APPENDIX A

SH Acoustics: Pickleball Noise Guidelines

Town of Wellesley, MA

Pickleball Noise Guidelines

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Introduction

Weston & Sampson have engaged the expertise of SH Acoustics (SHA) to develop comprehensive noise guidelines tailored specifically for the selection and placement of public pickleball courts in Wellesley, MA. The primary objective of these guidelines is to effectively mitigate the noise generated by pickleball play, ensuring that it falls within an acceptable range that minimizes disturbance to nearby residents and surrounding areas. Through careful consideration of the specific nature of pickleball noise, mitigation strategies, and the multiple contributing factors to outdoor noise propagation, SHA has created a point system that can identify the noise mitigation necessary for a given plot near residential spaces to maintain the tranquility and well-being of local residents.

Pickleball is the fastest growing sport in the United States and throughout this growth, many issues with the sound of the sport have arisen across the country. Many pickleball court installations are situated too close to residential properties and/or without the appropriate noise mitigation. However, it's essential to recognize that pickleball noise is a manageable issue with the implementation of proper noise mitigation strategies. By utilizing techniques such as strategically placed fencing, and designated playing hours, communities can effectively control and minimize the impact of pickleball noise. Unlike tennis, pickleball has a distinct “plunk” noise due to the hard plastic ball against a hard paddle. We have measured this frequency to be around 1 kHz. Fortunately, this relatively small wavelength can be easily controlled with the appropriate noise mitigation.

Noise codes frequently fail to account for pickleball gameplay's unique sound profile and frequency. The repetitive thwack of paddles hitting balls and the reverberations off hard court surfaces can be particularly disruptive in residential areas. However, these nuances are seldom captured in traditional noise ordinances. Consequently, residents near pickleball courts may experience heightened frustration due to the lack of specific guidelines tailored to mitigate the annoyance factor of pickleball noise. Addressing this gap in noise regulation requires a nuanced approach that considers the distinctive characteristics of pickleball sound and its impact on community well-being, prompting noise guidelines specific to the sport.

Contributing Factors to Pickleball Noise Propagation:

The main factors that play into how disruptive a sound will be is Factors at play are:

Distance: naturally, the further a residential property is to a court or set of courts, the weaker the sound waves will be as they propagate in all directions.

Relative Topography: The elevation of the court(s) vs. the elevation of the

Number of Courts: A larger number of courts will increase the number and frequency of pickleball hits and the number of players.

Night Play: If the courts are to have lights installed and play can be expected into later hours of the day and into the night, additional mitigation will be required. This is due to a variety of factors, including quieter background noise levels and the tendency for sound to bend back down to the earth after the sun sets due to temperature inversions.

Noise Reducing Paddles:

While our system below acknowledges the potential variance in equipment choices among players, promoting the adoption of noise-reducing paddles can significantly contribute to minimizing overall noise levels on the court. These paddles offer a practical solution by dampening the sound produced during gameplay, thereby lessening the potential for disturbance to nearby residents. While it is understood that not all players may opt to use these specialized paddles, promoting their adoption can help cultivate a culture of mindfulness and respect for the surrounding community.

Proposed Guidelines

To determine if a piece of land is appropriate for pickleball courts, the factors of distance, relative topography, number of courts and nighttime play should all be considered. Use Table 1 below to calculate the points for the specific plot of land to determine how tall of an acoustic barrier, if any, would be required. Determine the number of points for each contributing factor by using the formulas provided or the tables on the following pages. Once the total number of

points is summed, use Table 2 to determine if and how tall a barrier is necessary, or if the studied location is not acceptable for pickleball.

Table 1:

Factor:	Description:	Points Formula (refer to tables on the following pages for each factor)	Points:
Distance (in feet)	D = Shortest distance between the edge of the court to the nearest property line, in feet	$\text{Distance Points} = 55 - \left\lvert 10 \cdot \log\left(\frac{2}{4\pi \cdot (D \times 0.305)^2}\right)\right\rvert$ *(see Table 3 for a conversion chart)*	
Relative Topography	Ep = Elevation of the nearest point along the property line, in feet Ec = Elevation of the proposed courts' playing level, in feet	$\text{Topo Points} = (E_p - E_c) \times 0.2$ *(see Table 4 for a conversion chart)*	
Number of courts	N = number of courts	$\text{Courts Points} = 13 \cdot \log(N)$ *(see Table 5 for a conversion chart)*	
Lights/Night Playing	If lights are to be installed/night playing will be allowed, add 5 points. If not, add 0.	$\text{Night Points} = 5$	
		Sum of Points from all factors:	

Table 2:

Number of Points	Height of Barrier Required
0 or less	No barrier required
0 - 6 points	6' barrier
7 - 8 points	8' barrier
9 - 10 points	10' barrier
11 - 13 points	12' barrier
14 - 16 points	15' barrier
17 or more points	Courts should not be constructed in this location.

Distance Factor:

Where "D" is the shortest distance between the edge of the court surface to the nearest property line, measured in feet.

D	Points		D	Points		D	Points		D	Points
20'	31		210'	11		480'	4		1250'	-5
25'	29		220'	10		490'	4		1300'	-5
30'	28		230'	10		500'	3		1350'	-5
35'	26		240'	10		525'	3		1400'	-6
40'	25		250'	9		550'	3		1450'	-6
45'	24		260'	9		575'	2		1500'	-6
50'	23		270'	9		600'	2		1600'	-7
55'	23		280'	8		625'	1		1700'	-7
60'	22		290'	8		650'	1		1800'	-8
65'	21		300'	8		675'	1		1900'	-8
70'	20		310'	8		700'	0		2000'	-9
75'	20		320'	7		725'	0		2100'	-9
80'	19		330'	7		750'	0		2200'	-10
85'	19		340'	7		775'	0		2300'	-10
90'	18		350'	6		800'	-1		2400'	-10
95'	18		360'	6		825'	-1		2500'	-11
100'	17		370'	6		850'	-1		2600'	-11
110'	17		380'	6		875'	-2		2700'	-11
120'	16		390'	6		900'	-2		2800'	-12
130'	15		400'	5		925'	-2		2900'	-12
140'	14		410'	5		950'	-2		3000'	-12
150'	14		420'	5		975'	-2		3500'	-14
160'	13		430'	5		1000'	-3		4000'	-15
170'	13		440'	4		1050'	-3		4500'	-16
180'	12		450'	4		1100'	-3		5000'	-17
190'	12		460'	4		1150'	-4		5500'	-17
200'	11		470'	4		1200'	-4		6000'	-18

Table 3 – Distance Factor Points Chart

Relative Topography Factor:

Where "$E_p - E_c$" is the elevation of the nearest point along the property line minus the elevation of the courts.

$E_p - E_c$	Points		$E_p - E_c$	Points		$E_p - E_c$	Points		$E_p - E_c$	Points
-250'	-50		-30'	-6		0'	0		30'	6
-200'	-40		-28'	-6		1'	0		32'	6
-175'	-35		-26'	-5		2'	0		34'	7
-150'	-30		-24'	-5		3'	1		36'	7
-125'	-25		-22'	-4		4'	1		38'	8
-100'	-20		-20'	-4		5'	1		40'	8
-95'	-19		-19'	-4		6'	1		42'	8
-90'	-18		-18'	-4		7'	1		44'	9
-85'	-17		-17'	-3		8'	2		46'	9
-80'	-16		-16'	-3		9'	2		48'	10
-75'	-15		-15'	-3		10'	2		50'	10
-70'	-14		-14'	-3		11'	2		55'	11
-65'	-13		-13'	-3		12'	2		60'	12
-60'	-12		-12'	-2		13'	3		65'	13
-55'	-11		-11'	-2		14'	3		70'	14
-50'	-10		-10'	-2		15'	3		75'	15
-48'	-10		-9'	-2		16'	3		80'	16
-46'	-9		-8'	-2		17'	3		85'	17
-44'	-9		-7'	-1		18'	4		90'	18
-42'	-8		-6'	-1		19'	4		95'	19
-40'	-8		-5'	-1		20'	4		100'	20
-38'	-8		-4'	-1		22'	4		125'	25
-36'	-7		-3'	-1		24'	5		150'	30
-34'	-7		-2'	0		26'	5		175'	35
-32'	-6		-1'	0		28'	6		200'	40

Table 4 – Relative Topography Factor Points Chart

Number of Courts Factor:

Where "N" is the number of courts to be installed.

N	points		N	points
1	0		16	16
2	4		17	16
3	6		18	16
4	8		19	17
5	9		20	17
6	10		21	17
7	11		22	17
8	12		23	18
9	12		24	18
10	13		25	18
11	14		26	18
12	14		27	19
13	14		28	19
14	15		29	19
15	15		30	19

Table 5 – Number of Courts Factor Points Chart

Barrier Requirements:

The barrier must consist of a material designed specifically for noise mitigation with a minimum weight of 1 lb. per square foot. The barrier material must extend completely to the court surface and be installed without any gaps. The height of any retaining walls along the edges of the courts should count toward the height of the barriers.

The barrier must be installed on a minimum of three of the four sides of the courts, with the open side facing away from the nearest property line. The calculation must be repeated for the nearest point along the property line exposed to the open side, reaching 0 points or less.

Exceptions:

The point system above is a simplified version of a potentially complex calculation. The point system is always conservative in favor of the residential neighbors. In some cases, additional natural or existing noise mitigation may exist such as extreme topography, large buildings, and densely wooded areas may sufficiently attenuate pickleball noise.

In these cases, if a qualified professional in the field of acoustics is consulted and they determine and document that the existing conditions provide equal or additional noise attenuation, the rules can then be reduced.

Conclusion

We are confident that the system we have developed above will enable pickleball to be played without causing disturbance to the surrounding community. We look forward to continuing our collaboration with you to address any questions or concerns you may have regarding our acoustic study. Please feel free to reach out for further clarification or assistance with any aspect of this matter. Your input is highly valued as we strive to ensure that our pickleball facilities contribute positively to the overall well-being of Wellesley.

Kind regards,

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