exceeds the background level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context".

The World Health Organisation nighttime noise guidance stipulates:

"Below the level of 30 dB Lnight,outside, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40 dB Lnight,outside are harmful to health. However, adverse health effects are observed at the level above 40 dB Lnight,outside , such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives. Therefore, 40 dB Lnight,outside is equivalent to the lowest observed adverse effect level (LOAEL) for night noise. Above 55 dB the cardiovascular effects become the major public health concern, which are likely to be less dependent on the nature of the noise."

To comply the aforementioned guidance, and on the basis of the noise survey results, we propose the following environmental plant noise emission criteria to not exceed the most frequent background noise levels occurring achieved at 1 metre from the nearest noise sensitive residential window:

Plant Noise Emission Limits L_{eq} dB re2x10-5Pa		
Receptor	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
1 &2 Belsize Lane	42	33

The above criteria apply to cumulative noise level of all plant operating simultaneously, under normal operating conditions. The proposed limitation ensures *"no observed adverse effect"* at all receptors and all levels are below the WHO guidance for potential *lowest observed adverse effect level* by -7dB.

7.0 PLANT NOISE IMPACT ASSESSMENT

7.1 Nearest Noise Sensitive Receptor

The nearest potentially affected noise-sensitive receptor to the proposed plant is at window at properties 1 and 2 Belsize Lane, Belzise Park, NW3 5AS. The first-floor bedrooms are approximately 18m from the plant.

Figure 1 Nearest Noise Sensitive Receptor (Google Imagery 2022, The GeoInformation Group)

7.2 Proposed Plant Selections

The sound power levels for the proposed plant selections shown below, together with the distances to the nearest noise sensitive receptors:

Plant	Distance to nearest noise sensitive receptor (m)	Sound Power Level (Lp) (dBA)	Quantity
EDLA16	11	62	2
RXYSCQ4	11	69	1

7.3 Attenuation

To satisfy the proposed criterion at the identified receptors, the acoustic attenuation required should be achieved as the proposed units benefit from a screening loss from the building.

We therefore would suggest no additional attenuation is required as summarised below.

Plant	Attenuation requirement dB (Octave Band Frequency Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
EDLA16	No Attenuation Required							
RXYSCQ4	No Attenuation Required							

7.4 Noise to Nearest Residential Window

The following table summarises our assessment of plant noise to the nearest noise sensitive residential window:

Item	Sound Pressure at 1m
	dBA
EDLA16	52
RXYSCQ4	51
Total	56
Propagation and barrier losses attenuation	-27
Total	29 dBA

With refence to Section 6.0 above, the predicted plant noise level at the nearest noise sensitive residential property is 29dBA. We therefore believe this should be considered acceptable.

8.0 CONCLUSIONS

Quantum Acoustics have undertaken a fully automated environmental noise survey to establish the existing noise levels within the property 34 Belsize Lane, Belzise Park, NW3 5AS.

Environmental plant noise emission criteria have been proposed based on the noise survey results and in accordance with the relevant guidance including the Local Authority's requirements.

Environmental noise emissions from the proposed plant have been assessed to the worst affected nearby noise sensitive receptors primarily at 1 and 2 Belsize Lane, Belzise Park, NW3 5AS.

Our calculations indicate that environmental plant noise emissions should comply with the suggested criterion without additional attenuation.

With regard to atmospheric plant noise emissions, we therefore see no reason why planning permission cannot be granted.

quantum
acoustics

APPENDIX A

Glossary of Acoustic Terminology

General

Vibrations in the air, water or other media cause pressure variations in the surrounding air. These pressure changes are perceived by the human ear as "sound".

Measurement Units

Given the huge range of pressure fluctuations detectable or tolerated by the human ear, sound is quantified on a logarithmic scale with values expressed in "decibels". Values are based on a reference sound pressure level of 20μPa, thus a sound pressure of 20μPa would equate to 0dB and a pressure of 200Pa would equate to 140dB.

Frequency

The number of cycles or vibrations per second, measured in Hertz (Hz). Higher frequencies are perceived as higher-pitched. Noise audible to the human ear typically covers a frequency range of 20Hz to 20,000Hz.

A-Weighting

The human ear is typically more sensitive to sound in towards the middle of the audible range and less sensitive to lower and higher and frequencies. In order to take account of these differences, a frequency weighting is often applied to the sound measurement which adjusts the measurement value to reflect the way the human ear will perceive the sound. The use of "A-weighting" therefore gives a measure of subjective "loudness". A-weighted sound levels are expressed in dB(A).

Comparison of Sound Levels

The subjective perception of sound is illustrated by reference to various relatable noise sources below:

Sound Pressure Level, dB(A)	Typical Noise Source
160	Space rocket taking off
140	Military jet taking off (at 30m)
100	Dancefloor of nightclub
90	Heavy goods vehicle driving past
80	Busy urban road
70	Vacuum cleaner
60	Busy office
55	Normal speech at 1m
40	Whispered conversation at 2m
30	Bedroom at night (BS 8233: 2014)
20	Remote country location
0	Threshold of hearing

Variation of Sound with Time

The magnitude of most sounds varies with time. Environmental noise is normally measured with a "fast" time weighting which best replicates the way sound fluctuations are perceived.

Acoustic Terminology

A number of noise metrics are routinely used to assist in characterising a noise environment. These include:

- L_{90} is the noise levels that is exceeded for 90% of the measurement period. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is often used as a basis for setting noise emission criteria. The A-weighted value over time period (T) is written as LA90,T.
- Leq is the level of a notional continuous sound that would deliver the same sound energy as the actual fluctuating sound over the measurement period. This may be thought of as the "average" level during the measurement period. The A-weighted value over time period (T) is written as LA90,T.
- L_{max} is the maximum noise level during the measurement period. For environmental noise purposes, L_{max} values are normally measured with a "fast" time response. The A-weighted value is then reported as $L_{Amax,fast}$ (or $L_{Amax,F}$)

Addition of Sound Levels

The use of a logarithmic scale does not allow the simple arithmetic addition of sound levels – they need to be added logarithmically. This means that two noise sources, each generating a sound level of 50dB(A) will generate a combined sound level of 53dB(A) – not 100dB(A),

Subjective Perception of Sound Level Changes

Subjectively, the human ear:

- Cannot perceive a sound level change of less than 3dB(A);
- Will perceive a sound level change of 4-5dB(A) as "noticeable";
- Will perceive a sound level change of 10dB(A) as a doubling (or halving) of loudness

Sound Insulation

The sound insulation performance of building constructions can be described using a number of metrics:

- R_w is the "weighted sound reduction index" and is an intrinsic measure of the sound reduction capabilities of a construction measured in an acoustics laboratory.
- D_w is the "weighted sound level difference". This is a measured of the in-situ performance of a construction, as installed in a building.
- $D_{nT,w} + C_{tr}$ is a weighted sound level difference to which further corrections (standardisation and the addition of "$+C_{tr}$" correction). This descriptor forms the basis of the airborne sound insulation performance requirements of Approved Document E of the Building Regulations 2010 (as amended).
- $L'_{nT,w}$ is the standardised impact sound pressure level and forms the basis of the impact sound insulation performance requirements of Approved Document E of the Building Regulations 2010 (as amended).

Reverberation Time

This is the time taken for sound in a room to decay by 60dB. Reverberation times are lower in smaller rooms with lots of soft furnishings, and longer in large rooms with hard finishes.

Noise Rating Level

As an alternative to expressing a sound level in dB(A), noise from some sources (e.g. building services system) are quantified in terms of a Noise Rating (NR) level. This is achieved by comparing the frequency content of the sound against a series or curves defined in Annex A of BS 8233: 2014.

quantum
acoustics

APPENDIX B

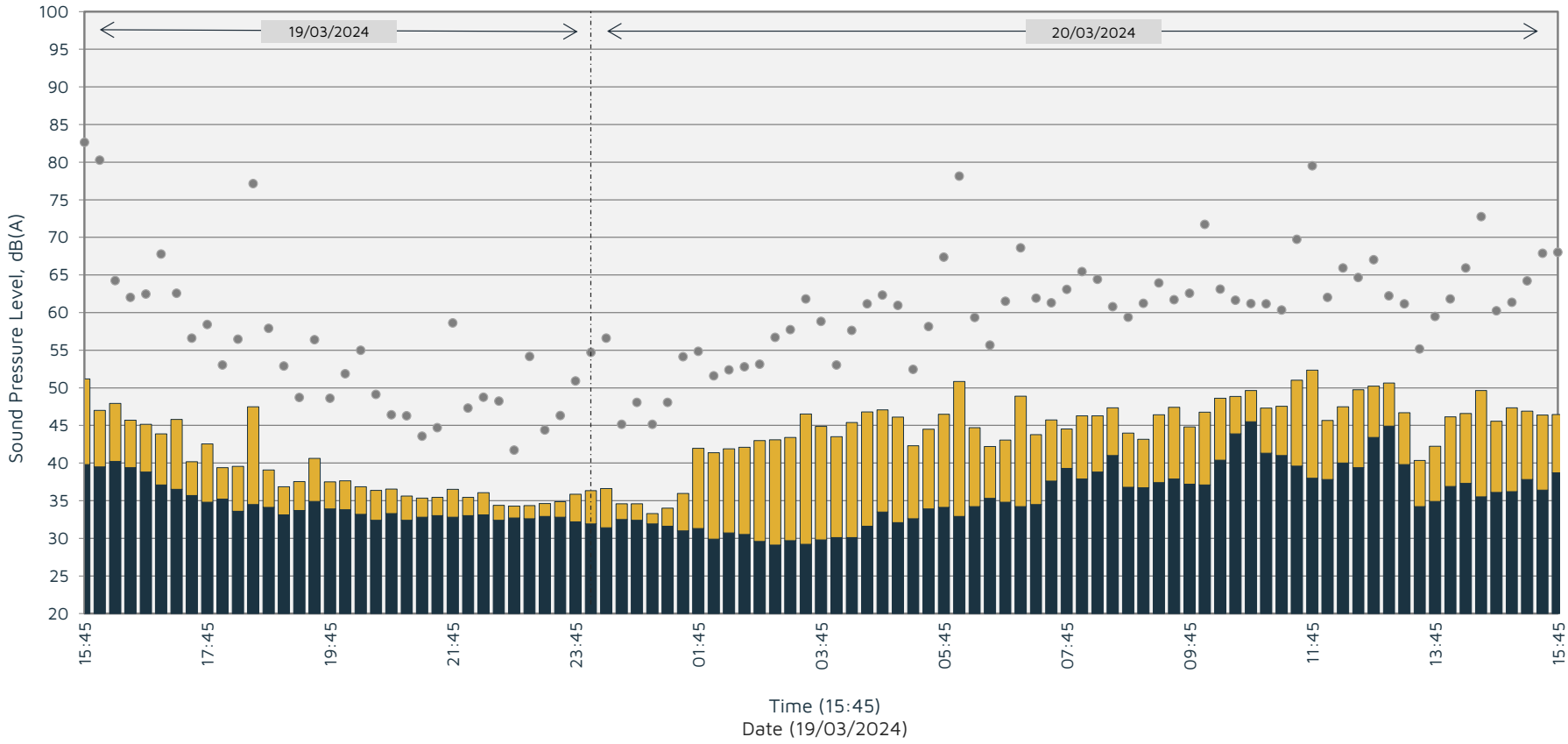
Time History Graphs

Graph 1

Project: 34 Belsize Lane, Belsize Park

Measurement Location: Position 1

Survey Date: 19 to 20 January 2024



Graph 2

Project: 34 Belsize Lane, Belsize Park

Measurement Location: Position 2

Survey Date: 19 to 20 January 2024