335 Euston Road
Noise impact assessment

08 August 2024

Report For:

Reza Hajhosseiny

Report reference

30137_NIA2_RevA

TIMBRAL

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Reference	Date	Comments	Issued by
30137_NIA1	21 May 2024	First issue	Tony Trup BMus MSc MIOA MAES
30137_NIA2	17 July 2024	Revision to proposed plant.	Tony Trup BMus MSc MIOA MAES
30137_NIA2_RevA	8 August 2024	Revision to proposed plant.	Tony Trup BMus MSc MIOA MAES

1.0 Introduction

As part of a proposed redevelopment of 335 Euston Road into a medical clinic, the client proposes to install an air source heat pump.

Timbral have been instructed to undertake an environmental noise survey, assess the noise emissions of the proposed installation in accordance with the Local Authority's requirements, and make recommendations, where required, to bring the units into compliance.

This report presents our findings.

2.0 Site description

2.1 Site location and context

The site is located at 335 Euston Road, London, NW1 3AD, within the administrative boundaries of the London Borough of Camden. The site is bounded to the north by Euston Road, and to the south, east and west by mixed use premises.

Euston road is a major thoroughfare through central London, with significant levels of road traffic. Residential premises are located at first floor and above of the neighbouring buildings.

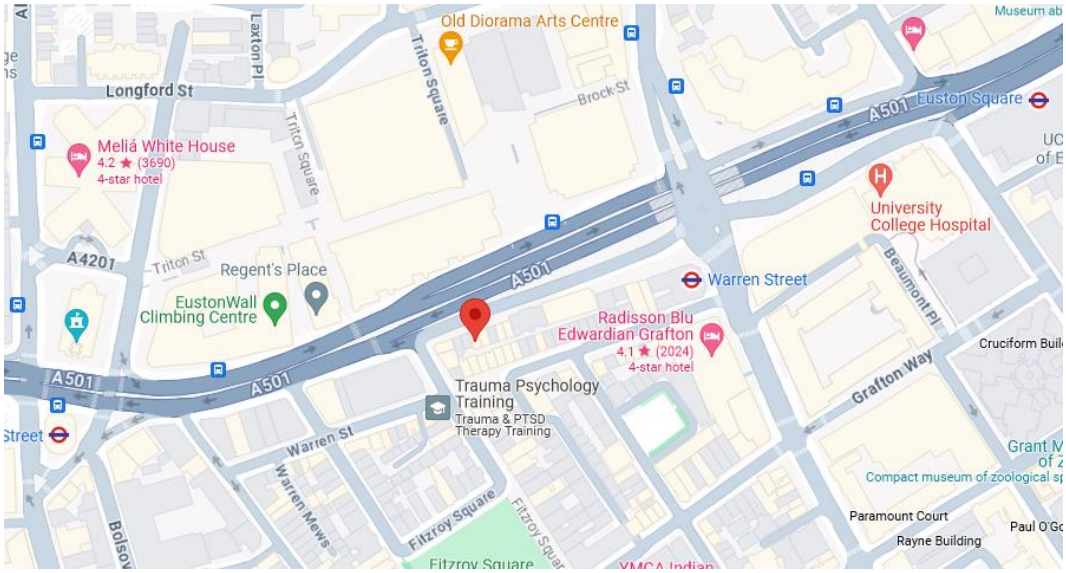

Figure 1 Site context (maps.google.co.uk)

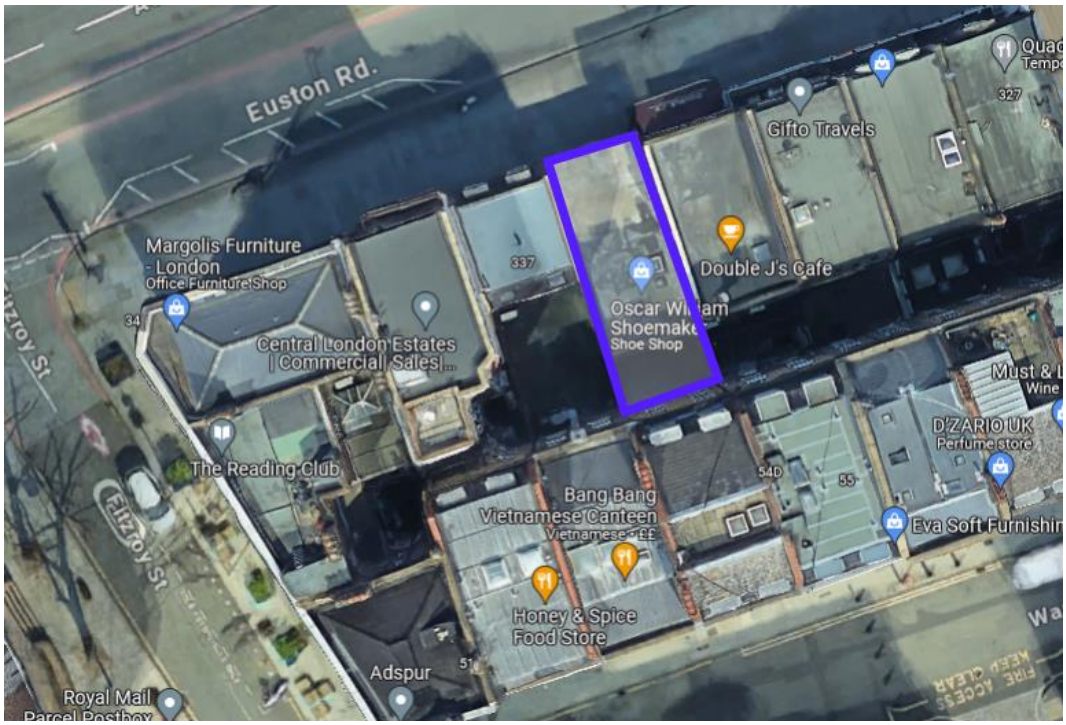

Figure 2 Satellite image (Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Maps)

2.2 Proposals

The site is currently a single storey ground floor retail unit.

The client proposes to demolish the existing unit and build a new medical centre comprising basement, ground and two additional floors.

Figure 3 Proposed elevation

3.0 Criteria, policy and guidance

A summary of relevant national planning policy and industry guidance is presented in Appendix B.

3.1 Local policy and guidance

Chapter 6 of the *Camden Planning Guidance – Amenity (January 2021)* describes the Local Authority's policies regarding noise and vibration, and provides guidance for assessments to be submitted with planning applications.

Relevant to this application, paragraphs 6.27 and 6.29 state,

"6.27 Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. 'BS4142 Method for rating Industrial and Commercial Sound' contains guidance and standards which should also be considered within the acoustic report.

...

6.29 Plant, ventilation, air extraction or conditioning equipment and flues can cause disturbance to residential properties. The Council would therefore welcome the use of long-term maintenance agreements to ensure that equipment maintains acceptable noise levels over its lifetime and the use of timers to limit any unnecessary operation of the equipment."

3.2 Summary criteria

On the basis of the Local Authority's policy, and previous experience with similar applications in the London Borough of Camden, we would suggest that the cumulative noise emissions of proposed mechanical plant (including any penalties for acoustic characteristics) do not exceed a level of -10 dB below the representative background sound level, for the relevant period of operation.

In summary, the proposed criteria are:

$L_{Ar,Tr(plant)} = L_{A90,T} - 10$ dB

Where:

$L_{Ar,Tr}$ is the cumulative rating level of the plant noise (including acoustic character penalties);

$L_{A90,T}$ is the representative background sound level, and;

T is 60 minutes during the day, and 15 minutes at night.

This criterion is subject to approval by the Local Authority.

4.0 Survey methodology

4.1 Overview

An unattended survey was undertaken from approximately 10:30 on Tuesday 23 April to 09:30 on Friday 26 April 2024.

Sound pressure level measurements were undertaken using Class 1 sound level meters, in general accordance with *BS7445 Description and measurement of environmental noise*.

Measurements were undertaken of the L_{Aeq}, L_{AFmax} and L_{A90} indices (along with 1/1 octave-band data) in 1-minute intervals, and the data has been processed to compute longer periods, where required for assessment or as recommended by industry guidance.

4.2 Personnel

The survey and impact assessment were undertaken by Tony Trup, BMus, MSc, MIOA, MAES. Tony has over a decade of experience in acoustics consultancy, having previously worked at national and multidisciplinary firms. Tony has been responsible for the acoustics on luxury residential and office tower developments, and was also previously the acoustics project manager for a nationally-significant infrastructure project.

4.3 Measurement positions

Measurements were undertaken at one position, at first floor level towards the rear of site. The microphone was placed on a tripod approximately 1.5 metres from the flat roof, with two additional reflecting walls. This location was chosen for security purposes as it was shielded from line of sight from most of the surrounding windows (which open out onto the flat roof),

and from street level. The position is thought to be representative of the soundscape at neighboruing residential windows, as they all overlook the same area of flat roof, which spans across the site, and partially over neighbouring demises. See photos in Appendix D, which also show the plant serving other nearby buildings. The condenser unit closest to the microphone was not operating at the time of our site visits.

Figure 4 Measurement positions

4.4 Equipment

The following equipment was used in the survey.

Table 1 Survey equipment

Item	Make and model	Serial No.	Laboratory calibration due
Type 1 Sound Level Meter	Norsonic Nor-140	1402823	August 2024
Field calibrator	Norsonic Nor-1251	32120	February 2025

The microphone was fitted with a windshield and attached to a data logger by an extension cable.

The sound level meter was calibrated prior to, and upon completion of the survey. No significant drift was found to have occurred.

4.5 Weather

According to timeanddate.com, the ambient temperature ranged from 2 to 12 degrees Celsius over the course of the survey, with no rainfall.

During set-up and take-down of the unattended survey, the sky was overcast and roads were dry.

4.6 Subjective impressions

Subjectively, the dominant sources of noise at the rear of site were road traffic from Euston Road, and mechanical plant serving adjacent buildings. Multiple air conditioning condensers and some kitchen extract fans were noted to be serving neighbouring premises. See photos in Appendix D.

4.7 Results

A time history graph is presented in Appendix E.

A summary of the survey results is presented below. We have only presented data for the working-hour Daytime period (taken as 07:00 to 19:00), as no operation is proposed during evening or night-time periods.

Table 2 As-measured summary results, sound pressure levels, dB(A), working-hour daytime only (07:00 to 19:00)

Date	$L_{Aeq,12hr}$	Modal $L_{A90,60min}$
Tuesday 23 April	64	60, 62
Wednesday 24 April	64	61
Thursday 25 April	64	61

These levels are presented as measured (i.e. including reflections). The microphone was approximately one metre away from two walls, and 1.5 metres from the first floor roof. A -9 dB correction should be applied to estimate free-field values.

5.0 Assessment

5.1 Proposed installation

The client proposes to install one Daikin Altherma 3 M – EBLA09-14D3W1 air source heat pump at the rear of site, at first floor level. The manufacturer's sound pressure level data is presented in Table 3.

Table 3 Sound pressure levels of proposed plant, dB at octave band centre frequencies, Hz, at 1m in a semi-anechoic chamber (1 reflecting surface)

63	125	250	500	1k	2k	4k	8k	dB(A)
72	63	59	50	41	37	33	27	54

The measurements are understood to have been taken at one metre from the units on a hemispherical surface, in an outdoor environment (i.e. without significant reflections from other surfaces).

5.2 Nearest sensitive receptor

The nearest noise-sensitive receptors are the windows of residential units at first floor and above at 333 and 337 Euston Road, as well as to the rear on Warren Street. All the sensitive windows overlook the first floor roof, which will effectively become a shared lightwell once the proposed redevelopment of 335 takes place.

5.3 Background sound level

Some plant noise from other installations (notably the fan and condensers serving the neighbouring premises) was present in the background sound. BS 4142:2014 discusses the treatment of background plant noise as follows, *"Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound."*

BS 4142:2014 also states, *"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."*

It should be recognised that the existing building is single storey, and the receptors at the rear of site therefore are exposed to noise from Euston Road. Once the proposed building is erected to second floor level, the line of sight will be obscured, and ambient and background sound levels will reduce somewhat. However, noise from plant serving neighbouring buildings will still continue to contribute to the soundscape at the rear of site, and are thought to partially control the existing levels of ambient and background sound. We suggest that criteria are proposed on the basis of the existing noise levels, given that these are partially determined by existing plant serving other premises, and also recognizing that, in doing so, noise-sensitive receptors would be exposed to noise levels no worse than existing, perhaps with a slight reduction in overall noise exposure.

On the basis of our measurements, we propose a background sound level of 61 dB(A) (52 dB(A) free-field) to be used during the daytime (dB $L_{A90,60min}$, from 07:00 to 19:00 hours). **No evening or night-time operation is proposed.** Therefore, the Local Authority requirement would be that the cumulative rating level of the proposed installation, $L_{Ar,Tr}$, does not exceed 42 dB(A) (free-field) at the nearest noise-sensitive receptors.

This background sound level and proposed criterion are subject to approval by the Local Authority.

5.4 Acoustic feature corrections

The manufacturer's data does not indicate any likely tonality or other acoustic features.

In our experience, air source heat pumps can produce a slight low frequency tonal hum, depending on the model and its duty. We therefore apply a +2 dB acoustic feature correction in the course of our assessment.

5.5 Uncertainty

In our experience, the noise of HVAC plant can vary by ±5 dB versus the design calculations, due to installation, balancing, calculation uncertainty and manufacturing variations. The suggested Local Authority criterion of -10 dB below background sound level includes for a suitable buffer, such that, if the noise levels are 5 dB higher than predicted (as in the potential worst-case), then the sound level at the nearest receptor would still be substantially below the background sound level and have a negligible impact.

5.6 Mitigation measures

An initial calculation of noise impact indicated that, without mitigation measures, the noise impact from the proposed installation exceeds the requirements of the Local Authority.

We therefore recommend that an acoustic enclosure providing at least 10 dB(A) of attenuation is provided to the proposed air source heat pump. See attached specification for acoustic enclosures in Appendix C. The enclosure should include suitable anti-vibration measures to mitigate risk of vibration transfer into adjacent structures. Acoustic enclosures can be heavy, and the additional mass should be taken into account in the structural design of the project.

The air source heat pump (in its enclosure), must be located a minimum of four metres away from neighbouring residential windows, and with only two reflecting surfaces within 3 metres.

5.7 Calculated impact

A calculation of sound propagation from the proposed ASHP is presented in Figure 5.

Predicted noise emissions of EBLA14D3W1 ASHP

Item / Description	Rating/Broadband/Input Rating	dB	dB(A)	Octave Band Centre Frequency, Hz 31.5	63	125	250	500	1k	2k	4k	8k
SPL at 1m (A-weighted spectrum)					46.0	47.0	50.0	47.0	41.0	38.0	34.0	26.0
A-Weighting Curve				-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1
SPL at 1m (Z-weighted spectrum), with 1 reflecting surface			54.2 (A)		72.2	63.1	58.6	50.2	41.0	36.8	33.0	27.1
Ratio of Distances - Point Source	1.0 m	4.0 m		-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0
Additional reflections (2 more sufaces)					6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Enclosure					-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
			38.1 (A)		56.2	47.1	42.6	34.2	25.0	20.8	17.0	11.1

Figure 5 Predicted noise emissions

An assessment in accordance with BS 4142:2014 and the Local Authority requirements is presented in Table 4.

Table 4 Noise impact assessment in accordance with BS 4142:2014, dB sound levels

	dB sound level of proposed installation, with mitigation implemented
Specific sound level L_{As}	38
Acoustic feature corrections	+2
Rating level L_{Ar}	40
Background sound level	52
Exceedance over background sound level	-12
Local Authority requirement	42
Exceedance over Local Authority requirement	-2
Compliance with Local Authority requirement	PASS

6.0 Conclusions

A new medical centre is proposed at 335 Euston Road. One air source heat pump is proposed to serve the building.

A background noise level survey has been undertaken, and noise emission criteria proposed in accordance with Local Authority requirements and industry guidance.

We **recommend** the air source heat pump is provided with enclosures providing at least 10 dB(A) attenuation (see attached specification). Attention must be paid to the recommendations on distances and reflecting surfaces in 5.6.

Our assessment finds that, with the recommended mitigation measures, the proposed air source heat pump should be capable of achieving the Local Authority's requirements.

Appendix A Glossary

Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of 106:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (Lp) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as LA10, LA90, and LAeq for the 'A' weighted equivalent continuous noise level.

Equivalent continuous sound level, Leq

An index for assessment for overall noise exposure is the equivalent continuous sound level, Leq. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

Lden

Day-evening-night noise level, the A-weighted, Leq (equivalent noise level) over a whole day, but with a penalty of 10 dB(A) for night-time noise (23:00-07:00) and 5 dB(A) for evening noise (19:00-23:00), also known as the day evening night noise indicator

Lnight

The A-weighted, Leq (equivalent noise level) over the 8 hour night period of 23:00 to 07:00 hours, also known as the night noise indicator.

Frequency

Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1kHz, eg 2kHz = 2000Hz. Human hearing ranges approximately from 20Hz to 20kHz. For design purposes the octave bands between 63Hz to 8kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or in some cases, narrow frequency bands.

Maximum noise level, LAmax

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response. Slow time weighting (S) has an exponential time constant of 1s and is used to allow more accurate estimation of the average sound level on a visual display.

The maximum level measured with fast time weighting is denoted as LAmax, F. The maximum level measured with slow time weighting is denoted LAmax, S.

Structure-borne noise

This is the transmission of noise energy as vibration of building elements. The energy may then be re-radiated as airborne noise. Structureborne noise is controlled by structural discontinuities, i.e. expansion joints and floating floors.

Appendix B Policy and guidance

Policy and Guidance

National policy and guidance

National Planning Policy Framework

The National Planning Policy Framework 2023 (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. The NPPF must be taken into account in preparing the local development plans and is a material consideration in planning decisions.

The excerpts of the NPPF relevant to the proposed development are as follows:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of... noise pollution."

"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 ..."

Planning Practice Guidance (Noise) (PPG(N))

The PPG(N) is published by the Ministry of Housing, Communities & Local Government and aims to provide guidance on the implementation of government policy in planning and noise.

In summary, it states that noise can override other planning concerns where justified, although the context of the wider characteristics of the development, its likely users and surroundings all can have an effect on whether noise is likely to pose a concern. It emphasizes that good acoustic design needs to be considered early in the planning process to ensure that the most appropriate and cost-effective solutions are identified from the outset.

The PPG(N) also includes a Noise Exposure Hierarchy Table which, in summary, emphasizes that increasing noise levels have adverse effects on behaviour, attitude, physiology, sleep and quality of life. The PPG(N) does not contain objective targets for noise levels and thus further guidance and studies should be referred to, in order to quantify appropriate targets.

Noise Policy Statement for England

The Government's policy on noise is set out in the Noise Policy Statement for England. Its vision 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."

Its aims are to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimize adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

The NPSE provides the policy framework to assist the implementation of the Environmental Noise Directive and the Environmental Noise (England) Regulations 2006 ('the Regulations'). Whilst the NPSE is not legislation and local authorities are not legally bound by it, it is expected that local authorities will take it into account in relevant situations.

The NPSE encourages relevant stakeholders, including Local Planning Authorities (LPAs), to review and revise existing policies and practices so that *"the policies and any noise management measures being adopted accord with the vision, aims and principles of the NPSE"*.

Industry guidance

BS 4142:2014

British Standard BS 4142[2014] + A1(2019) *Method for rating and assessing industrial and commercial sound* is widely used by local authorities to determine whether a new industrial noise source is likely to give rise to complaint from people living nearby.

BS 4142[2014] + A1(2019) sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS 4142[2014] + A1(2019) for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,Tr}$ 'specific sound level', immediately outside the dwelling with the LA90,T background sound level.

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

BS 4142[2014] + A1(2019) states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound

occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound 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 negligible impact, depending on the context."
- During the daytime, the assessment is carried out over a reference time-period of 1-hour, and 15-minutes during the night-time. The periods associated with day and night, for the purposes of the assessment, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

The initial estimate of the impact may need to be modified due to the context of the assessment. Section 11 of BS 4142[2014] + A1(2019) states that where background sound levels and rating levels are low, absolute levels might be more relevant than the margin by which the rating level exceeds the background.

Appendix C Specification for acoustic enclosures

The acoustic enclosure must provide the attenuation of sound pressure levels described in this report, as a minimum.

The acoustic enclosure shall be designed and constructed so as not to add additional pressure drop to the system, to provide the required ventilation and to avoid overheating. The mechanical plant supplier shall be consulted for acceptability of the enclosure from mechanical, overheating and fire risk perspectives.

Suitable anti-vibration mounts shall be incorporated, and the enclosure fabric shall be suitably damped such that it does not resonate, buzz or re-radiate noise or vibration.

The implementation of the enclosure shall not result in attention-grabbing acoustic characteristics (e.g. tonality, impulsivity, percussive sounds), as would be considered for penalties under the regime described in BS 4142:2014.

Suitable suppliers of acoustic enclosures could include Environ, IAC or Caice.

Appendix D Photos

Photo 1 Measurement position UA1

Photo 2 Plant serving neighbouring buildings (1)

Photo 3 Plant serving neighbouring buildings (2)

Appendix E Figures

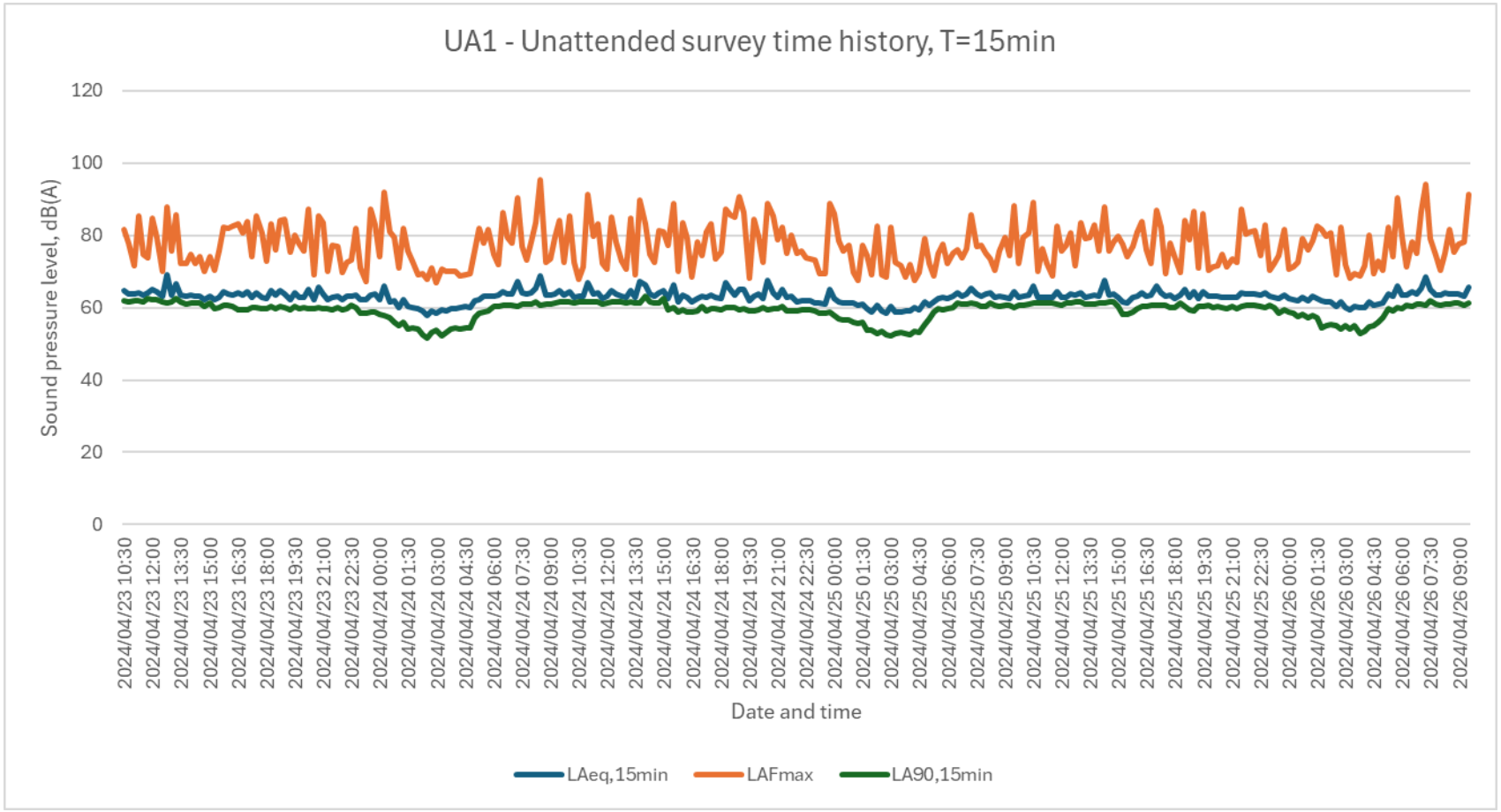

Figure 6 Unattended survey time history