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Sheen Lawn Tennis and Squash Club London

Noise Impact Assessment Report
Report 21200.NIA.01.Rev C

Sheen Lawn Tennis and Squash Club
Parklands Close
London
SW14 7EH

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Report 21200.NIA.01 Revision History			
First Issue Date: 16/10/2020			
A	29/10/2020 – Small corrections and clarifications made to report	D	
B	29/07/2021 – Updated site plans included	E	
C	18/08/2021 – Small amendments made	F	

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Contents

1.0 INTRODUCTION 1

2.0 SITE SURVEYS 1

2.1 Site Description 1

2.2 Environmental Noise Survey Procedure 2

2.3 Equipment 4

3.0 RESULTS 4

3.1 Environmental Noise Survey 4

3.2 Manual Noise Measurements 5

4.0 NOISE ASSESSMENT GUIDANCE 5

4.1 IMEA Guidelines for Environmental Noise Impact Assessment 5

5.0 NOISE IMPACT ASSESSMENT 6

5.1 Calculations 6

6.0 CONCLUSION 8

List of Attachments

21200. TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustics Terminology

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Sheen Lawn Tennis and Squash Club, to undertake a noise impact assessment of the aforementioned tennis club at Parklands Close, London SW14 7EH, at evening hours due to the proposed installation of additional flood lights.

A 24-hour environmental noise survey and manual noise measurements have been undertaken on site in order to prepare a noise impact assessment in accordance with relevant British standards.

This report presents the methodology and results from the environmental survey, followed by calculations in order to provide an indication as to the likelihood of the noise emissions from play on outdoor courts at the tennis club having an adverse impact on the closest noise sensitive receiver. Mitigation measures will be outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

Sheen Lawn Tennis and Squash Club located at Parklands Close, London is considering making a planning application for the installation of additional floodlights on their tennis courts.

The flood-lit courts will be located adjacent to a number of residential properties. As shown in Figure 2.1, the site is bounded by Parklands Close to the south and residential properties and gardens in all other cardinal directions. Entrance to the site is located via Parklands Close to the south.

The closest window of the nearest residential receiver would be at an approximate distance of 30 metres from the sites closest court.

The current opening hours of the Tennis club are between 08:00 and 22:00. It is important to note that one of the club's existing tennis courts has permanent floodlighting installed. The club also has approval from Richmond Borough Council for the use of temporary portable floodlighting on its other tennis courts.

Initial inspection of the site revealed that the background noise profile at the monitoring location was typical of an urban cityscape environment, with the dominant source being road traffic noise from the surrounding roads.

Due to the site's proximity to Heathrow airport, the tennis club also sits adjacent to a flight path. Analysis of the flight path routes indicate that the closest route to the site in question is the A-27 NE and SE which forms part of the operations from Heathrow for arrivals from the west only. The site also sits a similar distance from the D-09 E path, which forms part of the easterly operations for departures only.

Due to the repercussions of the Covid-19 outbreak, observations during the site visit noted that air traffic as well as vehicular and general pedestrian movements were drastically reduced, which would be a strong indicator that the noise levels reported in Table 3.1 are lower than they would be typically.

Figure 2.1 Site Location Plan (Image Source: Google Maps)

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 22:00 on 29/09/2020 and 09:00 on 01/10/2020.

In order to accurately assess the noise emissions from the play on outdoor courts at the tennis club, manual measurements were undertaken at approximately 1m from court 4 of the tennis club whilst play was taking place, play on multiple courts within the club was also taking place during this time. The measurement positions are described in Table 2.1 and shown in Figures 2.2 and 2.3, with the noise data presented in Section 3.2.

Icon	Descriptor	Location Description
	Noise Measurement Position	The meter was installed on the flat roof of the site clubhouse at approximately 1st floor level, as shown in Figure 2.2.
	Manual Noise Measurement Position	Manual measurements undertaken at 1m from court 4 during play

	Closest Noise Sensitive Receiver	Rear first floor window of residential house to the north on The Mall, Richmond
	Closest Existing Noise Source	Existing tennis court within club site
	Floodlight installations	Floodlight installations are outlined in Figure 2.3

Table 2.1 Measurement position and description

Figure 2.2 – Site measurement position (Image Source: Google Maps)

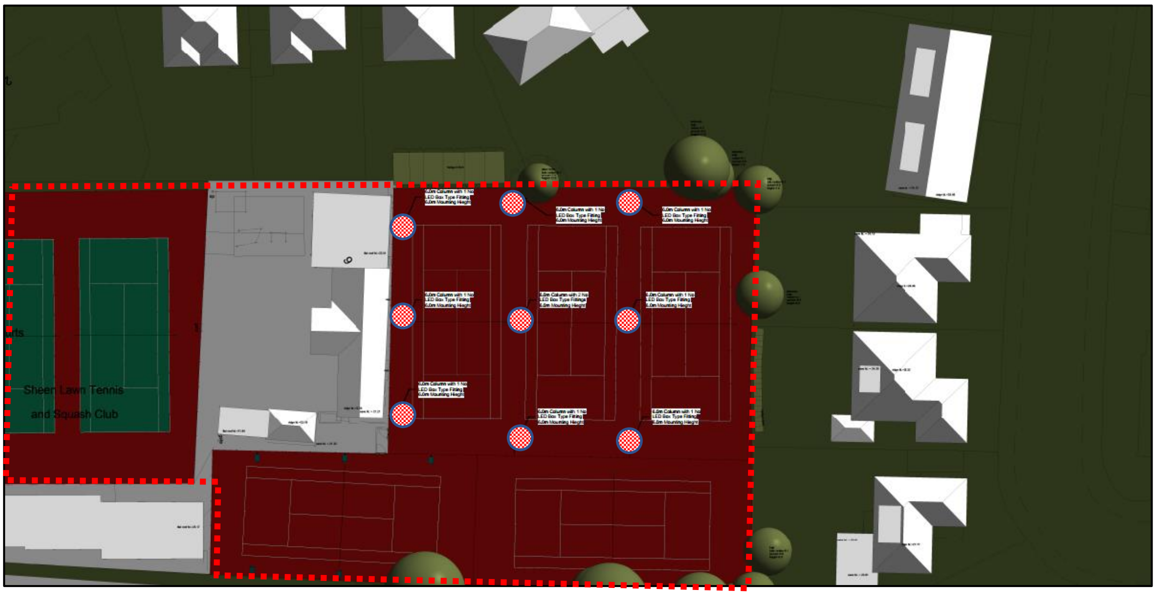

Figure 2.3 – Proposed site plans (Image Source: Sports Facility Planning and Design Ltd)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver relative to existing noise source.

Weather conditions were generally dry with light winds 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*'.

2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.3.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 7	Svantek Type 948 Class 1 Sound Level Meter	6545	03/07/2020	14015592
	Free-field microphone PCB 378B02	163182		
	Preamp PCB 377B02	043149		
	Svantek External windshield	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	04/02/2019	04130/1

Table 2.3 Measurement instrumentation

3.0 RESULTS

3.1 Environmental Noise Survey

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 21200.TH1.

The average ambient noise levels are shown in Table 3.1 for daytime and night-time.

Time Period	Average Ambient Noise Level L_{Aeq} dB(A)
Daytime (07:00-23:00)	51
Night-time (23:00-07:00)	38

Table 3.1 Representative background noise levels.

The average ambient noise levels of the late evening period during which tennis play is proposed to take place post-installation of the floodlights is shown below in Table 3.2 and will be used as a point of reference to determine the level of noise impact on nearby residential receivers. Due to the lower level of background noise generally expected during this time, comparing the calculated noise emissions of tennis play to the average ambient noise levels during this period will be more representative of the levels the adjacent residential properties on The Mall will experience during the newly proposed hours of play.

Time Period	Average Ambient Noise Level L_{Aeq} dB(A)
Evening (20:00-22:00)	45

Table 3.2 Representative background noise levels during evening period

3.2 Manual Noise Measurements

Manual measurements were taken adjacent to court 4 during a standard session of play. Play on other courts was also taking place during this time contributing to the total source emissions. This position and time were chosen to collect data on the closest court relative to the closest noise sensitive receiver as well as a representative level of noise emissions of the tennis club as a whole at standard operation.

Manual measurements were taken for one hour of activity at 10m from the centre of the closest tennis court relative to the closest noise sensitive receiver. The $L_{Aeq,1 Hour}$ measurements for the court noise emissions are presented in Table 3.2 below.

Location	One Hour of Tennis Play $L_{Aeq, 1 Hour}$ (dB)
Tennis Court 4	52

Table 3.3 Manual noise measurements of tennis court activity

4.0 NOISE ASSESSMENT GUIDANCE

4.1 IMEA Guidelines for Environmental Noise Impact Assessment

It is our professional opinion that the noise criteria should be based on the noise profile of the area at the receiver as per IMEA Guidelines for Environmental Noise Impact Assessment Version 1.2 (November 2014) in order to ensure that the amenity of the noise sensitive receiver is protected.

To determine the overall noise impact, the aforementioned document presents the combination of magnitude and sensitivity criteria into a Degree of Effect matrix as shown in Figure 4.1 with the corresponding descriptor in Table 4.2.

		IMPORTANCE/SENSITIVITY OF RECEPTOR			
		High	Medium	Low	Negligible
MAGNITUDE/SCALE OF CHANGE	Large	Very Substantial	Substantial	Moderate	None
	Medium	Substantial	Substantial	Moderate	None
	Small	Moderate	Moderate	Slight	None
	Negligible	None	None	None	None

Table 4.1 Degree of effect matrix

Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
None	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

Table 4.2 Effect descriptor

Taking into account that the residential building receiver would be considered as Medium-High sensitive receiver, we would recommend that the noise generated by the activities at the proposed two flood-lit tennis courts should not change moderately or substantially the current ambient noise of the area over the operating hours.

5.0 NOISE IMPACT ASSESSMENT

Table 5.2 shows the results of the predictions for the tennis courts to the closest noise sensitive receiver, based on an assessment period of 1 hour.

5.1 Calculations

The 'Specific Sound Level' of tennis activity within the club has been calculated at 1m from the closest receiver using the noise levels shown in Table 5.1, and corrected due to different acoustic propagation features such as distance, reflective surfaces, screening elements, etc. Detailed calculations are shown in Appendix B.

The 'Rating Level' of the tennis court noise emissions has been assessed following the 4.1 IMEA Guidelines for Environmental Noise Impact Assessment for the evening period when the Tennis club would be newly operational, with a subsequent conclusion taking into consideration the above context. The full assessment is presented in Table 5.1.

Noise Impact Assessment		
Source:	Activity on tennis courts within Sheen Lane Tennis and Squash Club	
Operating Period:	Evening	
Reference time interval (*Tr*):	1 h	
Receiver:	Rear 1st floor window of residential house to the north on The Mall	
Element	**Level (dB)**	**Comment**
Specific Sound Level $L_s=L_{Aeq,\ Tr}$	52	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r. In this case, the specific sound levels take into consideration noise data measured on-site.
Distance Correction $D_T=20xlog(D_1/D_2)$	-10	A correction of -10dB has been applied for the minimum attenuation provided by the distance between the source and receiver. The calculation has considered the 30m distance between the centre of the court and the receiver window (D and the 10m distance between the centre of the court and the noise measurement position
Specific Sound Level at Receiver	42	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the receiver. Taking into account the attenuation provided by distance
Residual Ambient Noise Level (no tennis activity) during evening period, LAeq dB	45	Average sound pressure level at the assessment location during the environmental noise survey undertaken on site

Total Level at receiver due to specific sound level and residual ambient noise level	47	Specific Sound Level at receiver + Average Ambient Noise Level
Change in sound level at a receptor due to tennis activity	+2	
Assessment Indication		
It is anticipated that the change in the ambient sound level when measured for 1h at 1m from the identified receptor´s façade due to tennis activity on the tennis courts would be no more than 2dB above the existing residual ambient noise level. When compared alongside the noise assessment guidance provided by the IMEA Guidelines, and the effect descriptor levels detailed in table 4.2, the less than 2.9dB change in sound level can be considered negligible and would result in no adverse impact upon the closest noise sensitive receiver.		

Table 5.1 Noise impact assessment

As shown in Table 5.1, tennis play on the existing tennis courts would be expected to have no adverse impact on the amenity of the nearby noise sensitive receivers.

6.0 CONCLUSION

An environmental noise survey, manual noise measurements and a noise impact assessment have been carried out for Sheen Lawn Tennis and Squash Club at Parklands Close, London SW14 7EH.

The calculations have allowed the degree of acoustic impact upon the existing adjacent residential properties as a result of tennis play during the newly proposed evening hours to be predicted.

Current calculation results have shown that noise emissions of the tennis courts during evening hours would be negligible when compared to the existing ambient noise level.

The proposed floodlight installation would result in a low magnitude of noise impact and an indication of no adverse impact on the closest residential receiver, in accordance with the IMEA Guidelines for Environmental Noise Impact Assessment.

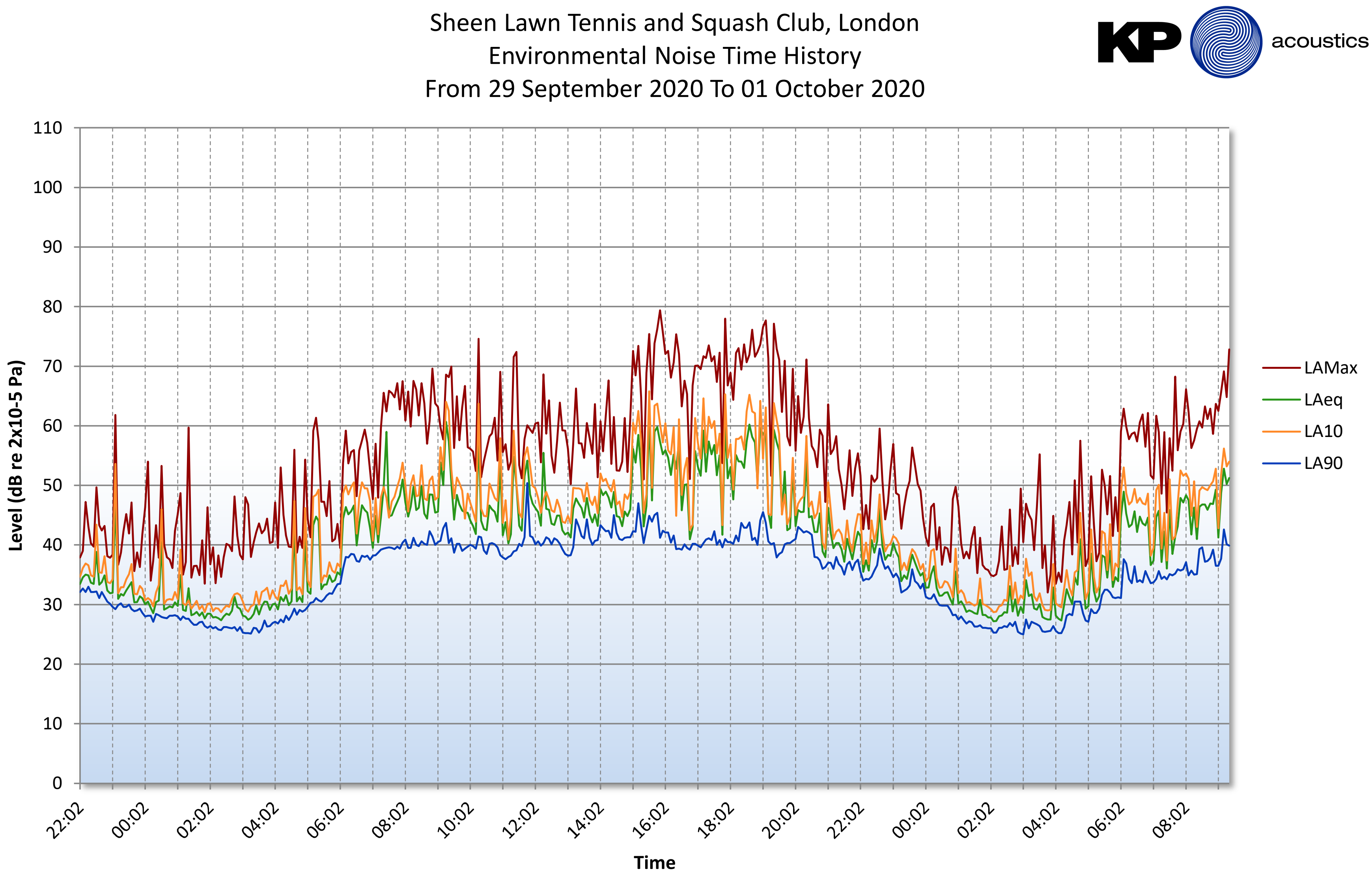

Figure 21200.TH1

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.