

Model Noise Ordinance for Pickleball

September 26, 2024

Prepared by the Noise Pollution Clearinghouse
Using the U.S. EPA Model Noise Ordinance as a Basis

Executive Summary

This paper presents model language for noise ordinances and zoning regulations. The language is both general in scope and also specific to pickleball courts. This language will allow communities to protect the health and well-being of neighbors. Adoption of the model language should enable pickleball to occur in places that will not adversely impact neighbors.

While the model language provides a number of tools to regulate pickleball noise, from decibel levels to plainly audible to time of day requirements, the primary and easiest method to protect the health and well-being of neighbors is to adopt a setback from dwellings of 800 feet.

The recommended decibel limits and distances selected are based on the mean and mode decibel levels found in noise regulations in the United States based on research by the US EPA and the Noise Pollution Clearinghouse.

Introduction

Pickleball is an increasingly popular sport that, while leading to healthier individuals, can also harm the health and well-being of neighbors if poorly sited. Moreover, poor pickleball court siting is increasingly causing conflict and controversy in communities. These conflicts are entirely unnecessary and due primarily to poor zoning and noise regulations that do not address the very frequent, unique, impulsive acoustical properties of the ball hitting the paddle. Consequently, pickleball courts are being sited in locations that are sure to cause strong community reaction, controversy, and conflict. **Siting a pickleball court without proper planning is the functional equivalent of planning to create noise problems and community conflicts.**

These problems can easily be prevented, however, with proper noise ordinances and zoning regulations. This paper presents model language for noise ordinances and zoning regulations to address and prevent these problems and conflicts. The results can also be used as design guidelines for siting pickleball courts within planned communities.

The paper is organized into four parts.

- Part I describes our noise regulatory philosophy.
- Part II familiarizes the reader to the parts of a noise ordinance.
- Part III recommends specific ordinance language that can be adopted, and explains the rationale for that language.
- Part IV presents considerations for inclusion into zoning regulations.

I. Regulatory Philosophy—Utilize as many Regulatory Tools as Possible

Preventing noise pollution and conflicts resulting from noise in a community requires well written noise ordinances and zoning regulations. Moreover, those regulations must be easily enforced by a number of different individuals and entities, from noise control officers, police officers, zoning administrators, and zoning staff. A further complication is that these people will have different levels of training and experience, and some will have little or no training in noise enforcement.

Fortunately, there are many noise regulatory tools available to communities. These regulatory tools include:

1. Decibel levels
2. Setbacks from residential uses
3. Time of day restrictions
4. Day of week restrictions
5. Plainly audible restrictions
6. Prohibitions in residential zones

Each of these regulatory tools have unique considerations, advantages, and disadvantages. Together they provide a comprehensive approach to regulating noise pollution. Consequently, communities should adopt noise regulations that utilize as many regulatory tools as possible, and make sure they utilize several that are easy to enforce.

When people think of a noise ordinance they often think of a decibel standard. While a good decibel standard will prevent most pickleball noise problems in a community, decibel standards are actually among the least utilized and most difficult to enforce noise regulatory tools. The most effective and least costly regulatory tool to address pickleball noise involves distance setbacks from residential land uses. This provides an easy to understand and enforce objective criteria. Since noise decreases by about 6 decibels for each doubling of the distance from a noise source, distance can be used as a surrogate for decibel levels in noise regulations, with the distance chosen to achieve an approximate decibel level.

Time of day and day of week regulations also provide objective criteria that are easy to understand and enforce.

Finally, neighbors should not have to listen to others' noise within their own homes. Noise problems are exasperated when neighbors cannot escape the noise by retreating inside their own homes. If there is no peace in one's home, there will not be peace in the community. Consequently, the plainly audible standard should also be included in the regulatory tools employed.

II. Parts of a Noise Ordinance

The following sets out a general framework for a noise ordinance. In general, provisions in noise ordinances and zoning regulations can be nearly the same, with the exceptions that zoning regulations contain provisions that pertain directly to zoning such as permitted and conditional uses. The special considerations for zoning regulations are presented in Part IV.

Noise ordinances generally have the following structure:

1. Purpose or Intent
2. Definitions
3. General Prohibitions
4. Specific Prohibitions
5. Exemptions
6. Motor Vehicles
7. Penalties
8. Severability

Occasionally sections are omitted, but generally, a good noise ordinance will have all these sections, although they may call them something different. The next part of this paper focuses on *the General Prohibitions* and *Specific Prohibitions* needed to address pickleball noise.

III. Recommended Noise Regulatory Tools

Within a noise ordinance there are multiple regulatory tools that can apply to pickleball. Recommended language for both *General Prohibitions* and *Specific Prohibitions* sections of a noise ordinance are given below, along with the rationale and explanation for them.

A. General Prohibitions

1. Noise Disturbances Prohibited

No person shall unreasonably make, continue, or cause to be made, or continued, any sound which (a) endangers or injures the safety or health of humans or animals; or (b) annoys or disturbs a reasonable person of normal sensitivities; or (c) endangers or injures personal or real property.

2. Maximum Permissible Sound Pressure Levels

No person shall operate or cause to be operated on private property any source of sound in such a manner as to create a sound level which exceeds the limits set forth for the receiving land use category in Table 1 when measured at or within the property boundary of the receiving land use.

TABLE 1
SOUND LEVELS BY RECEIVING LAND USE

Receiving Land Use Category	Time	Sound Level Limit	
		dBA Fast Lmax	dBC Fast Lmax
Residential and Public Space	8 a.m. to 6 p.m.	55	65
	6 p.m. to 8 a.m.	50	60
Commercial	8 a.m. to 6 p.m.	60	65
	6 p.m. to 8 a.m.	55	60
Industrial	All times	65	70

3. Correction for Character of Sound

For any source of sound which emits a pure tone or impulsive sound, the maximum sound level limits set forth in Section 2. shall be reduced by 5 dBA and 5 dBC respectively.

4. Maximum Increase in Interior Sound Pressure Levels

No person shall operate or cause to be operated on private property any source of sound in such a manner as to create a sound level which intrudes upon the interior of a residence or dwelling unit such that it raises the background sound level by more than 3 dBC when measured within the residential property.

Rationale and Explanation for the General Prohibitions Recommendations

Provision 1, Noise Disturbance Prohibited, is straight out of the EPA Model Noise Ordinance, with one minor modification, which is that the prohibition of noise disturbances and the definition of noise disturbances were combined.

Provision 2, Maximum Permissible Sound Pressure Levels, is modified from the EPA Model Noise Ordinance to include dBC (to capture low frequency noise). Also, times and decibel levels were specified. *Communities are free to select other times and levels.* According to EPA and Noise Pollution Clearinghouse research, 55 dBA during the day and 50 dBA at night are the most common noise levels specified in the noise ordinances for urban residential receivers.¹ If you have a quiet suburban community, those numbers could be reduced by 3-5 dBA. Also, EPA data show that typical permitted noise levels in commercial and industrial areas are approximately 5 and 10 decibels higher than the residential levels.

¹ See the EPA Model Noise Ordinance in the Appendix.

The phrase “dBA Fast Lmax” (also sometimes specified as LAFmax) is critical because it specifies how to measure the noise. Each term designates a setting on the sound level meter that should be used. The “dB” stands for decibel. “A” designates A-weighting which gives different weight or value to different frequencies. A-weighting was designed to mimic human hearing at quiet noise levels. There is also C-weighting which better matches our response to somewhat louder sounds and can be used to regulate low frequency noise.

“Fast” or “Fast Response” refers to the time a noise is evaluated by the meter. Fast utilizes 1/8 second time periods. The other common setting on sound level meters is “Slow,” which utilizes 1 second periods and also utilizes other adjustments that were meant to “slow down” the rapidly bouncing needle on old analog sound level meters to make them easier to read). “Slow” is no longer needed as digital sound level meters have solved the problem of a rapidly moving needle by eliminating it and storing the instantaneous noise levels. “Fast” is preferred because, of the common sound level meter settings, it is the one that best matches our ear’s response to loudness. That said, while it is better than “Slow,” it is still less than ideal when dealing with impulsive noise. See Provision 3 below.

“Lmax” refers to the maximum level recorded by the meter during a specific time. Combined with the other terms, the phrase “55 dBA Fast Lmax” means the maximum 1/8 second sound pressure level using A-weighting should not exceed 55 decibels.

The 55 (daytime)/50 (evening and nighttime) dBA levels were chosen because they are the most common level used for **urban residential neighborhoods** in the United States. Suburban and rural residential areas, or quiet urban residential areas should consider lowering the permitted level by 3-5 dBA.

The selection of hours varies from community to community, but generally evening and nighttime hours deserve more protection to ensure outdoor activities in a yard, deck, or porch are not impacted, and to ensure that indoor activities like sleep are not impacted. Some communities have specific daytime, specific evening, and specific nighttime periods with permitted levels getting progressively lower.

A good general noise performance standard as described above will prevent most but not all conflicts related to pickleball noise, particularly when combined with the impulsive noise correction described in Provision 3 below. The problem with decibel levels is that measuring them is expensive for communities and requires training and equipment that police officers often do not have. For that reason, most communities choose to use other regulatory tools first. Decibel level standards are generally the regulatory tool of last resort for communities that utilize them. Communities generally rely on specific prohibitions to implement easier to enforce provisions of noise ordinances (see below).

While communities may opt to exclude a decibel level from their noise ordinance, or to use it only if other provisions cannot be used, a decibel level provision should be included in all zoning regulations. It provides developers needed design criteria.

Provision 3, Correction for Character of Sound, is from the EPA Model Noise Ordinance. The Model does not specify the decibel level, but either 5 or 10 decibels are justifiable.

Impulsive noise is more problematic than continuous noise as it draws human and animal attention. Research has consistently shown that impulsive noise is more annoying than continuous noise at the same decibel level. The incorporation of corrections for noise that is more problematic is very common in noise regulations, with the most common ones being a correction for nighttime noise, impulsive noise, and tonal noise. Often, the night time noise correction is incorporated as a specific nighttime noise standard as is the case above, but it can also be incorporated as a specific decibel correction during certain nighttime and evening hours.

A second reason for the correction factor is that the Fast response understates noise levels of impulsive noise. As mentioned above, “Fast Lmax” utilizes 1/8 second periods of time to measure noise. For impulsive noise with durations of less than 1/8 of a second, such as pickleball noise, the Fast setting understates noise levels and averages in quieter times. Still on a common sound level meter, it is the best setting available.

Typical pickleball noise is inherently impulsive. It has an exceedingly fast onset and short duration.² It would certainly qualify for an impulsive correction.

Provision 4, Maximum Increase in Interior Sound Pressure Levels, utilizes “C” weighting. Because home walls are much better at reducing higher frequency noise than low frequency noise, more often than not, noise heard within a home has had the higher frequencies “filtered out” by the walls. Consequently, a metric such as “C” Weighting is required to measure the remaining low frequency noise. A 3 dB or greater increase in the background means that the source of the noise must be equal to or greater than the existing levels inside the home.³

Related Definitions for the General Prohibitions Recommendations

"NOISE DISTURBANCE" MEANS

Any sound which (a) endangers or injures the safety or health of humans or animals; or (b) annoys or disturbs a reasonable person of normal sensitivities; or (c) endangers or injures personal or real property. (US EPA Model Noise Ordinance)

“dBA Fast Lmax” MEANS

The A-Weighted sound pressure level in decibels as measured on a sound level meter using the A-weighting network and Fast response setting. The level so read is designated dB(A) or dBA.

² See Barry Wyeman and Robert Unetich, *Pickleball 101*, Noise-Con 2023.

³ One of the implications of the logarithmic decibel scale is that two equal loudness sources, when combined, are 3 dB louder. Using “decibel math,” 50 dB plus 50 dB equals 53 dB, not 100 dB. So working backwards, a 3 dB increase means that the noise sources were the same level.

“dBC Fast Lmax” MEANS

The C-Weighted sound pressure level in decibels as measured on a sound level meter using the C-weighting network and Fast response setting. The level so read is designated dB(C) or dBC .

"IMPULSIVE SOUND" MEANS

Sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms. (US EPA Model Noise Ordinance)

“PURE TONE” MEANS

Any sound which can be distinctly heard as a single pitch or set of single pitches. For the purpose of this ordinance, a pure tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure level of the two contiguous one-third octave bands by 5 dB for center frequencies of 500 Hz and above and by 8 dB for center frequencies between 160 and 400 Hz and by 15 dB for center frequencies less than 125 Hz. (US EPA Model Noise Ordinance)

Note: Some communities define daytime and evening/nighttime hours in the definitions section. Others do it in the body of the ordinance.

B. Specific Prohibitions

The following shall apply to all pickleball courts.

1. Setback from Residential Dwellings.

No outdoor pickleball court shall be located or used within 800 feet of a residential dwelling or from residentially zoned land.

2. Not Plainly Audible inside a Residential Dwelling.

The sound from the use of outdoor pickleball courts shall not be plainly audible within a residential dwelling.

3. Evening and Nighttime use of Pickleball Courts Prohibited.

Use of outdoor pickleball courts less than 1,200 feet from a residential dwelling shall be prohibited after 7 p.m. or before 9 a.m. on Mondays –Saturdays, and after 5 p.m. or before noon on Sundays and Federal Holidays.

Rationale and Explanation for the Specific Prohibitions Recommendations

These Specific Prohibitions utilize objective criteria such as distance, time of day, and day of week, to regulate pickleball noise.

Provision 1, Setback from Residential Dwellings, is designed to substitute a distance for a decibel level. Because noise decreases with distance by 6 dB for each doubling of the distance, the setback can be adjusted to approximate a decibel level. See the table below for setbacks based on specific decibel levels in a noise ordinance.⁴ For example, a 800 foot setback provides approximately the same protection as a 50 dBA Fast Lmax standard (which is the combination of General Provision 2 and 3 above), but it does so without the need for a sound level meter.

Decibel Limit in Ordinance	Equivalent Setback Distance
60 dBA	250 Feet
55 dBA	450 Feet
50 dBA	800 Feet
45 dBA	1,400 Feet

In some cases it is possible to mitigate noise levels by as much as 10 dBA by installing barriers immediately next to the courts. Theoretically, this could allow for smaller setbacks. Barriers, however, have no impact if neighbors have a direct line of sight to the court, such as a second or third floor window overlooking the court. Also, barriers require maintenance and upkeep to provide mitigation over time. It is unlikely barriers will be effective over the lifetime of the court. Moreover, to properly design and install an effective barrier requires noise expertise. Consequently, it is not recommended that communities reduce setbacks by relying on barriers other than full enclosures to mitigate pickleball noise, or if they do, that they are fully committed to utilizing the decibel standard over the lifetime of the court to protect neighbors.

Similarly, in some cases quieter paddles and balls can mitigate noise levels. Until they are universally adopted, however, they will not change the maximum noise level experienced by neighbors if louder equipment is also used. Consequently, quieter paddles and balls do not currently impact the distances necessary to achieve those levels presented in the table above.

Provision 2, Not Plainly Audible inside a Residential Dwelling, will ensure that pickleball noise will not intrude on people’s homes.

Provision 3, Evening and Nighttime use of Pickleball Courts Prohibited, utilizes a longer setback distance of 1,200 feet. Essentially, courts more than 1,200 feet from a residential dwelling do not have any limitations on the hours of operation because they should be able to meet the nighttime noise standards from General Provisions 2 and 3 of 45 dBA. Technically, the 6 dBA per doubling of the distance rule would support a 1,400 foot distance as shown in the

⁴ The distances were calculated using the following formula:

$$r_2 = r_1 \cdot 10^{\left(\frac{|L_1 - L_2|}{20}\right)}$$

Where r_2 is the Equivalent Setback Distance, r_1 is 100 feet, L_1 is 68 dBA, and L_2 is the Decibel Limit in Ordinance. The value of 68 dBA Fast Lmax for the maximum noise from pickleball at 100 feet was selected from studies of pickleball noise that found a maximum of 71.9 dBA Fast Lmax, so the formula somewhat understates the maximum value, and consequently the corresponding distances in the table. See footnote 2.

table above, but other factors that impact noise transmission generally make it possible to reduce that distance somewhat.

Related definitions for the Specific Prohibitions Recommendations

“PLAINLY AUDIBLE” MEANS

Any sound that can be detected by a person using his or her unaided hearing faculties. As an example, if the sound source under investigation is a portable or personal vehicular sound amplification or reproduction device, the enforcement officer need not determine the title of a song, specific words, or the artist performing the song. The detection of the rhythmic base component of the music is sufficient to constitute a plainly audible sound.

"RESIDENTIAL DWELLING" MEANS

A structure used for human habitation including, but not limited to residential or commercial property used for human habitation.

“OUTDOOR PICKLEBALL COURT” MEANS

A temporary or permanent surface used to play pickleball.

IV. Zoning Considerations

General Provisions 2, 3, and 4 can be incorporated directly into zoning regulations and are pretty standard. They provide good general guidance for developers. But the most important provision that pertains directly to pickleball is Specific Prohibition 1, the 800 foot setback from dwelling units, and it should be included in zoning regulations.

Moreover, since pickleball is not a compatible use with nearby residential uses, and since one of the primary reasons for planning and zoning is to avoid non-compatible uses and conflicts within a community, pickleball should never be a *permitted use* in a residential zone or a zone that permits residential uses. Rather, pickleball courts should be a *conditional use* if they meet the General and Specific Prohibitions above.

V. For More Information

Communities and Homeowner Associations are free to copy and use the above provisions and text within their laws and regulations. For more information or questions about community noise regulations in general or pickleball noise regulations in particular, contact the Noise Pollution Clearinghouse at npc@nonoise.org. The EPA Model Noise Ordinance can be found at <https://www.nonoise.org/epa/Roll2/roll2doc7.pdf>. State and local noise regulations within the United States can be found at <https://www.nonoise.org/regulation/index.htm>.