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NEWHOUSE CENTRE, BUCKINGHAM ROAD, HAMPTON

PLANNING COMPLIANCE REPORT

Report 15346.PCR.01

For:

London Borough of Richmond upon Thames

Environment Directorate

Civic Centre, 44 York Street

Twickenham

TW1 3BZ

Site Address	Report Date	Revision History
Newhouse Centre, Buckingham Road, Hampton	31/01/2017	

Registered in England Company No. 7947892
KP Acoustics is the Trading Name of KP Acoustics Limited

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by London Borough of Richmond upon Thames, Environment Directorate, Civic Centre, 44 York Street, Twickenham TW1 3BZ, to undertake an environmental noise survey at the Newhouse Centre, Buckingham Road, Hampton. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for a plant unit installation in order to ensure that nearby noise sensitive receivers are not negatively impacted.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant unit installation to satisfy the emissions criterion at the closest noise-sensitive receiver and outline mitigation measures as appropriate.

2.0 ENVIRONMENTAL NOISE SURVEY AND EQUIPMENT

2.1 Procedure

Automated noise monitoring was undertaken at the positions shown in Site Plan 15346.SP1. The choice of these positions was based on security, accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver relative to the operations on site. The duration of the survey was between 09/01/2017 and 10/01/2017.

Initial inspection of the site revealed that the background noise profile at the monitoring location was largely dominated by road traffic noise from the surrounding roads.

The weather during the course of the survey was generally dry with wind speeds within acceptable tolerances and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics “*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*”.

2.2 Equipment

The equipment calibration was verified before and after the survey and no calibration irregularities were observed.

The equipment used was as follows.

- 2 No. Svantek 957 Class One Sound Level Meters
- 1 No. Svantek 948 Class One Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods in Figures 15346.TH1-3.

Minimum background noise levels are shown in Table 3.1.

	Minimum background noise level $L_{A90: 5min}$ dB(A)		
	Position 1 – Front Façade	**Position 2 – Rear Façade**	**Position 3 – Side Façade**
Daytime (07:00-23:00)	51	54	58
Night-time (23:00-07:00)	44	49	53

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

External Receivers

The criterion the for noise emissions of new plant in this instance is in place in order to minimise the likelihood of complaints from nearby noise sensitive receivers. As such, noise received as a result of the newly installed plant units should not exceed a level 10dB below the measured minimum background LA90, in order to demonstrate inaudibility at the nearest receiver.

We therefore propose to set the noise criteria as shown in Table 4.1 in order to comply with the above requirement.

	Daytime (07:00 to 23:00)	**Night-time (23:00 to 07:00)**
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	41 dB(A)	34 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the condenser unit will only be in use during daytime, we would utilise the daytime noise emissions criteria.

School Receivers

In order to ensure that classrooms of the school are not negatively impacted by noise emissions from the condenser unit, further assessment will be undertaken to the closest classroom windows. According to BB93, resting internal noise levels within the classrooms should not exceed 35 dB(A).

Using an assumed 10-15dB attenuation as stated by BS8233 for partially open windows, a criterion of 45dB(A) outside the classroom windows has been established.

5.0 DISCUSSION

The location of the plant unit is as shown in indicative site plan 15346.SP1.

The unit is proposed to be installed on the roof of the school block. The closest noise sensitive receivers to this location are the windows of the nearby residences to the Southwest of the site at a minimum distance of 35m. The closest school classroom receivers to this installation are located 3m to the Northeast of the proposed plant unit.

It is understood that the installation comprises the following unit:

- 1 No. Daikin RXS50L outdoor condenser

The sound power levels as provided by the manufacturer for the unit are shown in Table 5.1.

	Sound Power Level (dB) in each Frequency Band							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Daikin RXS50L	No Spectral Data Available: 62 dB(A)							

Table 5.1: Manufacturer Sound Power Levels

There is an existing air handling unit, and two smaller extract units, on the flat roof over the kitchen that will remain.

5.1 Objective overview

Taking all acoustic corrections into consideration, including distance and screening corrections, the noise levels expected at the closest noise sensitive windows would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver - Nearest Noise Sensitive Windows	**Criterion**	**Noise Level at Receiver**
Residential Windows	41 dB(A)	23 dB(A)
Classroom Windows	45 dB(A)	39 dB(A)

Table 5.2: Predicted noise levels and criterion at nearest noise sensitive locations

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant installation fully satisfies the emissions criteria.

It is the professional opinion of KP Acoustics that this level is not going to pose any negative impact on the amenity of nearby residential receivers or classrooms. Furthermore, the value of 23 dB(A) for residential receivers is to be considered outside of the building. Windows may be closed or partially closed leading to further attenuation, as follows.

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

British Standard 8233:2014 '*Sound insulation and noise reduction for buildings – Code of Practise*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:2014 recommends 30-35dB(A) for internal resting/sleeping conditions during night-time and daytime respectively.

With calculated external levels of 23 dB(A), the residential window would not need to provide any additional attenuation, in order for recommended conditions to be achieved. According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to an acceptable interior noise level that meets the criterion.

Receiver	**Design Range –** ***For resting/sleeping conditions in a bedroom, in BS8233:2014***	**Noise Level at Residential Receiver (due to plant installation)**
Inside Nearest Residential Space	30-35 dB(A)	Non-significant

Table 5.3: Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.3, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the criteria stipulated within this report, the emissions from the plant unit installation would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, even with neighbouring windows partially open.

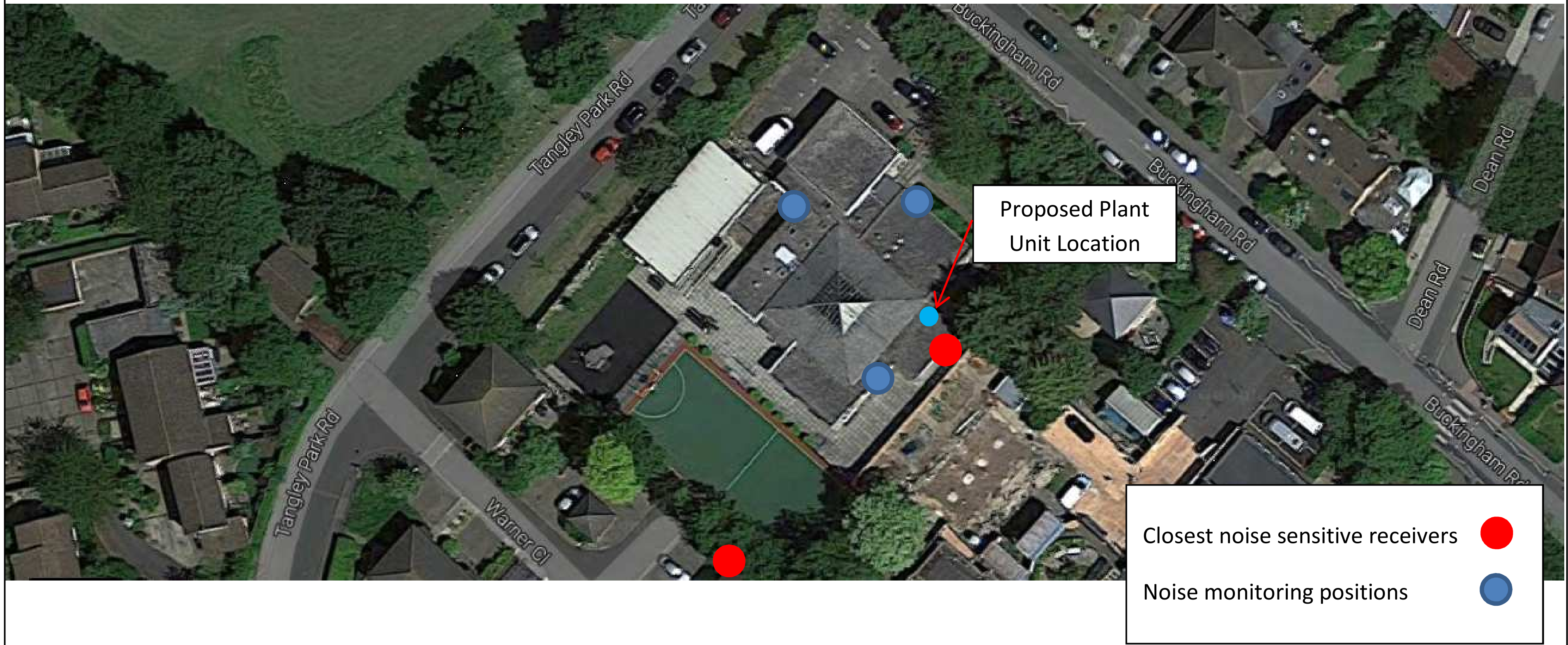
6.0 CONCLUSION

An environmental noise impact survey has been undertaken at the Newhouse Centre, Buckingham Road, Hampton, by KP Acoustics Ltd between 09/01/2017 and 10/01/2017. The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the proposed unit installation would be sufficiently low as to cause no negative impact on nearby noise sensitive residential receivers. Additional calculations show that the closest classroom receivers would not be expected to be negatively affected by noise from the plant unit.

Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

Report by:	Checked by:
Kenny Macleod AMIOA	**Kyriakos Papanagiotou MIOA**
KP Acoustics Ltd.	**KP Acoustics Ltd.**



Title:

Indicative site plan showing closest noise sensitive receivers and proposed plant unit location.
(Ref: Google Earth)

Date: 31 January 2017

FIGURE 15346.SP1

KP acoustics

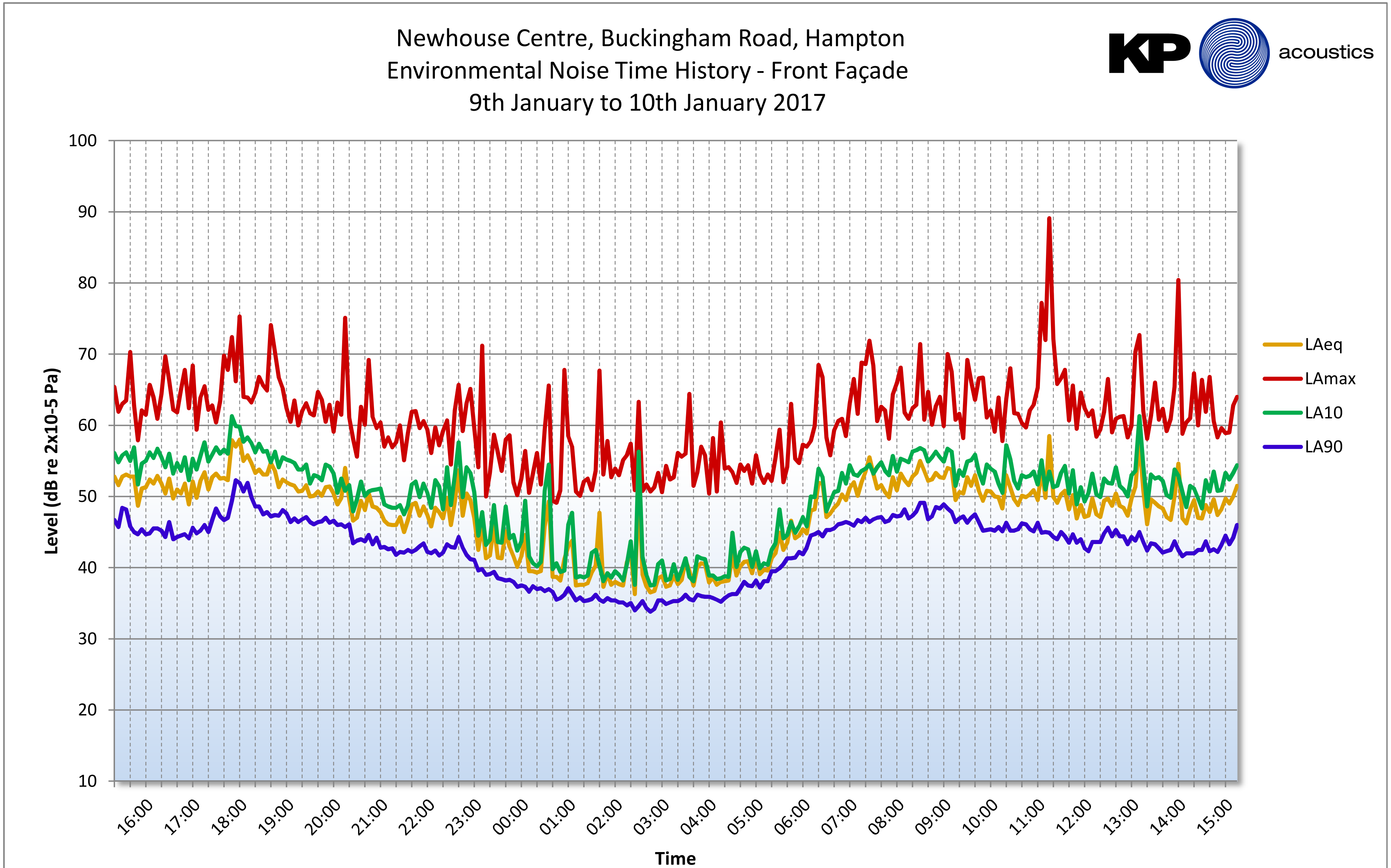


Figure 15346.TH1

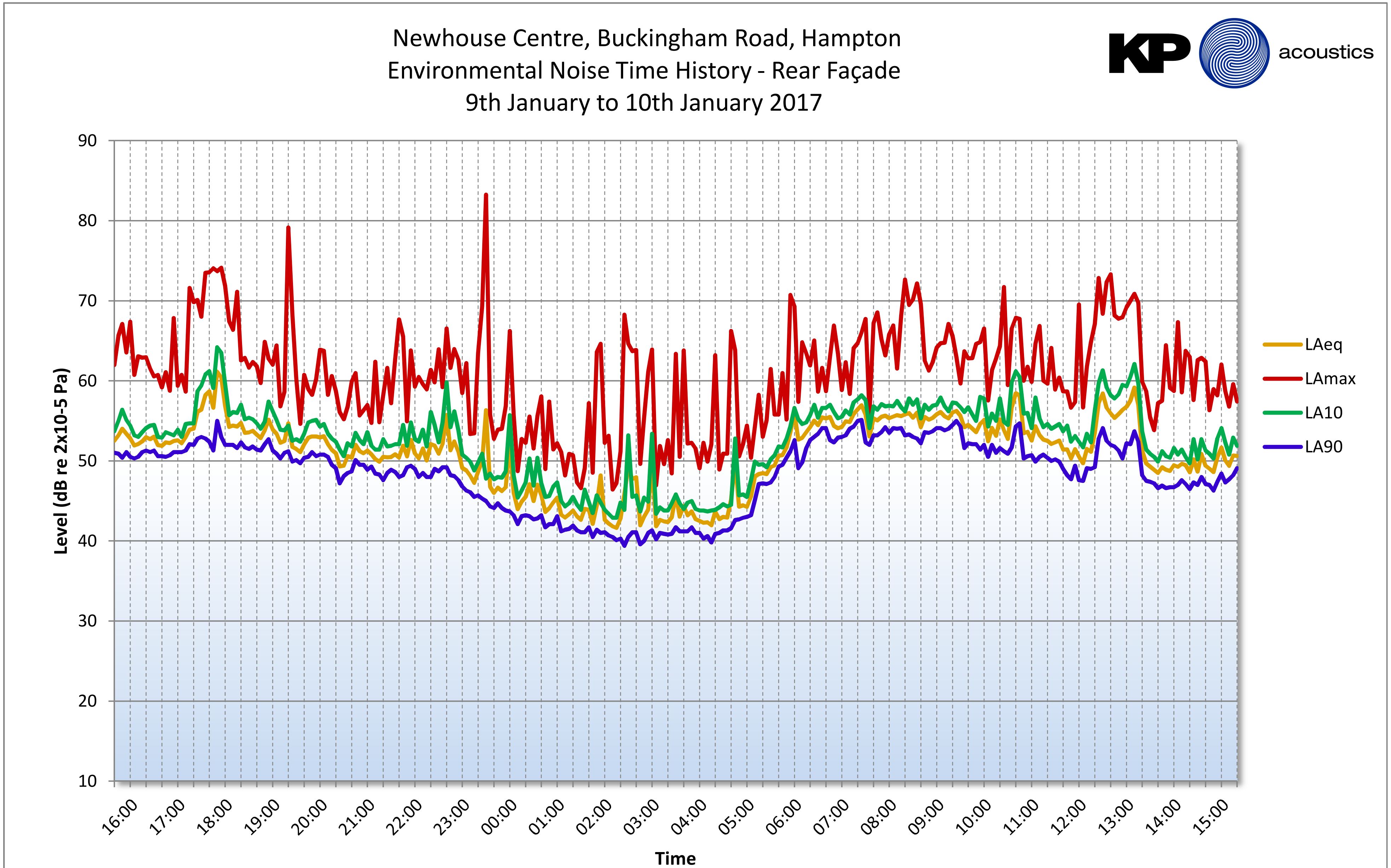
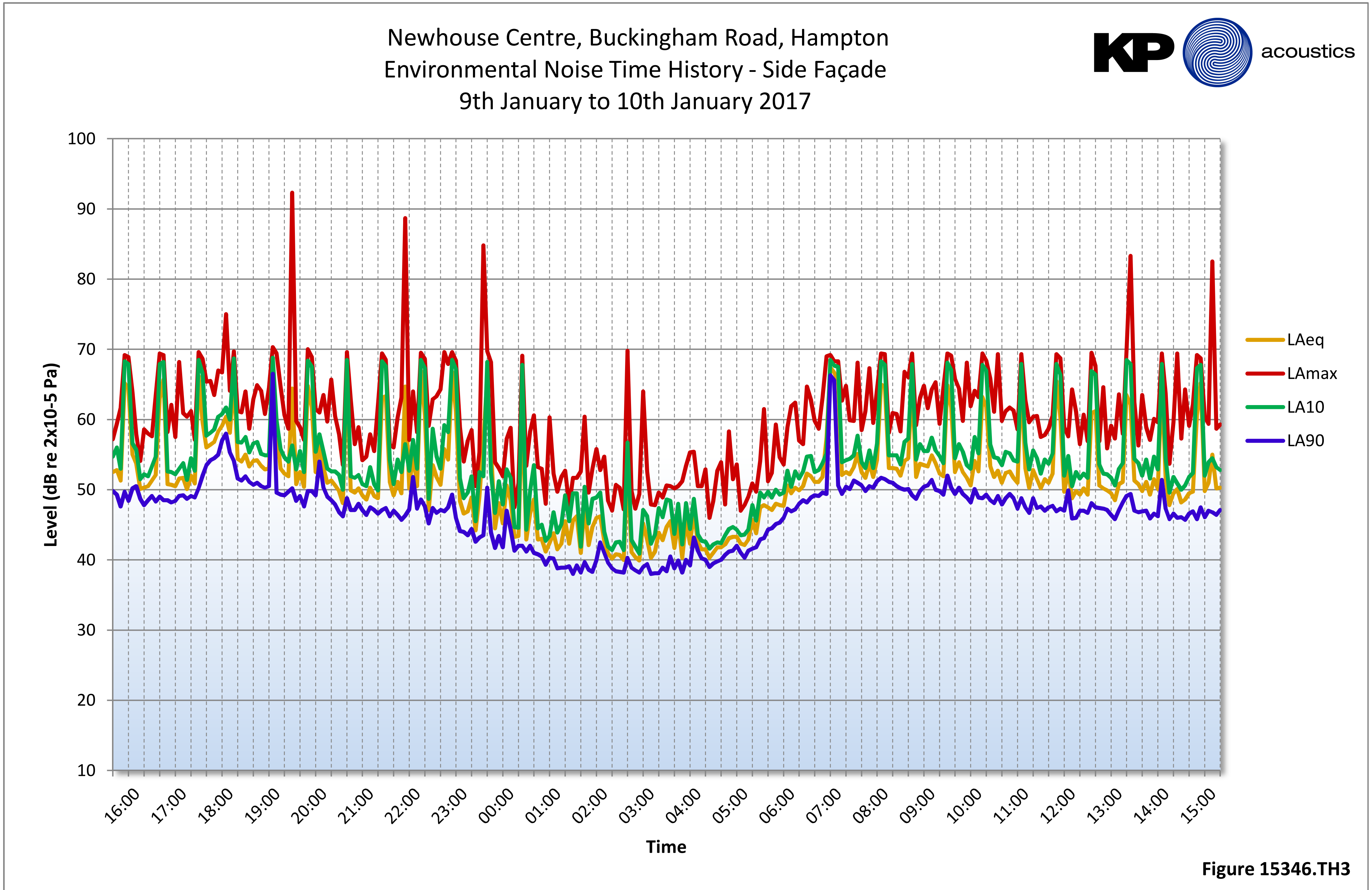


Figure 15346.TH2


Newhouse Centre, Buckingham Road, Hampton
Environmental Noise Time History - Side Façade
9th January to 10th January 2017
KP acoustics
Level (dB re 2x10-5 Pa)
100
90
80
70
60
50
40
30
20
10
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
Time
LAeq
LAmax
LA10
LA90
Figure 15346.TH3

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where 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 no 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 no 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 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

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 a single source and 4 sources produce a 6dB 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 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is 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 guide to explain increases or decreases in sound levels for many scenarios.

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

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

Newhouse Centre, Buckingham Road, Hampton

Plant Unit Emissions Calculations

Source: Condenser Unit **Receiver: Closest Residential Receiver**	*Frequency, Hz* 63	125	250	500	1k	2k	4k	8k	*dB(A)*
Condenser Unit Sound Power Level	No Spectral Data Available								62
Conversion to Sound Pressure Level at 1m									-11
Correction due to reflections									3
Attenuation provided by distance to receiver (min. 35m)									-31
Sound pressure level 1m from nearest residential receiver									**23**
								Design Criterion	**41**

Receiver: Inside Nearest Residential Window

Source: Condenser Unit	*Frequency, Hz* 63	125	250	500	1k	2k	4k	8k	*dB(A)*
Sound pressure level outside window									23
Minimum attenuation from partially open window, dB									-10
Sound pressure level inside nearest noise sensitive window									**13**

Source: Condenser Unit **Receiver: Closest School Receiver**	*Frequency, Hz* 63	125	250	500	1k	2k	4k	8k	*dB(A)*
Condenser Unit Sound Power Level	No Spectral Data Available								62
Conversion to Sound Pressure Level at 1m									-11
Correction due to reflections									3
Attenuation provided by distance to receiver (min. 3m)									-10
Attenuation provided by screening									-5
Sound pressure level 1m from nearest school receiver									**39**
								Design Criterion	**45**

Receiver: Inside Nearest Classroom Window

Source: Condenser Unit	*Frequency, Hz* 63	125	250	500	1k	2k	4k	8k	*dB(A)*
Sound pressure level outside window									39
Minimum attenuation from partially open window, dB									-10
Sound pressure level inside nearest classroom window									**29**