



Expected Pickleball Sound Levels
at Teather Park on Beach Road in Tiburon, CA
and a Review of Existing Regulations and Possible Sound Mitigation Options

Executive Summary

This park now has two tennis courts. Converting one of these courts into two pickleball courts will produce higher sound levels than tennis. In addition, the sound of a pickleball hit has a higher pitch or tone than tennis and this “pop” sound is considered more annoying to people than the “thud” of a tennis ball hit.

There are residential units within 250 feet of the planned pickleball court and some residents will be able to hear the sounds. The closest homes are within 200 feet and on an elevated area to the North and NE.

The homes to the NE are about 60 feet higher in elevation. There is limited vegetation present on the hillside between the homes and the courts. One of those structures is a multi-unit building while other buildings to the North appear to be single family homes. The probability is that there will frequently be sound levels above 60 dBA and some pickleball sound levels will extend above 70 dBA at the residences to the North. Placing a barrier in a location to block the line-of-sight path would be difficult and expensive because of the elevation difference. This predicted sound level will be about two or three times as loud as the nominal average background noise level although the actual background noise level is unknown.

The condos to the NW and the SE, a little over 200 feet away, are on a similar elevation and they are oriented in such a manner as to reduce the impact on the main outside living areas behind these units. Sound levels at 200 feet will frequently exceed 60 dBA.

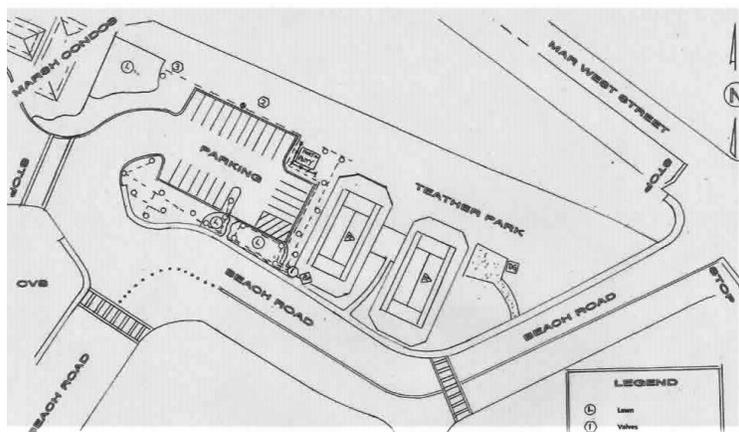
It can be argued that these typical sound levels are often exceeded by other sound generating devices such as car horns, leaf blowers and lawn mowers. The reality is that most other sound sources are intermittent annoyances while it is common for pickleball courts to be full of players from sun up until sun down and later if lighting is available.

This is a public park and controlling the types of paddles and balls used on the pickleball courts, a common sound mitigation technique in gated communities, is not likely to be possible. The age range of pickleball players is very wide and there will be players using these courts with high agility and strength capable of high velocity ball strikes.

There is no established standard for an acceptable pickleball sound level that would apply to all communities. Background noise varies widely and this could be measured at this site. It is also possible to simulate the sound of hard pickleball hits in order to survey nearby residents about the likely impact of regular play. If it is decided to enable pickleball play on this court, the most effective sound mitigation method may be restricting the hours of play.

Site Description

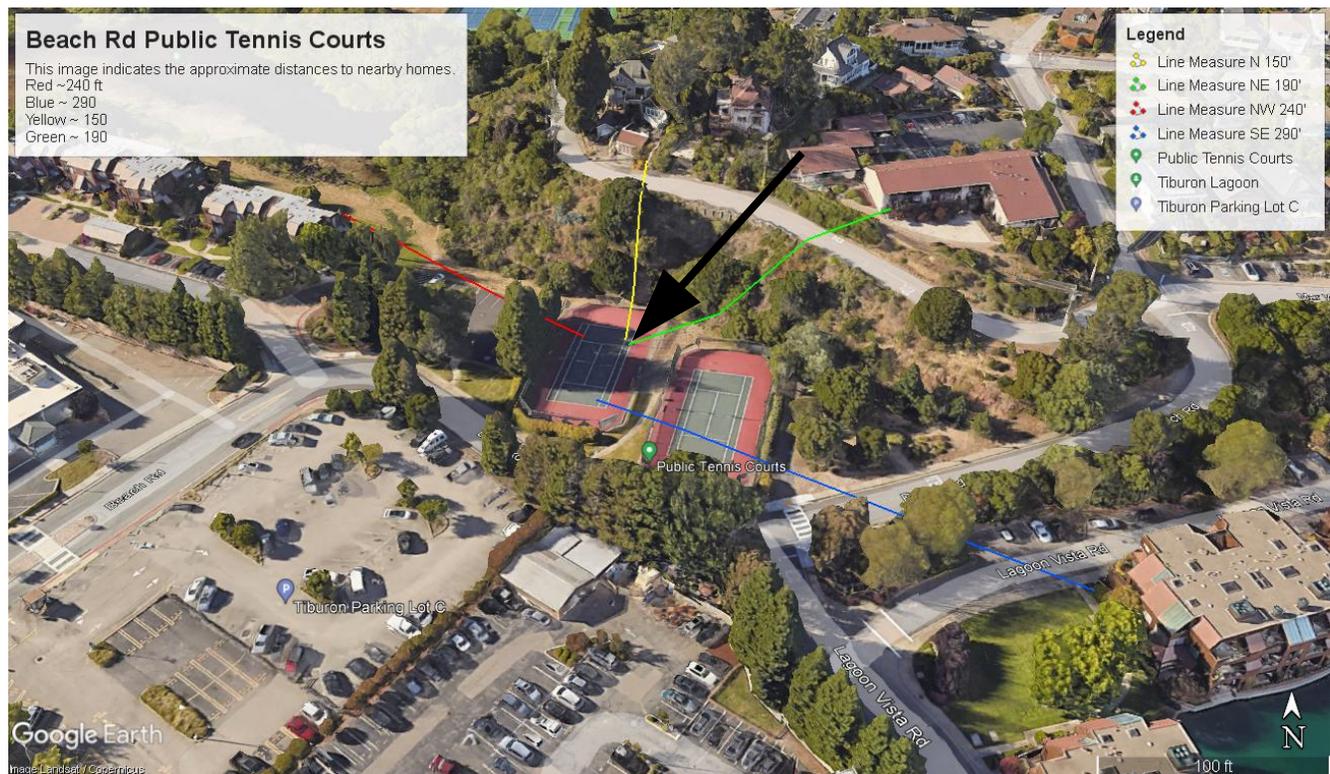
This drawing of the site was supplied:



A Google Earth view of the Teather Park community allows us to measure distances to nearby residential units and businesses.

It also provides elevation information. The elevation of the nearby condos is similar to the tennis courts but there is a hill to the North that has homes overlooking the courts. These properties are about 60 ft above the courts, making a sound barrier near the tennis courts useless. The second picture is a street view on Mar W St which illustrates the view from homes above Mar W to the courts.

The distances from these homes to the court is under 200 feet.



A view of the court under consideration, Mar W St and the path sound will travel:



Pickleball Sound Pitch and Level

The Sound

Pickleball is played with a hard surface paddle (not a “racket”) that typically weighs about 8 ounces and a hard plastic ball weighing about 1 oz. Pickleball sound is primarily generated by the paddle face vibrating as it is struck by a ball. While the pitch has a variety of audio components, the primary tone or pitch generated by most paddle models is usually around 1,000 Hertz or near music note C6. Many newer models have graphite face coverings which are slightly softer and which may reduce the pitch by half, placing the main component closer to note C5. There are some completely different designs that produce other sounds but they are less commonly used.

The loudness depends primarily on how hard a ball is struck. A player typically employs a wide variety of shots in a game, ranging from very soft to as hard as the player is capable of hitting. A result of this variability is that the level or loudness of pickleball sound varies from barely audible up to around 90 dBA near a paddle strike by a skilled high strength player.

Pickleball Sound generation is can be described as a classic stochastic process with a large number of variables contributing to the loudness of any given hit. While there will be an average sound level, there will also be, from time to time, sound levels at 2, 3 and more standard deviations above that level. Generally, the standard deviation is on the order of 2 decibels so we will hear the majority of sounds in a fairly narrow range of levels but it is worth noting that there will also be multi sigma louder sounds occasionally.

Making Sound level Measurements

Field measurements will yield data that can easily be inaccurate. Sound level meters vary in accuracy and in response time. A pickleball sound typically lasts under 10 milliseconds so a meter must have a

mode fast enough to detect these “impulse” sounds. There are international and US standards for meter accuracy and characteristics, IEC 61672-1 and ANSI S1.4, and meters are usually grouped by “Type” numbers. Type 1 meters, like the Sper Scientific 840015, are accurate to within 1 decibel. A Type 2 less expensive model, like the Sper 840018, is useful for most field tests but it has reduced accuracy, although readings will generally be within two decibels. Many communities have sound level meters. It is not uncommon for a police department to send an officer equipped with a sound level meter when noise complaints are filed.

Ordinances and Other Policies and Procedures

A review of the Town of Tiburon General Plan 7. Noise Element does provide some guidance for acceptable sound levels, as does the Town of Tiburon Administrative Policy and Procedure Number 2006-03: Noise Standards for Air Conditioning Units and Similar Mechanical Equipment. This later document establishes a sound level limit of 55 dBA “at any point on a property line” but it applies to HVAC equipment that operates 24 hours a day. There did not appear to be a definite sound level ordinance.

Pickleball Sound Propagation

Pickleball sound levels can reach 70 dBA at points 200 feet from the ball strike. The physics of sound wave propagation apply and using a logarithmic decibel scale simplifies the calculations. Each time the distance is doubled, the sound level will drop by 6 decibels (dB), assuming no other barriers are present that would further reduce sound levels. Cutting a given distance in half will add 6 dB and changing a distance by a factor of 10 will change the sound level by 20 dB. For example, homes at 200 feet from play may experience frequent pickleball sound levels of 60 dBA. At 400 feet, again assuming no other barriers, this would drop by 6 dB to 54 dBA, a level that may be above or below the normal background noise level at that location. At 800 feet, this level would drop by at least 6 dB to 48 dBA, a level that will be below the background noise level in most communities.

Establishing a Policy

The net effect is that residents within about 400 feet of unrestricted pickleball play will be able to hear the sound of pickleball. Communities generally establish an “acceptable” level and limits on the hours of use of pickleball courts. Tiburon could establish both sound level limits and an hours of use policy.

Sound mitigation techniques:

The three common methods:

1. Require the use of quiet gear and enforce this requirement, a generally unacceptable solution on public courts. There are softer balls that produce a lower sound level and these are frequently used in communities able to enforce their use.
2. Install sound barriers that block the line-of-sight. This is frequently employed at locations with little elevation change. Barriers can stand alone or hang from chain link fencing with due consideration of wind loading.
3. Restrict the hours of play.
4. Move the pickleball courts to another location.

Possible Field Tests:

1. Measure the average background noise level to quantify the likely pickleball sound-to-noise ratio.
2. Produce pickleball sound either electronically (typically a laptop and sound bar with a recording of pickleball sounds) or arranging for players to play or simply hit hard shots on a temporary court to measure the likely sound levels at distant points and to evaluate the likely impact of play.
3. Install sample sound barriers of various materials to test the effectiveness and determine the height required to achieve an acceptable sound level at distant points.

Recommendations:

The Town of Tiburon should decide if pickleball sound in the region of 60 to 70 dBa will be acceptable at local residences before the conversion to pickleball is accomplished. If more study is required to make this decision, the Town should consider doing a field test measurement of sound levels. It would need to be prepared to measure sound levels with reasonable accuracy. The information acquired could then be used to establish regulations on the use of this facility as a pickleball court.

GigaHertz LLC is available to answer questions about this report.

Disclaimer

This report attempts to predict sound levels near the possible location of pickleball courts and it offers potential solutions that have been used successfully at other locations. The estimates and based on experience and they take into account the sound levels frequently observed with typical paddles, balls and the test equipment used to measure sound levels. There are paddles and balls that are louder .

There is no guarantee offered that the potential solutions suggested will resolve the pickleball sound problem at the site described in this report.

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Admin of the facebook group [Pickleball Sound Mitigation](#)

and a member of the staff of [Pickleball Magazine](#)

Submission of this report by GigaHertz LLC

A quotation to prepare a report (Quotation # E1122) concerning pickleball sound at Teather Park was sent by GigaHertz LLC on January 12, 2022.

This Report has been prepared at the request of:

David O. Eshoo

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