Appendix 4

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CLIFTON HILL, LONDON

NOISE MONITORING SUMMARY

Report 14152.NM.01 rev.A

For:

Clifton Hill Residents Group

Clifton Hill

London

Site Address	Report Date	Revision History
Clifton Hill, London	15/08/2017	Rev.A – 29/08/2017

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics has been commissioned by Clifton Hill Residents Group, Clifton Hill, London, to undertake noise monitoring following the opening of a public house in Clifton Hill, London.

Measured noise levels at 97 Clifton Hill during key events identified by the Clifton Hill Residents Group are compared with background noise levels from the results of previous surveys undertaken on site, in order to identify any increase in background noise level as a result of the public house operation.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

Continuous environmental noise monitoring has been undertaken at the position shown in Site Plan 14152.SP2. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and previous survey data. Continuous automated monitoring was undertaken for the duration of the survey between 22nd June and 28th July 2017.

2.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- Svantek Type 958 Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

3.1 Original Background Environmental Noise Survey

The $L_{Aeq:\ 15min}$, $L_{Amax:\ 15min}$, $L_{A10:\ 15min}$ and $L_{A90:\ 15min}$ acoustic parameters were measured and are shown as a time history in Figure 14152.TH2. This survey was undertaken as referenced in report 14152.NIA.02.

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

The minimum background noise levels as measured during the original survey during daytime and night-time over the weekend period are shown in Table 3.1.

	Background noise level $L_{A90:\,15min}$ dB(A)
Daytime (07:00-23:00)	**34 dB(A)**
Night-time (23:00-07:00)	**30 dB(A)**

Table 3.1 Originally Measured Background Noise Levels

3.2 Environmental Noise Monitoring Results

The $L_{Aeq:\,15min}$, and $L_{A90:\,15min}$ acoustic parameters were measured throughout the duration of the noise monitoring exercise. The full results of this are shown in time history 14152.NMTH2. A number of key events were logged by the Client during this survey period, and are highlighted in time history 14152.NMTH1.

The key events captured during the noise monitoring exercise as identified by the Clifton Hill Residents Group are as shown in table 3.2 below, excluding events occurring outside the weekend period (Friday – Sunday), in order to relate events to background noise levels measured during the original survey.

Date and Approximate Time of Event	Description of Event
Sunday 3 July, 17.00 to 22.00	Noise from Public House
Friday 7 July, 19.10 to 21.00	Noise from Public House
Saturday 15 July, 17.15 to 20.30	Noise from Public House
Sunday 16 July, 18.00 to 21.00	Noise from Public House

Table 3.2 Description and approximate time of key events

Average measured $L_{Aeq:event}$, minimum $L_{Aeq:15min}$, and minimum $L_{A90:15min}$, throughout the duration of each even have been calculated and are shown in Table 3.3 below.

Date and Approximate Time of Event	Description of Event	Average measured $L_{Aeq:event}$	Minimum $L_{Aeq:15min}$	Minimum $L_{A90:15min}$
Sunday 3 July, 17.00 to 22.00	Noise from Public House	61 dB	50 dB	38 dB
Friday 7 July, 19.10 to 21.00	Noise from Public House	56 dB	53 dB	47 dB
Saturday 15 July, 17.15 to 20.30	Noise from Public House	56 dB	51 dB	43 dB
Sunday 16 July, 18.00 to 21.00	Noise from Public House	54 dB	53 dB	42 dB

Table 3.3 Noise levels measured during events

4.0 DISCUSSION

In order to provide a robust assessment, noise levels measured throughout the noise monitoring exercise for key events are compared with the background noise levels as measured prior to the opening of the public house.

In many cases, the criteria applied to the introduction of a new noise source into a residential area such as this is that noise emissions from the new noise source should not generate any increase over the existing background noise level in the area.

It should be noted that typically variations in background noise (LA90) in the region of 5dB are not uncommon as a result of a number of factors which may not be attributed to the noise source in question, such as weather, slight changes in road traffic patterns, changes in any overhead flight paths or other similar events. It would however be expected that any significant deviation (5dB or more) in the originally measured background noise level (LA90) during the identified events, would be attributed to the identified event itself. In this case this would mean that exceedances during these events would be attributed to the public house operation.

The daytime minimum background noise level during the weekend period according to the original survey undertaken was 34dB(A) without the public house in operation. As such, a noise emissions criterion of 39dB(A) is proposed in this case. Minimum dB L_{A90} exceeding the criteria would be expected to be sufficient to disturb the amenity of nearby residential receivers, such as the Client's premises.

Date and Approximate Time of Event	Description of Event	Original Background Noise Level (min. L_{A90})	Noise Emissions Criterion (L_{A90})	Minimum $L_{A90:15min}$
Sunday 3 July, 17.00 to 22.00	Noise from Public House	34 dB(A)	39 dB	38 dB
Friday 7 July, 19.10 to 21.00	Noise from Public House			47 dB
Saturday 15 July, 17.15 to 20.30	Noise from Public House			43 dB
Sunday 16 July, 18.00 to 21.00	Noise from Public House			42 dB

Table 4.1 Noise levels measured during events compared with criteria

As shown in Table 4.1 above, all minimum $L_{A90:15min}$ measurements during the identified event periods exceed the originally measured background noise level on site. The criteria of 39dB(A) is exceeded on three of these occasions by a significant and clearly discernible margin.

Based on this evidence alone, it would be expected that the amenity of neighbouring noise sensitive receivers to the public house would be negatively affected during the operation of the public house.

It should be noted that this presents the least onerous assessment. In similar cases, measured $L_{Aeq:15min}$ during the event is compared directly with the noise emissions criterion. This assessment is shown in Table 4.2 below.

Date and Approximate Time of Event	Description of Event	Original Background Noise Level (min. L_{A90})	Noise Emissions Criterion (L_{A90})	Minimum $L_{Aeq:15min}$
Sunday 3 July, 17.00 to 22.00	Noise from Public House	34 dB(A)	39 dB	50 dB
Friday 7 July, 19.10 to 21.00	Noise from Public House			53 dB
Saturday 15 July, 17.15 to 20.30	Noise from Public House			51 dB
Sunday 16 July, 18.00 to 21.00	Noise from Public House			53 dB

Table 4.2 Noise levels measured during events compared with criteria

As shown in Table 4.2 above, the minimum $L_{Aeq:15min}$ measured during the identified events significantly exceeds the proposed noise emissions criterion. As a result, this would be expected to negatively impact the amenity of neighbouring noise sensitive receivers.

5.0 CONCLUSIONS

Environmental noise monitoring has been undertaken at 97 Clifton Hill, London, by KP Acoustics Ltd between 22nd June and 28th July 2017.

Measured noise levels during key events identified by the Client have been compared directly with a noise emissions criterion determined as a result of the original noise survey undertaken referenced in 14152.NIA.02.

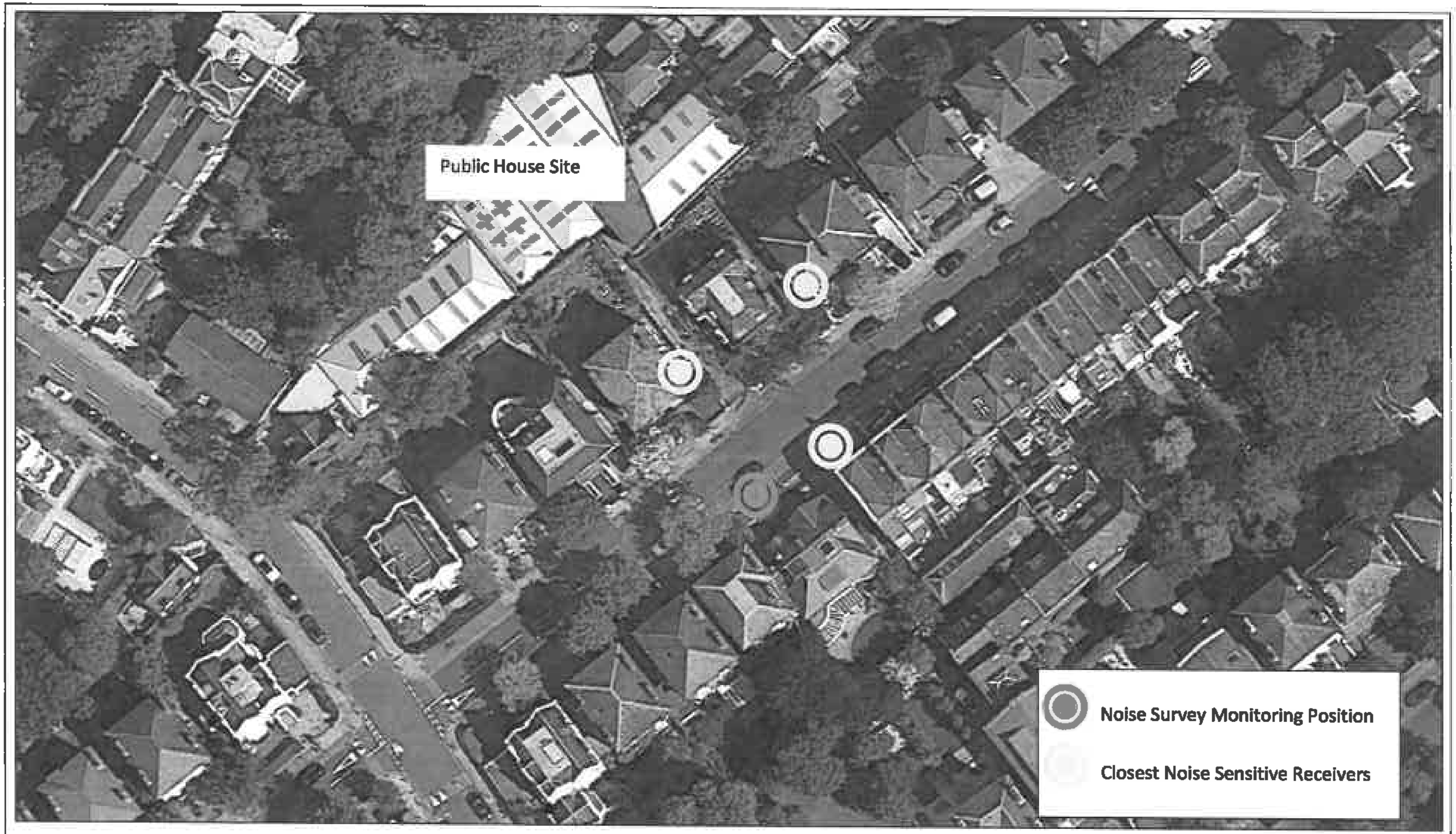
Comparison of noise levels received with the noise emissions criterion have determined that a negative impact on the amenity of neighbouring noise sensitive receivers to the public house would be expected to result from the continued operation of the public house.

Report by:

Duncan Arkley AMIOA
KP Acoustics Ltd.

Checked by:

Daniel Green AMIOA
KP Acoustics Ltd.



Title: Indicative site plan showing noise monitoring position and the closest noise sensitive receivers. Ref. Google Maps

Date: 15th August 2017

FIGURE 14152.SP2

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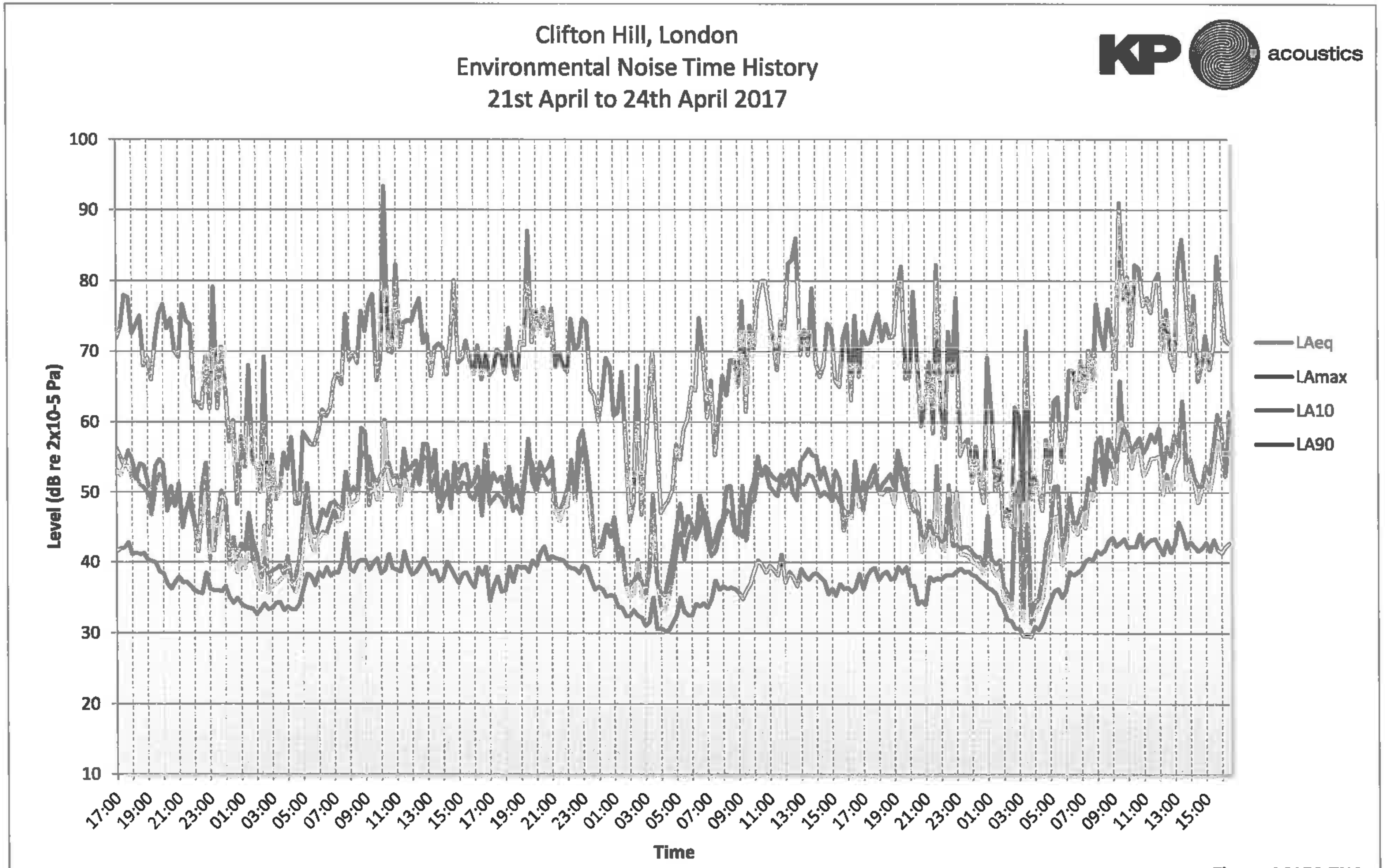

Figure 14152.TH2

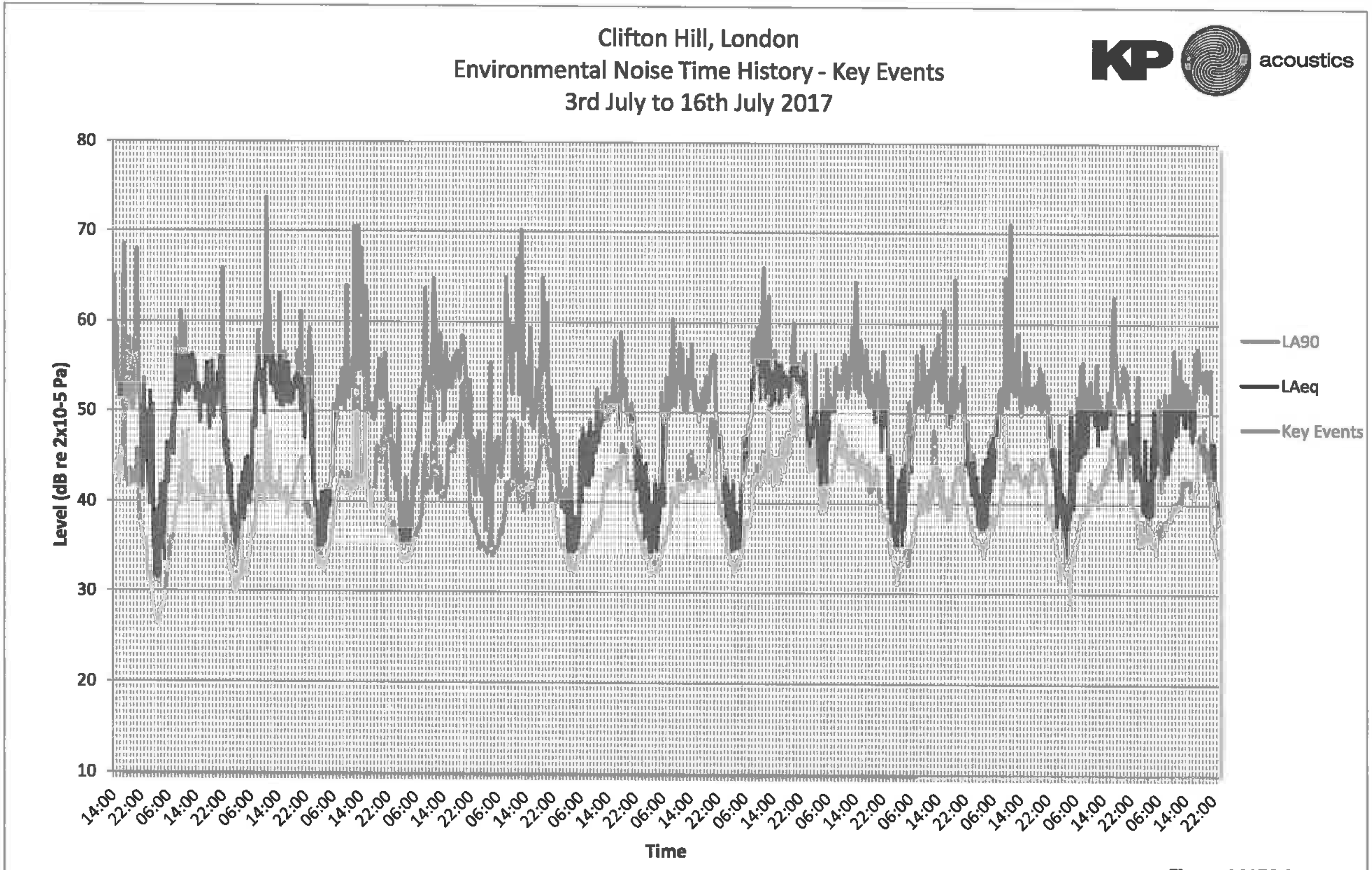

Figure 14152.NMTH1

Clifton Hill, London
Environmental Noise Time History
22nd June to 28th July 2017

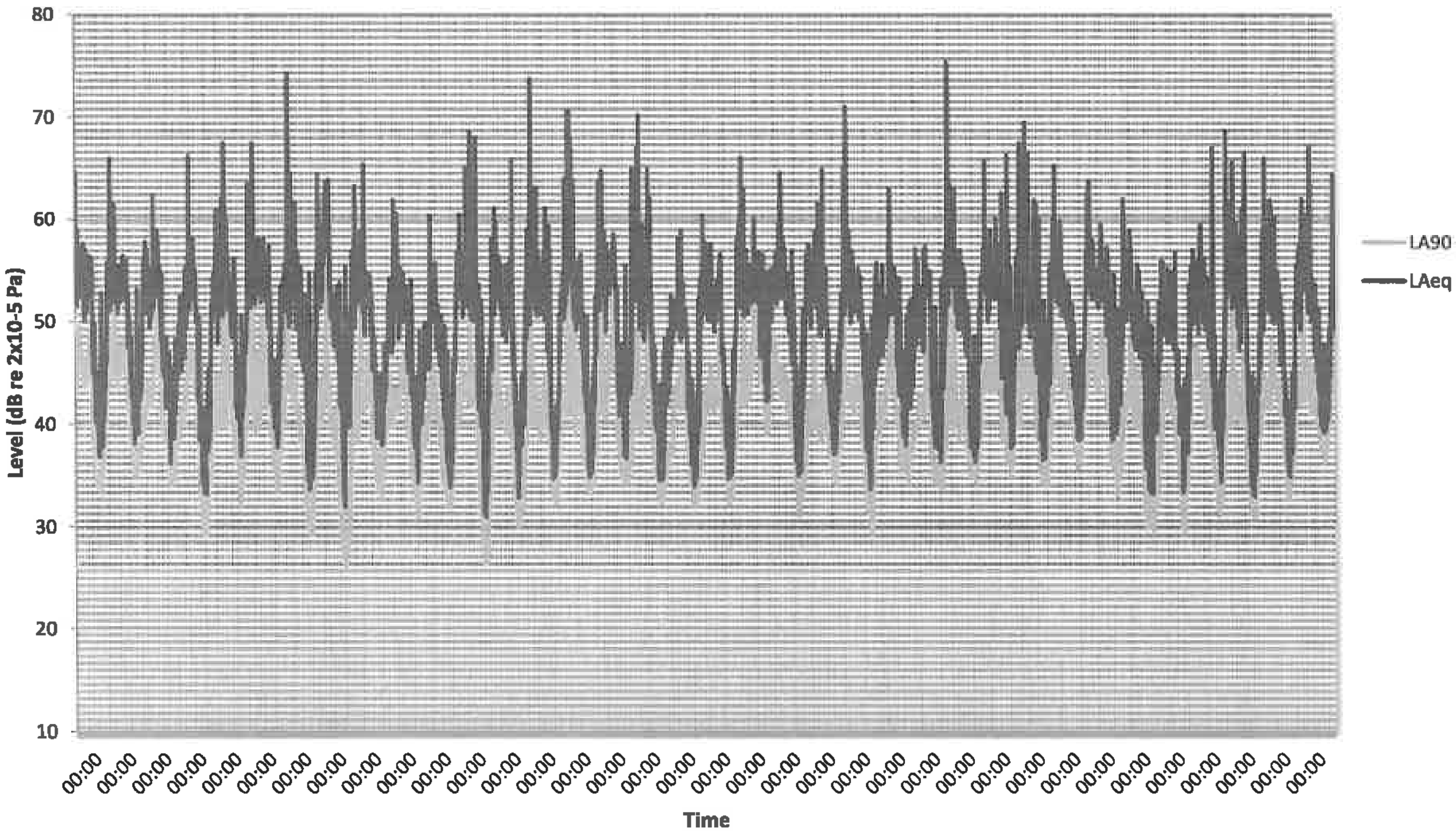

Figure 14152.NMTH2

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CLIFTON HILL, LONDON

NOISE IMPACT ASSESSMENT

Report 14152.NIA.02 Rev.A

For:

Mr John Harrison

97 Clifton Hill

London

NW8 0JR

Site Address	Report Date	Revision History
Clifton Hill, London	15/05/2017	Rev.A – 01/06/2017

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics has been commissioned by Mr John Harrison, 97 Clifton Hill, London, NW8 0JR, to undertake a noise impact assessment for a proposed public house located Clifton Hill, London.

Measured background noise levels will be used to assess the potential noise impact of the proposed public house to nearby neighbouring noise sensitive receivers.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

Measurements were taken at the position shown in Site Plan 14152.SP2. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver. Continuous automated monitoring was undertaken for the duration of the survey between 20th April and 24th April 2017.

Weather conditions throughout the survey were dry generally with light winds, therefore suitable for the measurement of environmental noise.

The measurement procedure fully 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 use and no abnormalities were observed.

The equipment used was as follows.

- Svantek Type 958 Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

3.1 Environmental Noise Survey

The $L_{Aeq:\,15min}$, $L_{Amax:\,15min}$, $L_{A10:\,15min}$ and $L_{A90:\,15min}$ acoustic parameters were measured and are shown as a time history in Figure 14152.TH2.

Initial inspection of the site revealed that the background noise profile at the monitoring location was dominated by road traffic noise from the surrounding roads. Due to a-typical background noise received as a result of building works on site, noise data from Thursday 20th until Friday 21st at 17:00 have been omitted from the survey results.

The proposed hours of operation for the public house are understood from the premises license to be 10:00 – 23:30 Monday to Saturday, and 12:00 – 23:00 on Sundays.

The minimum background noise levels for each period are shown in Table 3.1.

	Background noise level $L_{A90:\ 15min}$ dB(A)
Daytime (07:00-23:00)	34 dB(A)
Night-time (23:00-07:00)	30 dB(A)
Operating Hours (10:00-23:30 Friday-Saturday), (12:00-23:00 Sunday)	34 dB(A)

Table 3.1 Background noise levels

From available layout plans and proposals for the public house, the primary point of entrance and egress from the public house will be to the South West. It would be expected that this will be the primary noise breakout element, in particular when patrons are leaving the public house.

In this case, one potential noise issue could arise from conversation between patrons as they enter and exit the public house, or while patrons are seated in the external seating area to the front of the public house. While this cannot be directly controlled by the site management, noise from patrons will inherently be present with the introduction of the proposed public house with external seating areas as these are currently planned.

An additional noise issue would be expected to arise from noise breakout from the public house itself. Based on nominal attenuation figures to be expected from the external building fabric of the public house, and typical internal noise levels to be expected, noise propagation from the public house to the nearest noise sensitive receivers has been predicted.

Table 3.2 shows spectral noise levels of typical a busy pub/bar, which will be used in this assessment as a nominal internal noise level for the public house.

	Sound Pressure Level (dB) in each Frequency Band							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**dB(A)**
Busy Pub/Bar (Typical values)	80	85	85	85	85	80	70	88

Table 3.2 Sound Pressure Level of a typical busy pub/bar

Table 3.3 shows spectral noise levels of typical male human speech, which will be used in this assessment as a reference for noise levels within the front external space. It is now understood that up to 5 patrons will use the external space during the critical hours after 22:00.

	Sound Pressure Level (dB) in each Frequency Band (at 1m)							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Human Speech (Typical values)	37	48	59	64	61	53	46	37

Table 3.3 Sound Pressure Level of Human Speech

3.2 Objective overview

Taking all acoustic corrections into consideration, including distance corrections and nominal external building fabric attenuation, the noise levels expected at the closest residential window would be as shown in Table 3.4 as a result of both patron noise and noise breakout. Detailed calculations are shown in Appendix B1-2.

We would recommend the adoption of the operating hours minimum background level L_{A90} (15 minutes) as a noise emissions criterion to ensure the amenity of the closest receivers will be protected.

Receiver - Nearest Noise Sensitive Window	Minimum background level $L_{A90:15min}$ criterion	Noise Level at closest Receiver as a Result of Noise Breakout	Noise Level at closest Receiver as a Result of Public House Patrons
External seating area	34 dB(A)	36 dB(A)	52 dB(A)

Table 3.4 Predicted noise level at nearest noise sensitive receiver

As shown in Appendix B1-2 and Table 3.4, transmission of noise to the nearest sensitive windows due to both noise breakout and externally located patrons would be expected to exceed the background noise levels in the area.

It would be expected that the source of noise related complaints potentially received would be as a result of patrons using the site externally to the building, such as external seating areas to the front and rear of the site.

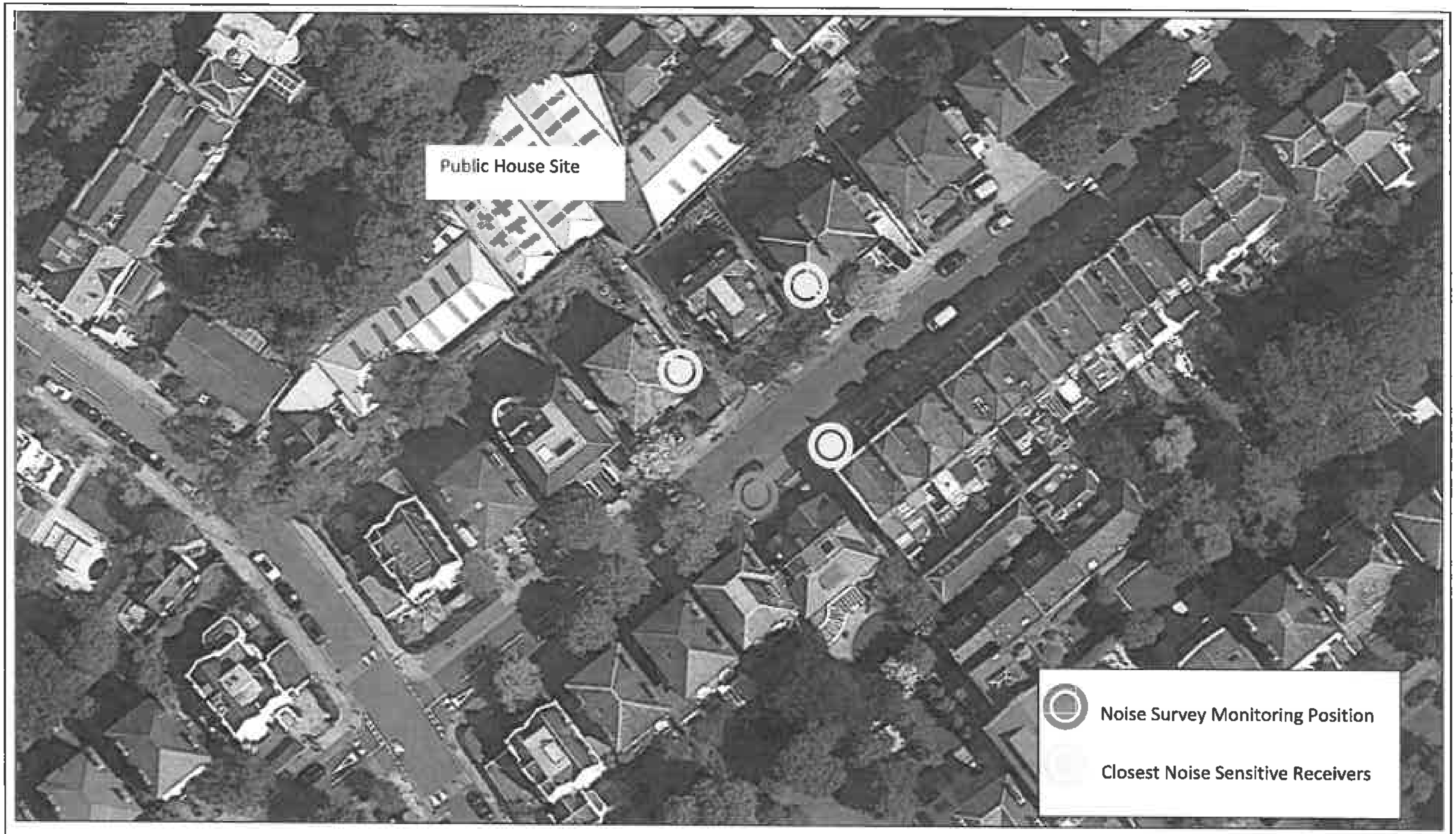
While it is possible to limit noise emissions from these spaces by means of screens and the incorporation of a noise management plan, control of noise would still be difficult to implement due to the inherent nature of the noise sources. As such, it would be recommended that general control measures such as acoustic screening, and time restrictions, are investigated further for use of the external space.

4.0 CONCLUSIONS

An environmental noise survey has been undertaken at Clifton Hill, London, by KP Acoustics Ltd between 20th April and 24th April 2017.

Calculations show that noise emissions from the proposed public house, including external seating areas, would exceed the measured background noise levels on site, and as such would be likely to cause complaints, without the use of suitable mitigation measures such as a noise management plan and the implementation of noise control measures.

Report by:	Checked by:
Duncan Arkley AMIOA **KP Acoustics Ltd.**	**Kyriakos Papanagiotou MIOA** **KP Acoustics Ltd.**



Title: Indicative site plan showing noise monitoring position and the closest noise sensitive receivers. Ref. Google Maps

Date: 15th May 2017

FIGURE 14152.SP2

KP acoustics

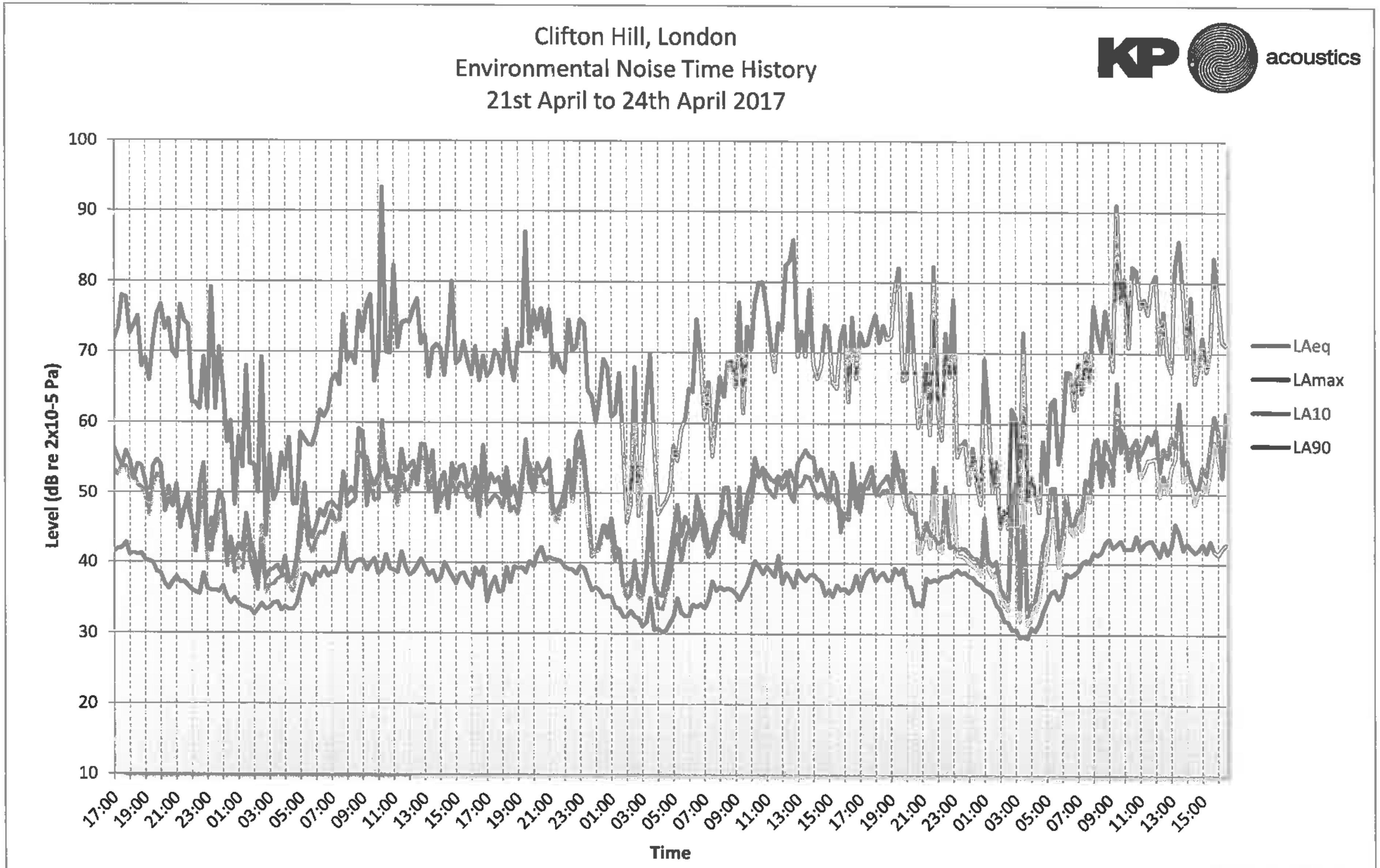


Figure 14152.TH2

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 B1 Rev.B- Noise Breakout

Clifton Hill, London

NOISE BREAKOUT CALCULATIONS

Acoustic Calculation used for Indoor to Outdoor Transmission:

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10\log_{10} S + 10\log\left(\frac{Q}{4\pi r^2}\right) - 6dB$$

Source: Typical Internal Levels via Main Entrance Door Breakout Receiver: Nearest Residential Window	*Frequency, Hz*								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Typical Internal Levels	80	85	85	85	85	80	70	70	88
Typical nominal sound reduction index of façade	-15	-15	-20	-20	-23	-26	-28	-30	
Correction for total area of building facade ($S = 15m^2$)	12	12	12	12	12	12	12	12	
Correction for directivity (Q) and distance (r) (Q=2, r = 10m)	-18	-18	-18	-18	-18	-18	-18	-18	
Non reverberant correction	-6	-6	-6	-6	-6	-6	-6	-6	
Predicted sound pressure level 1m from nearest residential receiver	35	40	35	35	32	24	12	10	36

Design Criterion	34

APPENDIX B2 Rev.B - External Patron Noise

Clifton Hill, London

Outdoor Seating Area Noise Calculations

APPENDIX B2: Noise Assessment for Receiver

Noise Source: Site Patrons in Front Seating Area

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Typical Sound Pressure Levels (at 1m)									
Human Speech (Male)	37	48	59	64	61	53	46	37	
Correction for number of patrons (5)	7	7	7	7	7	7	7	7	
Attenuation due to distance (10m), dB	-20	-20	-20	-20	-20	-20	-20	-20	
Total Sound Pressure Levels from Patrons	24	35	46	51	48	40	33	24	
Total Sound Pressure Level from Outdoor Bar Area	24	35	46	51	48	40	33	24	52

Design Criterion (Backgound Noise Level)	34

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

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Ground-borne vibration

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Sound insulation - Absorption within porous materials

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