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Teddington

3 June 2024

18799-NIA-01 RevC

Noise Impact Assessment

Project Number
18799

Issued For
Unico Devlopoments Ltd

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a proposed plant installation for residential and commercial use at 42 High Street, Teddington.

The proposed plant installation comprises 9 No. Mitstubishi Condenser Units installed within a plantroom.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements the London Borough of Richmond upon Thames.

Calculations were undertaken for the nearest receiver, identified as 2 Cedar Road, Teddington. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependent on the following material considerations:

- The plant could be in use at any time over a 24 hour period
- The noise emissions data for the proposed units, as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan
- Mitigation is applied as recommended in this report, in the form of an acoustic louvre for the plant room.

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

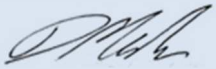
Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

This report is designed to be suitable to discharge typical plant noise planning conditions, as per our original scope of work. The report should not be relied upon for further reasons, such as the detailed design of mitigation measures.

CONTENTS

LIST OF ATTACHMENTS

18799-SP1 & SP2 & SP3	Indicative Site Plans
18799-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

Issue	Date of Issue	Author	Reviewed	Authorised
RevC	03/06/24			
		Daniel Ladega Technical Assistant MPhys (Hons)	**Duncan Martin** Director BSc (Hons) MIOA	**John Smethurst** Director BSc (Hons) MIOA

Issue	Comment
0	First Issue
RevA	New proposed site plan and change of receiver
RevB	Change of receiver from rear to front window
RevC	Change of plant operation times

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Unico Developments Ltd to measure existing background noise levels at 42 High Street, Teddington. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of the London Borough of Richmond upon Thames.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is bound by Teddington high street with commercial plots to the north and Cedar Road to the east. The surrounding area is both commercial and residential in nature.

The front façade ground floor window of 2 Cedar Road, Teddington has been identified as the nearest affected receiver. This nearest noise sensitive receiver was identified through observations on-site and through discussions with the client. If there are any receivers closer than that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 18799-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 18799-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The microphone was mounted on a 1st storey flat roof at the rear of the building. The microphone was positioned greater than 3 m to any walls.

The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 13:00 on 1 May 2024 and 11:00 on 3 May 2024.

The measurement procedure generally complied with BS 7445: 1991: 'Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use'.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were normal with no rain, negligible wind and temperatures of 17°C. It is understood that the weather conditions during the unattended survey were similar to that of set up and collection.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- Rion Type NC-74 Class 1 Calibrator *(London)*

4.0 RESULTS

4.1 Unattended Noise Survey Results

The $L_{Aeq:\,5min}$, $L_{Amax:\,5min}$, $L_{A10:\,5min}$ and $L_{A90:\,5min}$ acoustic parameters were measured at the location shown in site drawing 18799-SP1.

Measured noise levels are shown a time history in Attachment 18799-TH1, with average ambient and minimum background noise levels summarised in Table 4.1.

Position	Time Period	Average ambient noise level $L_{Aeq:\,T}$, dB	Minimum background noise level $L_{A90:\,5min}$, dB
1	Daytime (07:00 - 23:00)	55	39
	Night-time (23:00 - 07:00)	55	37

Table 4.1 Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

5.1 Relevant Local Policy

The assessment and recommendations in this report have been undertaken in accordance with Policy D14 of the London Plan 2021, which contains the following relevant sections:

"D14. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:

5) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses".

5.2 Local Authority Criteria

The London Borough of Richmond upon Thames' criteria for noise emissions are as follows:

"The rating level of the noise determined by the cumulative sound emissions of the plant hereby permitted shall be at least 5dBA lower than the existing background noise level at any given time of operation. The noise levels shall be measured or predicted 1m externally to any window at the nearest residential facade. Measurements and assessment shall be made according to British Standard 4142:2014."

It is understood that the proposed residential plant units will be operational at any time.

Based on the results of the environmental noise survey and requirements of The London Borough of Richmond upon Thames, Table 5.1 presents the proposed plant noise emission criteria to be achieved at 1 m from the nearest noise sensitive receiver.

Period	Plant Noise Emission Limit $L_{Aeq:T}$, dB
Daytime (07:00 - 23:00)	34
Night-time (23:00 - 07:00)	32

Table 5.1 Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises 9 No. Mistubishi PVZ-WM50VHA condenser units.

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 6.1. Loudest modes of operation have been used in order to present a robust worst-case assessment.

Unit	Sound Pressure Level (at 1 m, dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Mistubishi PVZ-WM50VHA	57	56	49	49	48	42	36	29	52

Table 6.1 Manufacturer provided noise emissions levels

The proposed plant location is inside the plant room which is shown on indicative site plan 18799-SP2.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that ventilation to the plant room is via acoustic rated louvres only. The louvres should provide sufficient attenuation to achieve a maximum sound pressure level of 44 dB(A) when measured at 1 m externally in all directions.

Based on the information provided, louvres meeting the sound reduction indices as stated in Table 6.2 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
Louvred Panels	6	7	10	12	18	18	14	13

Table 6.2 Required attenuation from mitigation

6.3 Noise Impact Assessment

The closest receiver has been identified as the window on the front façade of a residential property to the south, which is a minimum of 4.2 m and from the proposed plant location.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B.

Receiver	Design Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	32 dB(A)	31 dB(A)

Table 6.3 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with acoustic louvres to the plant room would be expected to meet the requirements of the proposed criteria.

6.4 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233: 2014 recommends 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 31 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.4.

Receiver	Recommended Target – For sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	16 dB(A)

Table 6.4 Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 42 High Street, Teddington. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the requirements of the London Borough of Richmond upon Thames.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the proposed plant, at the nearby noise sensitive receivers.

Calculations show that noise emissions from the proposed units should meet the requirements of the London Borough of Richmond upon Thames with the recommended mitigation installed as stated herein.

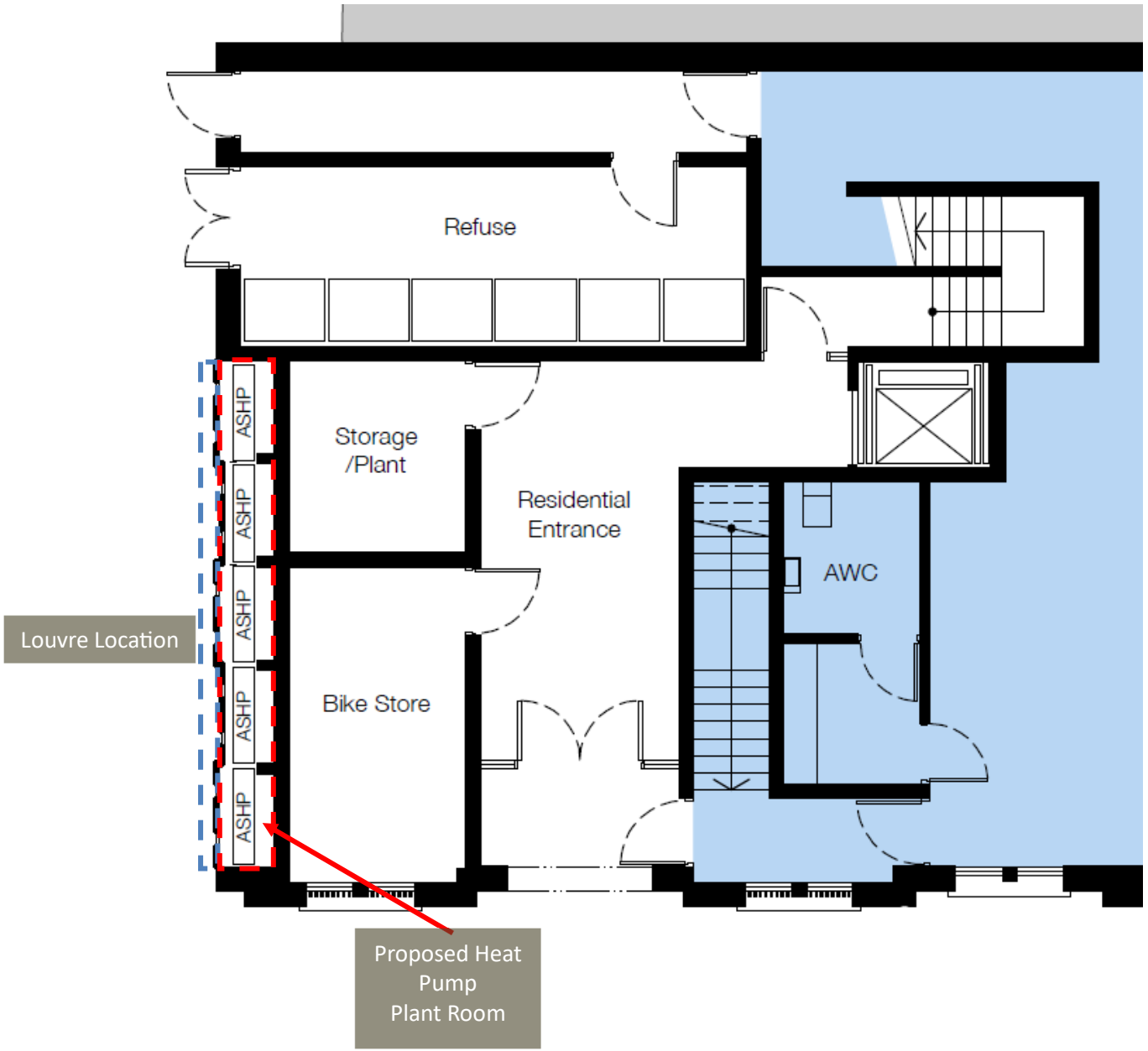
N

Not to scale

Description:
Indicative site plan showing noise monitoring position and nearest sensitive receiver

Date	03 June 2024
Our Reference	18799-SP1
Project Name	42 High Street, Teddington
Image ©	Google Earth

Key:	
	Unattended Noise Survey Position
	Noise Sensitive Receiver



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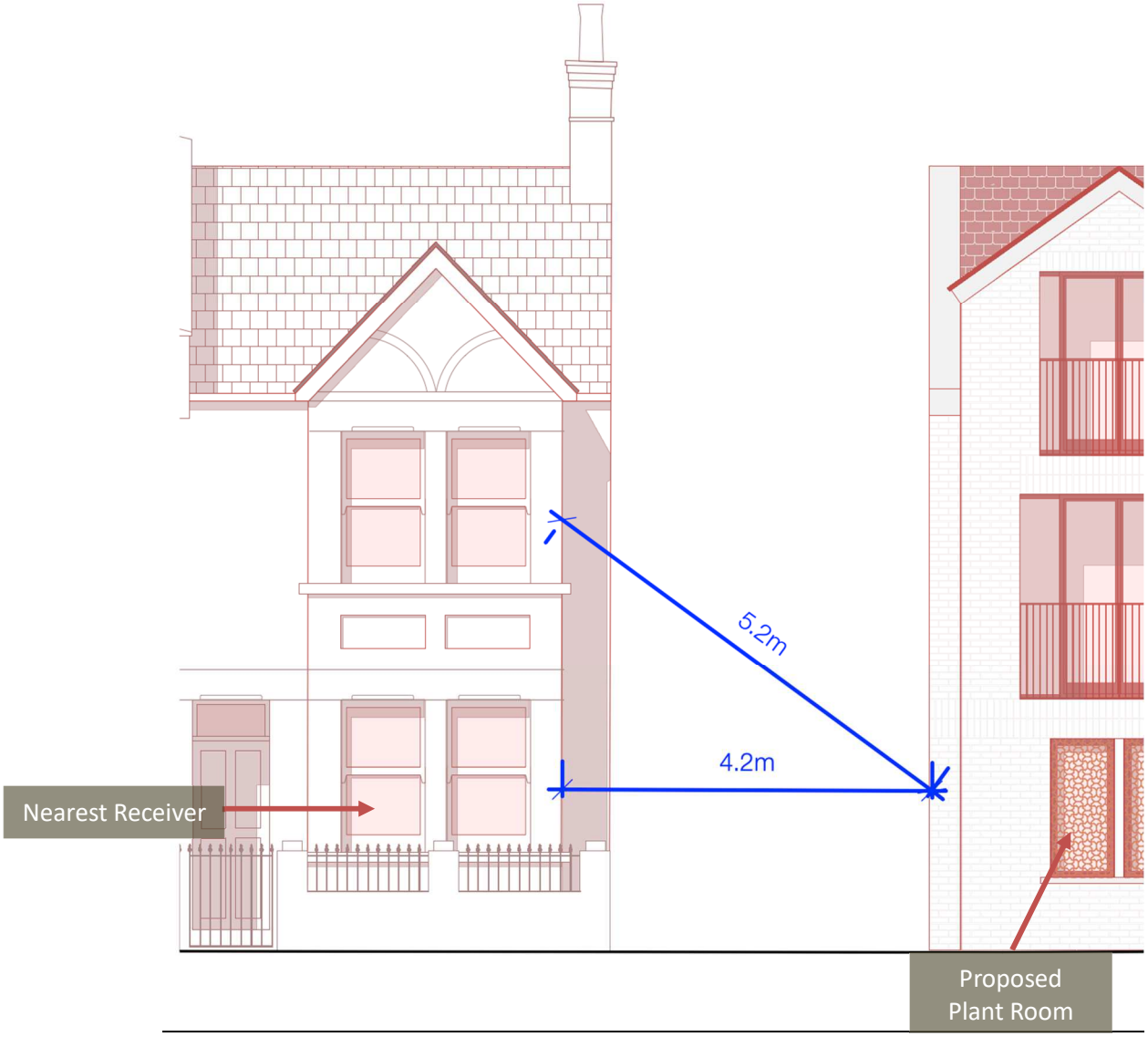
N

Not to scale

Description:
Indicative site plan showing noise monitoring position and nearest sensitive receiver

Date	03 June 2024
Reference	18799-SP2
Project Name	42 High Street, Teddington
Image ©	Google Earth



N

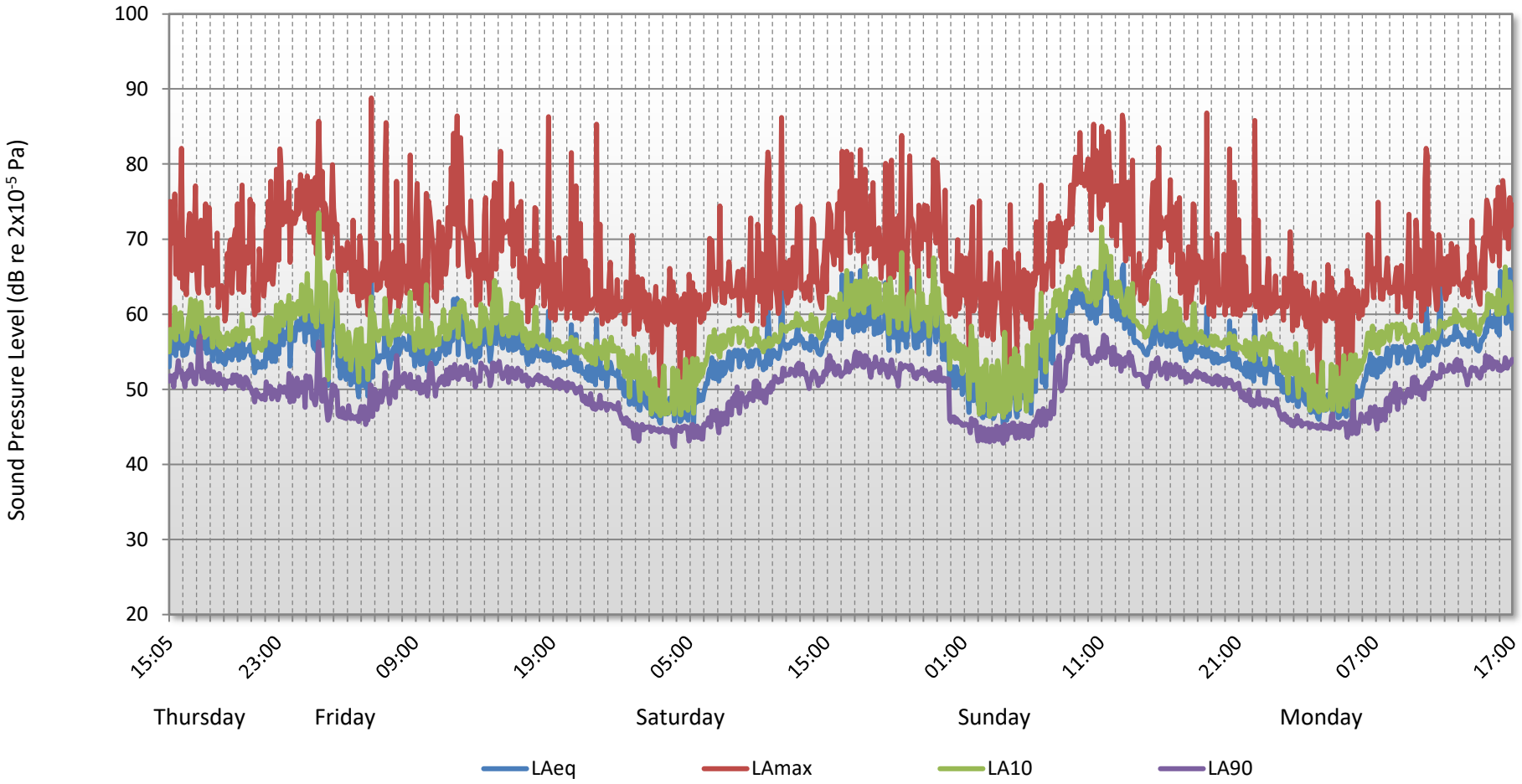
Not to scale

Description:
Indicative site plan showing noise monitoring position and nearest sensitive receiver

Date	03 June 2024
Reference	18799-SP3
Project Name	42 High Street, Teddington
Image ©	Google Earth

42 High Street, Teddington

Environmental Noise Time History
20/9/18 to 24/9/18



18799-TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3 dB for each doubling of distance.

APPENDIX A

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

Appendix B

Acoustic Calculations

18799

42 High Street, Teddington

Receiver 1: Front 1st floor window of 2 Cedar Road, Teddington

External Plant Noise Emissions Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Manufacturer provided sound pressure level at 1 metre									
Reveberant Sound Pressure Level of Plant Room, dB	68	67	58	58	57	50	44	37	61
Sound power at louvre from 9 No. Mitsubishi PVZ-WM50VHA, dB (1.5m x 5.1m)	9	9	9	9	9	9	9	9	
Attenuation required from Louvre, dB	-6	-7	-10	-12	-18	-18	-14	-13	
Inside to outside correction, dB	-6	-6	-6	-6	-6	-6	-6	-6	
Noise radiation correction, dB (hemi-spherical)	-8	-8	-8	-8	-8	-8	-8	-8	
Distance correction to receiver, dB (4.2 m)	-13	-13	-13	-13	-13	-13	-13	-13	
Sound pressure level at receiver	**45**	**43**	**30**	**28**	**21**	**14**	**12**	**6**	**31**

*** Distance loss calculated assuming Plane Source attenuation**

Design Criterion	**32**

BS 8233 Assessment Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	45	43	30	28	21	14	12	6	31
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**30**	**28**	**15**	**13**	**6**	**-1**	**-3**	**-9**	**16**

Design Criterion	**30**