



Pickleball Sound Assessment Report with Recommendations:

**Tucker Recreation Center
Henderson Park
Rosenfeld Park**

For City of Tucker, GA

by

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I. Executive Summary

Tucker Recreation Center

The City of Tucker, GA (**City**) is considering constructing 12 pickleball courts in the lot adjacent to the Tucker Recreation Center. The close distance to nearby residences and commercial properties has led to some concern about noise levels from the pickleball courts. Pickleball Sound Mitigation Consulting (**PSMC**) has been contracted to analyze the likely noise levels from pickleball play and different mitigation solutions.

Based on previous ambient noise measurements on the site, the background noise levels are expected to be around 49 dBA towards the north side of the lot, nearer the residential properties on Morgan Road. PSMC recommends a target limit of **52 dBA LAFmax** for pickleball noise at these residences to prevent community annoyance. The commercial properties to the east and south may tolerate higher levels depending on the nature of their business and the level of masking traffic noise from Lavista Road and Chamblee Tucker Road, however the target limit is still set at 52 dBA.

If no barriers are put in place, the raw pickleball sound emitted by the courts is predicted to exceed 60 dBA at the northern residences, and to reach higher noise levels to the south. **The 10' northern barriers in the May 2025 plans would mitigate noise from some court positions but leave direct sound paths from other positions on the courts, particularly to the residential and commercial properties to the east, where noise levels are predicted to remain well above the target limit.**

A more extensive barrier solution would extend the height to 12' and fully cut off sound paths to the east and west of the courts. **While this would improve the mitigation for many positions, some source positions would still be expected to exceed the target limit of 52 dBA by 1-2 dB.**

Additional measures which could be put in place would include

- Fully enclosing the east court with 12' reflective barriers on all sides
- **Increasing the height of the center court's northern barrier to 14' to reduce levels directly to the north of that court**
- **Reducing the number of pickleball courts on the northern dual-use tennis court and rotating their orientation by 90 degrees: this would reduce levels to the north and south but increase levels to the east by about 6 dB.**
- **Fully enclosing Zone 1 in 14' absorbent barriers to mitigate noise to the southern receiver positions on Lavista Road.**

Henderson Park

The City is evaluating the conversion of the four existing dedicated tennis courts at Henderson Park into dual-use courts for both pickleball and tennis. The nearest residences are located approximately 300' to 450' from the court area; however, no direct line of sight exists from any home to the courts. A buffer of mature trees and vegetation separates the residences from the racquet/paddle court area, which is situated 30' to 75' higher in elevation than the surrounding homes.

Handheld sound meter measurements indicate that the background noise level in the neighborhood surrounding the park is 44-47 dBA, quieter than the Recreation Center area and Rosenfeld Park; therefore, a slightly lower target limit of 50 dBA was established.

The footprint area of four tennis courts will comfortably support play on up to 12 pickleball courts, while still keeping the tennis nets in place. The orientation of the pickleball courts will be the same as tennis play, on a slight angle from north-south. This means that the highest level of sound from pickleball will radiate primarily towards the soccer field or to the north, which has homes at a greater distance, over 400', and has more intervening vegetation.

When adjusted for elevations, directionality factors, and other parameters, **the modeling software predicts that maximum sound levels will be at or below the conservative target limit of 50 dBA without the addition of sound mitigation barriers or other attenuation measures for any or all of the planned courts.**

Rosenfeld Park

The four existing tennis courts at Rosenfeld Park are planned for renovation, along with the addition of off-street parking. The Rosenfeld Park Improvements Site Plan provides details on converting the four tennis courts into three tennis courts and parking, plus consideration is being given to adding pickleball as a dual-use feature on these courts.

Although pickleball is being played on the existing tennis courts, primarily in the morning using portable nets, there is concern about the sound levels to the nearest residences. The park includes a public pool, which when busy serves as a pickleball sound masking element for homes towards the north; however, pickleball is a year-round sport and gaining in popularity rapidly. This sound assessment and resulting recommendations consider the non-summer months when the pool would not be in use.

Nearby homes to the proposed courts vary in distance from less than 100' to within 300'. Current pickleball play is clearly audible in many backyards and a few properties have a clear line of sight of the courts. There are trees, bushes and soft turf between the courts

and most homes; however, because the vegetation is not dense, it does little to block or absorb noise from the courts.

A small creek bed runs adjacent to the courts, contributing to rolling terrain and variations in elevation throughout the neighborhood. Informal local sound level measurements of background noise indicate values comparable to those of typical suburban areas, ranging from 45 dB to 49 dB. These findings influenced PSMC's decision to establish a conservative target limit of 50 dBA (LAFmax).

The Site Plan calls for one pickleball court on each side of the three tennis courts; therefore, six pickleball courts, aligned north-south.

The critical receptor location was identified as a residence immediately adjacent to the western boundary of the courts, and the initial acoustic modeling was conducted at this site. Modeling results indicate that achieving compliance with the target sound level at the second-story fenestration would necessitate a barrier height of approximately 22'. In the event that second-story noise exposure is not considered a constraint by the affected homeowner, a barrier of no less than 10' to 12' in height would still be required to attenuate sound levels impacting the backyard pool and patio areas.

Assuming the adjacent owner accepted existing noise levels, additional modeling was conducted to evaluate compliance for other residences. Simulations of 12' barriers on all four court sides, incorporating absorptive panels on chain-link fencing, indicated insufficient mitigation. Increasing barrier height to 16' likewise proved ineffective due to reflective sound paths propagating over the barriers.

Based on the findings, it is recommended that pickleball courts not be constructed in accordance with the current design.

Potential alternative solutions include:

- **Enclosing the courts with a fabric or solid structure incorporating sound-attenuating materials.** This option could also extend usable hours by reducing weather impacts and allow for nighttime play with lighting while minimizing disturbance to nearby residences.
- **Redesigning the facility to designate specific courts exclusively for tennis or pickleball.** This would permit a revised layout that facilitates more effective sound mitigation.

II. A Description of Pickleball Sound Characteristics

Pickleball Sound

Pickleball is a game played with paddles, a ball, and a net on a court that is approximately one half the size of a tennis court. The paddles are made of wood, plastic, or composite materials, and the ball is made of plastic. The sound generated by pickleball is louder than the sound generated by tennis play, and it has a higher, more annoying, pitch. Homeowners in proximity to pickleball courts hear a louder sound than from tennis. At elevated sound level, pickleball sounds are considered as noise and become bothersome and intrusive.

Properties of Pickleball Sound

Sound is generated when an object vibrates and excites the air molecules with which it is in contact. These vibrating air molecules create sound waves that radiate outward from the source of the sound at a speed of about 1,100 feet per second. As sound moves away from the source, it decreases in amplitude at a rate of 6 dB for each doubling of distance. The sound level or loudness is measured in decibels (dB). The louder the sound, the higher the dB level that is measured, and the more likely the sound will be an annoyance. The tonal quality is the combination of low frequency and high frequency components of the sound. Frequency is measured in cycles per second or Hertz (Hz). Most sounds include a combination of low frequency booming tones and high frequency shrill or sharp tones. Sound also varies with time. A steady state noise is continuous with little or no change in level or frequency content. Impulse noises have short duration and may or may not be repetitive and recurring.

Human Hearing and Annoyance

The human ear is sensitive to a sound's level, its frequency content, and its duration. The higher the sound level, the greater the annoyance becomes. Each 10 dB increase in sound level is perceived as a doubling in the sound level, which is a 100% increase. Each 6 dB increase is perceived as a 50% increase and each 3 dB increase is perceived as a 23% increase. The human ear is more sensitive to higher frequency sounds than to low frequency sounds, particularly in the range from 1000 to 4000 Hz. The human ear is also sensitive to the duration of a noise. 1 dB is near to the average threshold of detection under quiet, laboratory conditions. However, in the presence of fluctuating background noise conditions, humans often cannot perceive a 1 dB difference in auditory stimulus.

Typical Sound Levels

Human hearing normally has a very large range of hearing capability, usually expressed in decibels above a selected sound pressure level of 20 micropascals and designated at zero dB. Human hearing has a lower sensitivity to low pitch sounds and readings of meters and sound software are usually adjusted to account for this by using the A scale. As will be seen on the chart below, a quiet library is usually about 40 dBA.

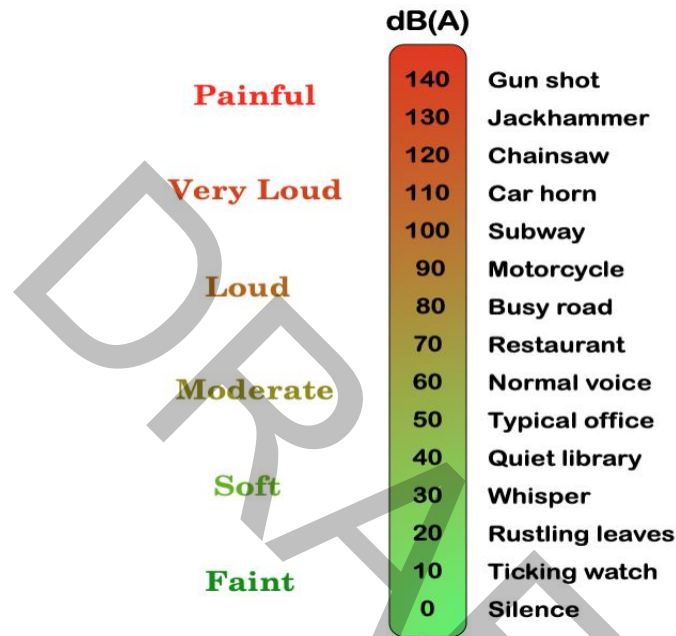


Figure 1: dB Values of Common Noise Sources, A-weighted

This chart illustrates that sounds in the range of 60 to 75 dBA and comparable to the loudness of normal conversation and to the sound levels usually present in a busy restaurant. Pickleball sound at 100 feet is usually under 70 dBA with no sound barrier and under 60 dBA with a ten ft high sound barrier. The height of the barrier can be adjusted to achieve sound level reduction with a basic goal of having pickleball sound not frequently exceed normal background sound levels.

III. The Measurement of Pickleball Sound Levels

Sound is simply a variation in air pressure over a period of time. A calibrated microphone connected to a device that measures the electrical output and records the peak sound pressure or averages the sound power over a defined period of time constitutes a sound measurement system. The measurements are generally done over time periods defined according to national measurement standards. In the US those standards are set by the American National Standards Institute or ANSI.

While ANSI defines a number of acoustics terms, pickleball has a usual time duration of about 10 to 20 milliseconds (ms). PSMC selects the Fast mode for measuring these short duration sounds, which has a 125 ms averaging period.

Background noise levels can be as low as 40 dBA but in areas with regular traffic, the average sound level can be much louder. While measuring these levels can be done accurately with a sound level meter, a more accurate method that measures multiple parameters simultaneously is to use a calibrated microphone connected to a computer running sound level measurement software.

Because sound is not constant and varies with time, the sound level meter has several measurement settings to average these sound fluctuations over the measurement period. These settings report the sound level for the measurement period selected. The meter setting must be properly selected to capture the sound level based on the duration of the sound and the response time of the human ear.

What measurement setting is best for pickleball play? For short duration sounds like pickleball impacts, the fast response with an A weighting best corresponds to the averaging time and sensitivity of the human ear. A maximum hold setting can also be used. The maximum hold setting “listens” for the maximum sound level within the fast time averaging interval and continues to update the maximum level. In this manner, the maximum level of these rapid fluctuations can be captured over the averaging interval.

The fast meter setting will always measure a higher sound level for a pickleball impact than a slow setting. The slow meter setting averages sound over a longer averaging period that includes intervals with no pickleball impacts. The slow setting is appropriate for continuous noise and for background noise but not for pickleball impacts. The slow setting understates the loudness of the short duration pickleball impact heard by the human ear. The peak setting of a sound level meter will measure an even higher level than a fast setting because of a shorter time interval. However, peak settings neglect the duration of sound, which is critical to human annoyance. Also, the peak measurement does not have an A-weighting.

Different time averaging intervals will therefore report different dB levels for the same sound event. When the A-weighting setting on a sound level meter is selected, dB measurements are described as dBA. If the sound level (L) is measured with an A-weighting (A) and a fast (F) setting, it is described as LAF. When the maximum level is captured in the measurement interval, this is called LAFmax. Unless otherwise noted, pickleball sounds in this report will be described in units of LAFmax. LAFmax measures the maximum sound, regardless of the number of impacts. **If the LAFmax sound level can be reduced through sound mitigation to a low enough level to not be heard, then the number of impacts will not be important.**

The LAFmax metric is preferred over Sound Exposure Level (SEL) which is a cumulative weighting of sound levels. SEL is used in environmental studies to predict annoyance from noise exposure over prolonged periods and in the workplace to predict hearing loss from continuous noise exposure from work operations. It requires on site measurements and is not recommended for evaluating the impact of sound over short durations. A mixture of excessively loud noises over short periods with low background noise may yield a low SEL. Yet, this noise may still be bothersome and annoying for a listener during the period in which it occurs. LAFmax simply addresses the maximum sound, regardless of the duration. The LAFmax noise level limit to avoid annoyance from pickleball has been determined from site evaluations and from human response.

Pickleball noise is uniquely different from the noise of tennis or of a bouncing basketball. PSMC has recorded noise levels of 56 dB and 54 dB LAFmax from tennis and basketball respectively at 100 feet. The noise level from pickleball is 70 dB LAFmax at 100 feet, more than twice as loud as these other sports. In addition, tennis and basketball have a lower tone than pickleball. The lower noise levels and lower tones from tennis and basketball make these noises less annoying than pickleball noise. They would be perceived as less than ½ as loud as pickleball.

IV. Municipal Noise Ordinances

All three parks are located within the City. Therefore, we believe the relevant noise ordinance is

Tucker, Georgia - Code of Ordinances

Chapter 28 – NUISANCES: ARTICLE VII. - NOISE

Sec. 28-137. - Purpose.

(a)

The city seeks to prevent plainly audible sound from disturbing the city's residents in their homes during typical sleeping hours, as such sound jeopardizes the public health, welfare, and safety of the city's residents and degrades the quality of life in the city.

(b)

This article applies to any sound projected, emitted or transmitted between 11:00 p.m. and 7:00 a.m., such that the sound is plainly audible anywhere within the interior of a single-family detached sealed dwelling in a residential area. This article further applies to any sound projected, emitted or transmitted between 11:00 p.m. and 7:00 a.m., such that the sound is plainly audible in a common area of a multifamily dwelling in a residential area.

(c)

Most sound within a commercial area, industrial area, or a mixed-use development shall be regulated in division 2 of this article.

...

DIVISION 2. - RESIDENTIAL AREAS

- Sec. 28-160. - Sound between the hours of 11:00 p.m. and 7:00 a.m.

(a)

Single-family detached dwellings. It is unlawful for any person, between the hours of 11:00 p.m. and 7:00 a.m., to make, cause, or allow any sound from a source within his ownership or control that projects, emits or transmits into any single-family detached dwelling in a residential area owned or occupied by another, such that the sound is plainly audible anywhere within the interior of a sealed dwelling.

(b)

Multifamily dwellings. It is unlawful for any person, between the hours of 11:00 p.m. and 7:00 a.m., to make, cause, or allow any plainly audible sound from a source within his ownership or control that projects, emits or transmits within the common area of a multifamily dwelling in a residential area.

[Sec. 28-160 lists here 16 excluded categories of sound, none of which apply to pickleball noise from courts]

DIVISION 3. - COMMERCIAL AND INDUSTRIAL AREAS AND MIXED-USE DEVELOPMENTS

- Sec. 28-183. - Maximum permissible sound levels and sound during certain hours.

(a)

This division applies to all sound emitting from property in all commercial and industrial areas and all mixed-use developments within the city.

(b)

No person shall cause, suffer, allow, or permit the operation of any source of sound on any property within commercial areas, industrial areas, mixed-use developments that exceeds 70 dB(A) in commercial areas; 80 dB(A) in industrial areas; and 70 dB(A) or 73 dB(C) in mixed-use developments from the hours of 7:01 a.m. until 10:59 p.m. or 60 dB(A) or 63 dB(C) from the hours of 11:00 p.m. until 7:00 a.m. Sound shall be measured at any location at or within the property line of the affected property, and sound levels in excess of those established in this section shall constitute prima facie evidence that such sound is in violation of this division.

(c)

It is unlawful for any person between the hours of 11:00 p.m. and 7:00 a.m. to make, cause or allow any sound from a source within his ownership or control that projects, emits or transmits from a commercial area, industrial area, or a mixed-use development if such sound is plainly audible within the interior of a single-family detached sealed dwelling in a residential area or in a common area of a multifamily dwelling in a residential area.

The Dekalb County ordinance is nearly identical to the City ordinance, and neither is significantly stricter than the other regarding noise allowances. Both have a dB limit for commercial or mixed-use development, but those daytime limits are quite high (70 dBA) compared to the auditory thresholds for annoyance for pickleball sound, which are much lower.

Given the max dBA (52) recommended by PSM and the fact that pickleball play will not be permitted between 11:00 p.m. and 7:00 a.m. per the established park hours, a detailed analysis of the proposed facilities with the city's noise ordinance is not necessary as a noise ordinance violation would not occur if the facilities were constructed and operated as recommended within this report.

However, since significant community annoyance can arise from pickleball sound even when it is in accord with the existing noise ordinance. Based on PSMC's extensive experience in mitigating pickleball noise complaints, we have developed a target limit of 50 dBA (LAFmax) when the background noise level is at or below 47 dBA. When background noise levels are greater, then the pickleball LAFmax value should be kept below a value of 3 dB greater than the background level¹. As a result, this target level will be used in this report, with the understanding that *all values below the target level will also be in compliance with the noise ordinance.*

¹ Exact detection thresholds vary based on frequency and background noise level but range from 3-10 dB in different experimental conditions [Oberfeld, Daniel. "The mid-difference hump in forward-masked intensity discrimination." *The Journal of the Acoustical Society of America* 123.3 (2008): 1571-1581]. 3 dB is used here as a conservative threshold to avoid community annoyance.

Site Overview

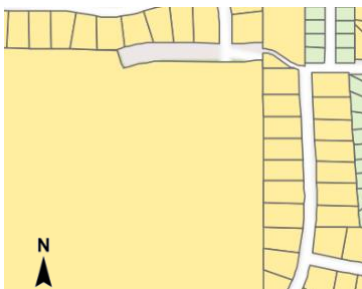
Tucker Recreation Center

As Figure 2a below shows, the receiver positions to the north of the rec center, along Morgan Road, are zoned as residential (yellow below). The other positions along Lavista Road and Chamblee Tucker Road are classified as “DT-1 (Downtown Neighborhood, gray below)”, which is a mixed-use zoning class and falls under the 70 dBA daytime noise limit.



Figure 2a: Zoning Map of Tucker Recreation Center Surroundings

Henderson Park



All properties surrounding Henderson Park are zoned for residential use.

Figure 2b: Zoning Map of Tucker Recreation Center Surroundings

Rosenfeld Park



All properties surrounding Rosenfeld Park are zoned for residential use.

Figure 2c: Zoning Map of Tucker Recreation Center Surroundings

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V. Background Noise Measurements

Tucker Recreation Center

A previous report² from Arpeggio conducted a series of background noise measurements in November, 2024 on the north side of the lot where the planned courts would be built. This report includes various statistical summaries of the time-series sound pressure levels logged using two Larsen Davis SoundTrack LxT meters. The LA90, which represents the sound pressure level exceeded 90% of the time, ranged from about **46-50 dBA** during daytime hours (corresponding to the operational hours of the planned pickleball courts). The LA90 value gives a good estimate of the background noise level when no traffic is audible.

The LA50, which represents the 50th percentile of sound pressure levels logged during that time period, ranged from **49-52 dBA** during daytime hours. This value gives a better estimate of the daytime background level when traffic noise is present. Based on these measurements, pickleball noise of up to 52 dBA may be sufficiently masked by traffic noise during daytime hours at northern residential receiver positions (R1-R8). **Based on these conditions, PSMC has established a target limit of 52 dBA (LAFmax).**

Henderson Park

The area is heavily wooded with notable elevation changes; however, traffic provides minimal acoustic masking, as local streets are limited to 25 mph and incorporate speed control humps. On August 1, 2025, sound pressure level measurements were conducted with a Tadeto Type 2 Sound Level Meter at multiple locations, recording daytime background levels ranging from **45 to 49 dBA (LAS)**. Measurements were taken at 2:00 p.m., with a temperature of 92°F, during which the park was unoccupied, no tennis activity occurred, and neighborhood traffic was minimal.

Based on these conditions, PSMC has established a target limit of 50 dBA (LAFmax).

² Tucker Recreation Center Pickle Ball Courts: Noise Impact Assessment, December 5, 2024

Rosenfeld Park

The community exhibits wooded and hilly topography. Although traffic volumes are somewhat higher in this area, vehicle speeds remain low and contribute minimally to background noise levels.

On August 1, 2025, sound pressure level measurements were conducted with a Tadeto Type 2 Sound Level Meter between 9:05 a.m. and 10:30 a.m. at multiple locations around Rosenfeld Park. Pickleball activity occurred intermittently, and the pool area became active with children after approximately 10:00 a.m. Care was taken to exclude measurements influenced by these activities. Background noise levels, excluding pool and pickleball sounds, ranged from 50 to 58 dBA (LAS), originating from birds, insects, airplanes, vehicles, and lawn care equipment. Pool noise measured up to 64 dBA (LAS) when children were present. **Based on these observations, PSMC has established a target limit of 50 dBA (LAFmax).**

VI. Pickleball Sound Mitigation Methods

Limitations on the times that pickleball can be played are common. When homes are within 500', it is not unusual for play to be limited to daytime only.

While an effective sound barrier near pickleball courts can reduce the existing pickleball sound levels, this requires the sound barrier to block the line-of-sight path. A roof or other structure above the courts can reduce the level further by blocking the diffracting sound traveling over the barrier. But if the wall barrier is absent, the roof structure will not provide effective attenuation as the direct sound path is not blocked. A roof alone, if made of a reflective material, may increase the lateral noise propagation as some of the sound that would have traveled upward is reflected outwards instead.

Effective sound barriers are made of heavy material. That includes earth, concrete walls, very thick vegetation such as tall thick hedges and mass loaded vinyl. Barriers can be sound reflecting or absorbing; several companies manufacture hanging sound barrier materials of both types. Examples include the frequently used mass loaded vinyl sheets called Acoustifence™, supplied by Acoustiblok™ and quilted fiberglass layers attached to mass loaded vinyl sheets, like those offered by Insul-Quilt™, which also offers basic mass loaded vinyl.

Mass loaded vinyl that weighs about one pound per sq. ft. is durable and it is easy to hang on existing chain link fencing. To block the line-of-sight sound path, a barrier should be at least 6' high. Eight feet or higher is more effective. We use a program called Noise Tools to calculate the likely reduction in sound level for this type of barrier.

At private pickleball courts, the required use of quieter balls and paddles can mitigate the sound levels. Paddle tests are conducted by PSMC's sister organization, Pickleball Sound Labs in Pittsburg, PA in a custom-built anechoic chamber. In fact, USA Pickleball, the sport's national governing body, has asked us to share our data and expertise as they develop standards for equipment. Limiting the manufacturers and models of paddles and balls that can be used is not the first choice of most pickleball players; however, PSMC provides a list of paddles which have been tested and found "quieter," if the facility wishes to encourage the use of such paddles, though this is difficult to enforce in a public facility.

In addition, PSMC has found that more experienced players tend to hit harder, yielding higher sound pressure levels from paddle-ball impact. Since many pickleball facilities divide courts according to player rating and ability, another simple sound mitigation strategy is to put the most experienced players on courts farthest away from the nearest residences and other relevant listening positions.

VII. Site Analysis - Simulated Levels, Simulated Mitigation Options

Tucker Recreation Center

Overview of the Site

The proposed pickleball site sits on the eastern side of the Tucker Recreation Center property (see red box on Figure 3 below). The lot is located on the NW corner of the intersection of highway 236 (Lavista Road) and Chamblee Tucker Road. The full proposed site plan from May 2025 is included in Appendix A.

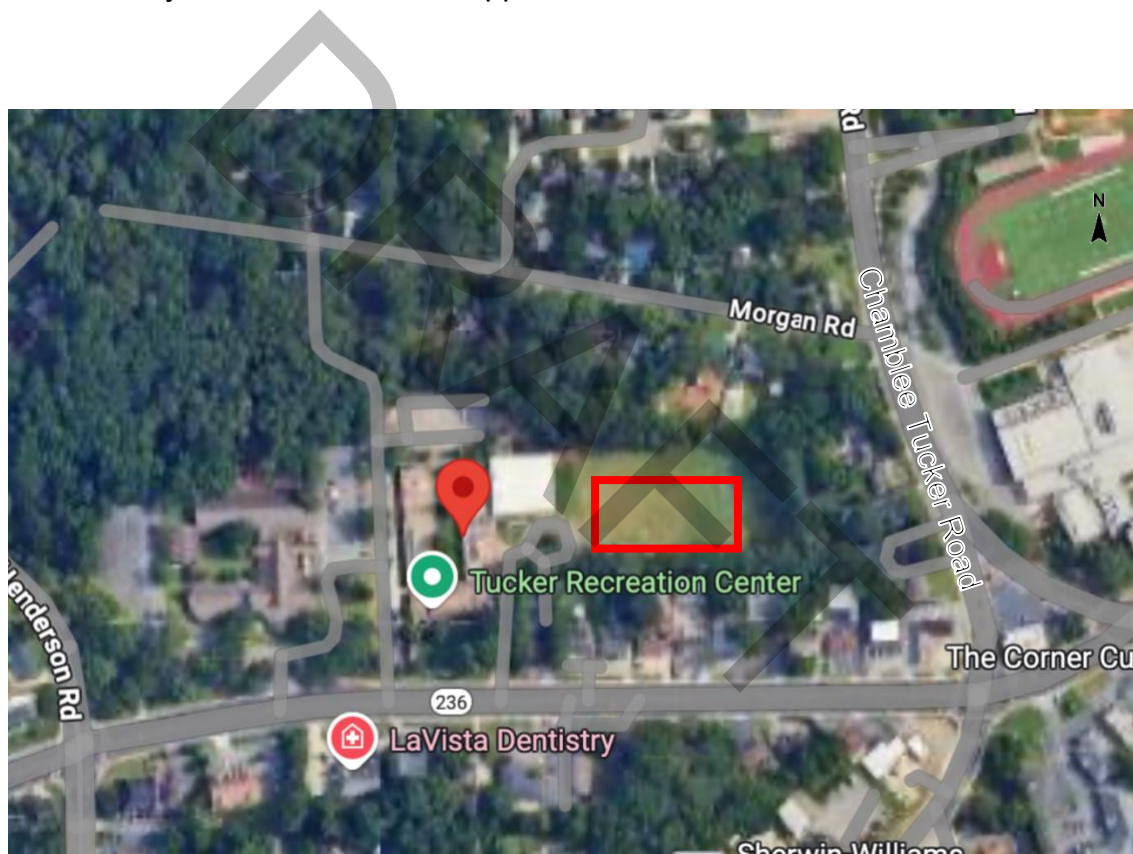


Figure 3: Overview of Tucker Recreation Center Area

The lot is located within 200' to nearby residential and commercial properties (Fig. 4).



Figure 4: View Looking North to Nearest Residence

The plans for future pickleball courts were scaled and aligned with the map of nearby residences according to the GIS map of property lines for the area (Fig. 5).



Figure 5: Planned Pickleball Courts Aligned with GIS Map

Because the land can form natural sound barriers or reflectors, the ground height was modeled first in NoiseTools software based on ground height readings from the Google Earth database. Buildings and other large obstructing or reflecting barriers were modeled in NoiseTools based on the layout of nearby buildings (Fig. 6).

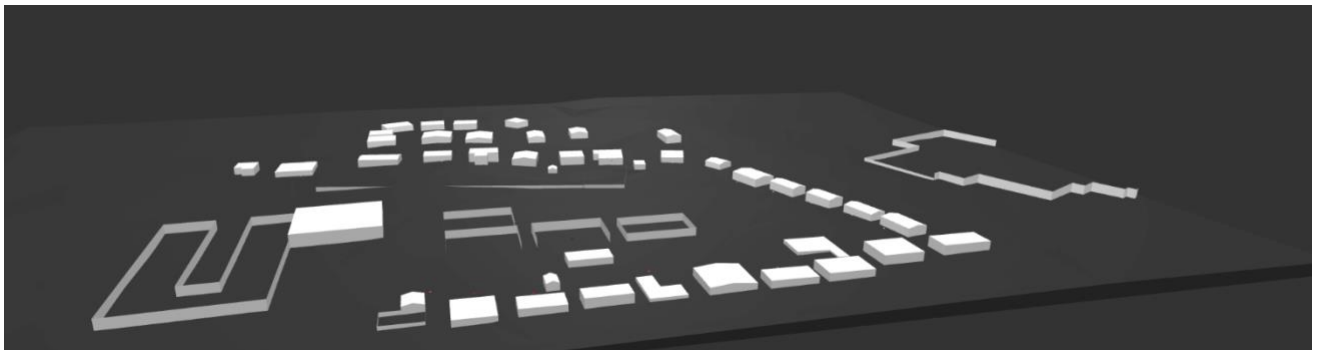


Figure 6: 3D Model of Nearby Buildings in NoiseTools

Possible pickleball noise sources were modeled in NoiseTools, three sources along the south of the southern courts (S1-S3), three sources along the north of the southern courts (S4-S6), and four sources on the north courts (S7-S10), for a total of 10 sources. Sources appear here as crosses: red crosses are inactive sources (possible sources not currently emitting sound), while black crosses represent the site of a pickleball hit. Each initial test source is designated S1 through S10 (Fig. 7). The sound pressure level and directivity of pickleball strikes were both modeled within NoiseTools.

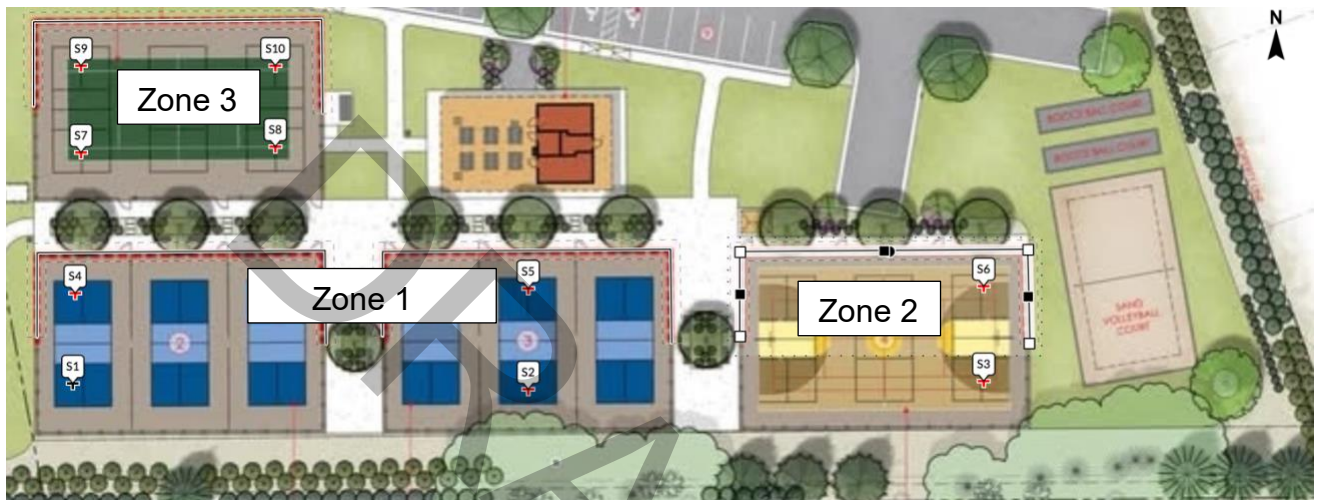


Figure 7: Source Positions Modeled on Existing Courts

Figure 8 below shows these 10 sources as well as 19 different listening positions (called receiver positions) that will be considered in this report, as well as the linear distance (in m) to the nearest noise source position from that receiver. Each receiver is designated R1 through R19. R1-R8, R11, R13, and R19 are residential properties, while R9, R10, R12, and R14-R18 are commercial properties.

Based on the positions of these sources and receivers, the pickleball courts will be considered sequentially in 3 zones as follows:

Zone 1 (South, Blue Courts): S1, S2, S4, and S5

Zone 2 (East, Brown Courts): S3 and S6

Zone 3 (North, Green Courts): S7, S8, S9, and S10

The plans from May 2025 show 6 pickleball courts (Zone 1 above) and 6 dual-use courts which can be used for pickleball (Zones 2 and 3 above).

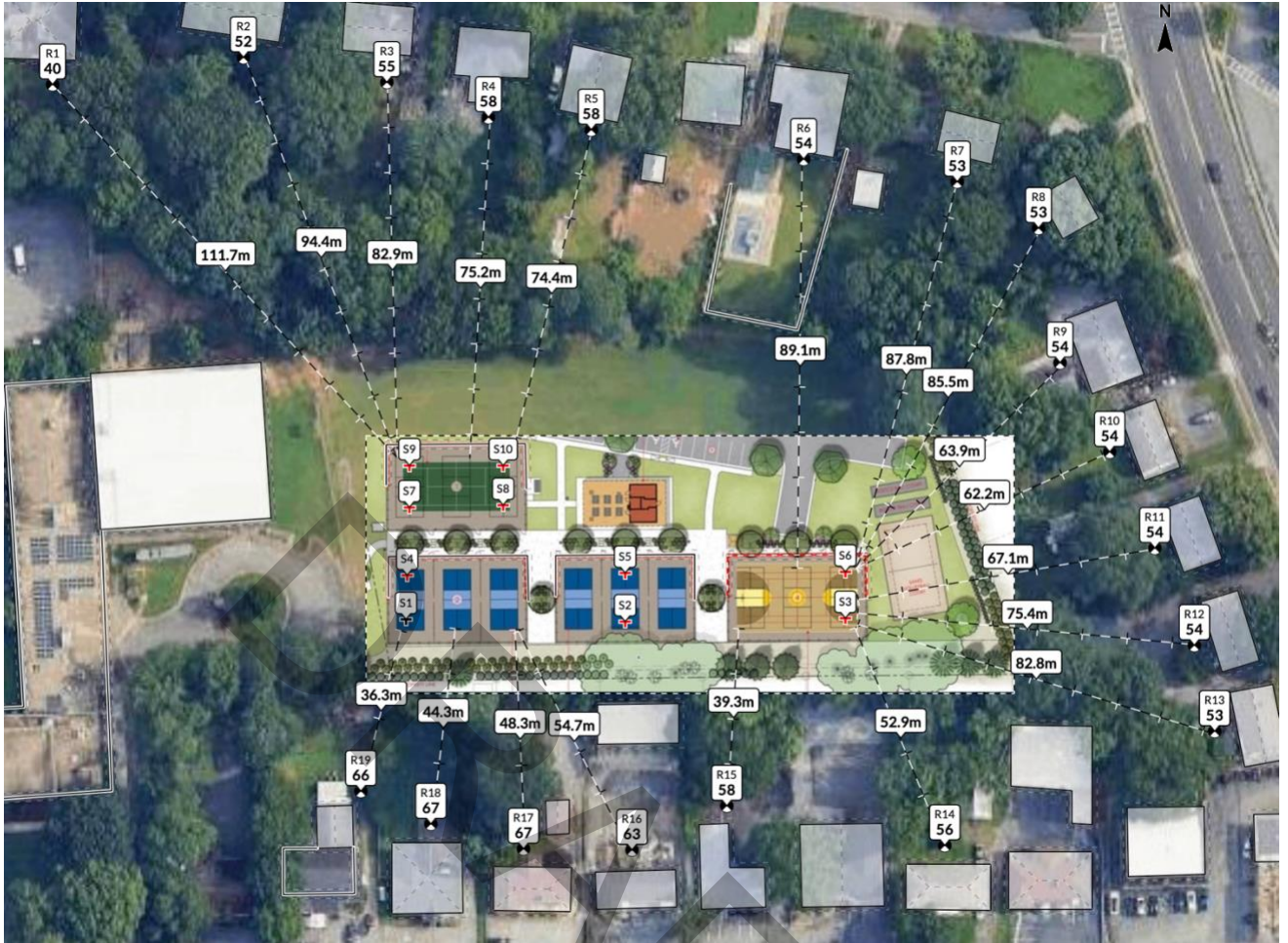


Figure 8: Distance to Receiver Positions R1-R19 for Nearby Residences and Commercial Properties

Addresses in green below are residential:

- Distance from courts to R1 (4109 Morgan Road) — 366.4' (111.7m)
- Distance from courts to R2 (4117 Morgan Road) — 309.7' (94.4m)
- Distance from courts to R3 (4123 Morgan Road) — 271.9' (82.9m)
- Distance from courts to R4 (4135 Morgan Road) — 246.7' (75.2m)
- Distance from courts to R5 (4143 Morgan Road) — 244' (74.4m)
- Distance from courts to R6 (4155 Morgan Road) — 292.3' (89.1m)
- Distance from courts to R7 (4163 Morgan Road) — 288' (87.8m)
- Distance from courts to R8 (5085 Chamblee Tucker Road) — 280.5' (85.5m)
- Distance from courts to R9 (5097 Chamblee Tucker Road) — 209.6' (63.9m)
- Distance from courts to R10 (5103 Chamblee Tucker Road) — 204' (62.2m)

Distance from courts to R11 (5109 Chamblee Tucker Road) — 220.1' (67.1m)
Distance from courts to R12 (5115 Chamblee Tucker Road) — 247.3' (75.4m)
Distance from courts to R13 (5121 Chamblee Tucker Road) — 271.6' (82.8m)
Distance from courts to R14 (4948 Lavista Road) — 173.5' (52.9m)
Distance from courts to R15 (4940 Lavista Road) — 128.9' (39.3m)
Distance from courts to R16 (4934 Lavista Road) — 179.4' (54.7m)
Distance from courts to R17 (4928 Lavista Road) — 158.4' (48.3m)
Distance from courts to R18 (4922 Lavista Road) — 145.3' (44.3m)
Distance from courts to R19 (4916 Lavista Road) — 119' (36.3m)

All receiver positions are quite close, within 400' of the nearest court. The closest position, R19, is less than 120' from the nearest possible source position.

With No Barriers

Zone 1

Noise levels were simulated in NoiseTools from the different source positions to each of the receiver positions shown above. All source positions were examined; however, for the sake of brevity and concision not all source-receiver combinations will be shown here, as certain positions yield lower levels in all cases. Priority will be given to receivers R1 through R8, as those are located in a quieter residential zone. In all the noise maps shown below, only the black + is an active source – red +'s indicate inactive noise sources during that simulation.

Figure 9 below shows the predicted noise map for a source located at S1, on the southwest court, to receivers on the north (R1-R8) and south (R14-R19). Even at the closest distance receiver (R19) the simulated LAFmax of 65 dBA – though perceptually very high and likely annoying to a human listener – does not exceed the 70 dBA limit imposed by the ordinance in a commercial or mixed-use zone. The levels do exceed PSMC's target limit of 3 dB above the background noise level measured. However, at the southern receiver positions noise levels from Lavista Road are likely to be higher than those measured by the Arpeggio report, which were farther from the traffic sources.

Meanwhile, at the northern (residential) receiver positions, with no mitigation the levels from S1 are predicted to be between 55-60 dBA at all positions except R1, which is shielded by the Recreation Center. **These levels exceed the target limit of 52 dBA.**

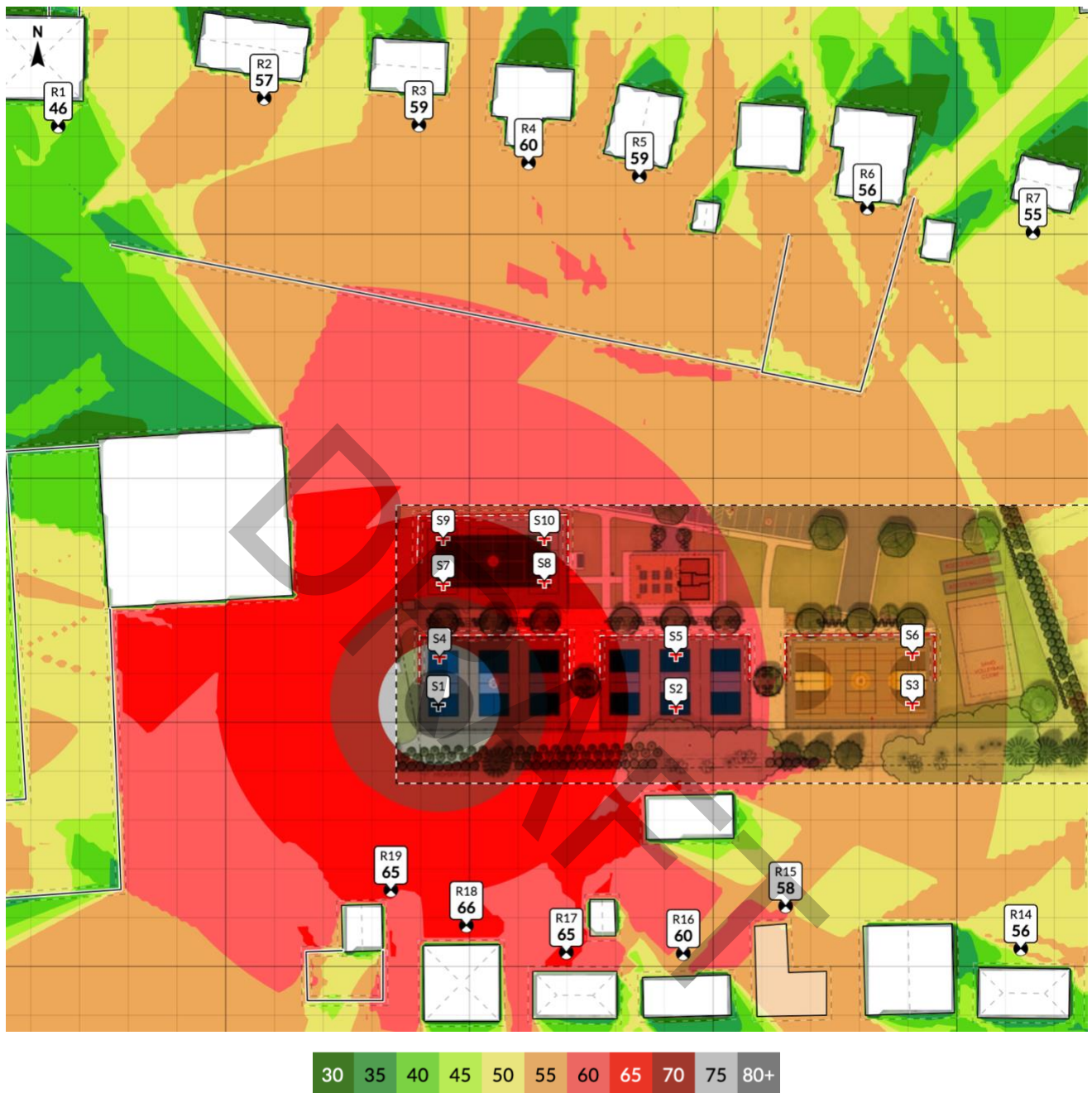


Figure 9: Noise Map, No Barriers, S1, North and South Receivers

Zone 2

Because of the directional nature of pickleball sound, noise will be slightly lower on the axis perpendicular to the courts. Figure 10 below shows the predicted noise map from source S6, on the NE corner of the far eastern court, to receivers R8-R13. **The predicted levels range from 54-57 dBA, which exceeds the target limit.**

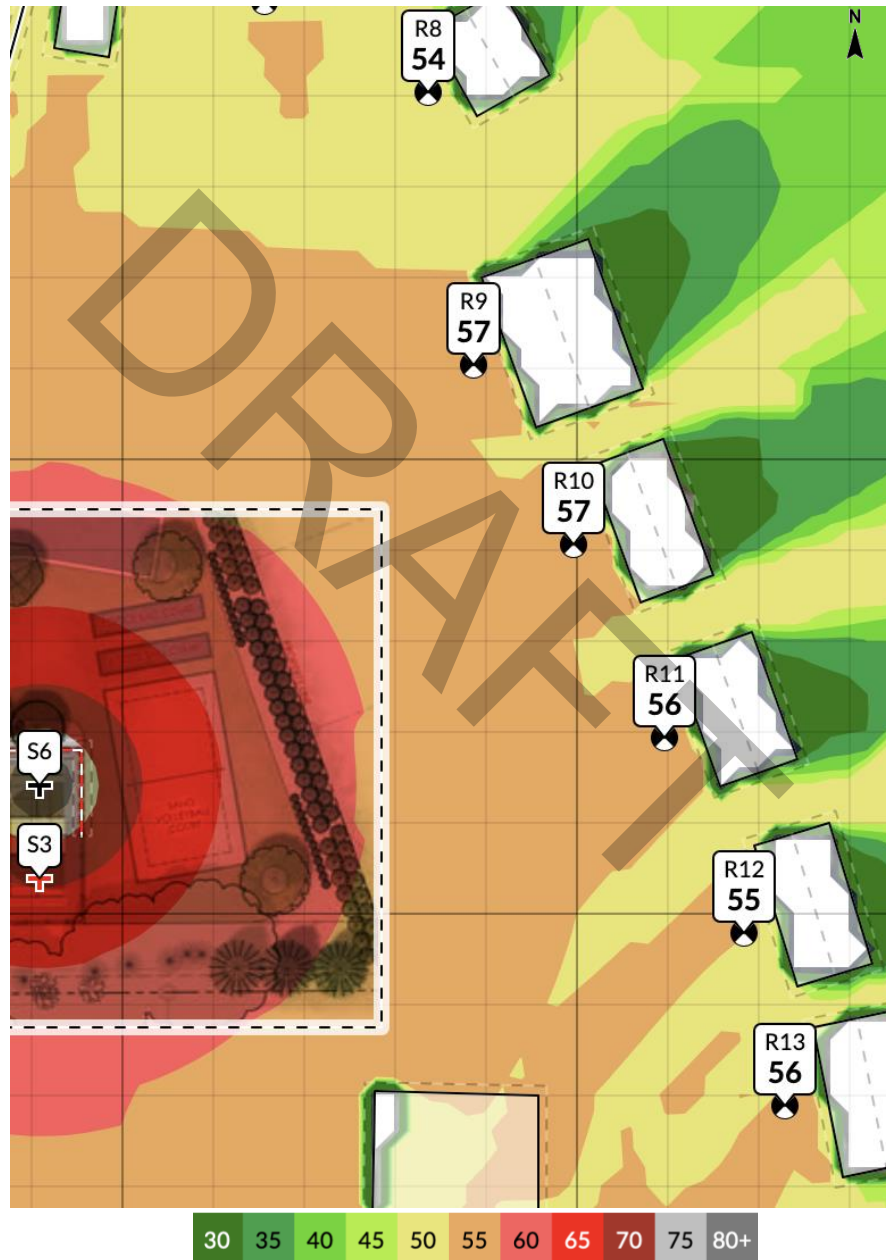


Figure 10: Noise Map, No Barriers, S6, East Receivers

Zone 3

If we simulated sound from a source on the northern planned courts, the predicted levels increase at the residential receiver positions along Morgan Road and decrease to the south along Lavista Road. Figure 11 below shows the predicted noise map from S10 on the NE corner of the northern court. **The predicted levels now rise to 58-61 dBA from R2 to R6, which exceeds the target limit.**

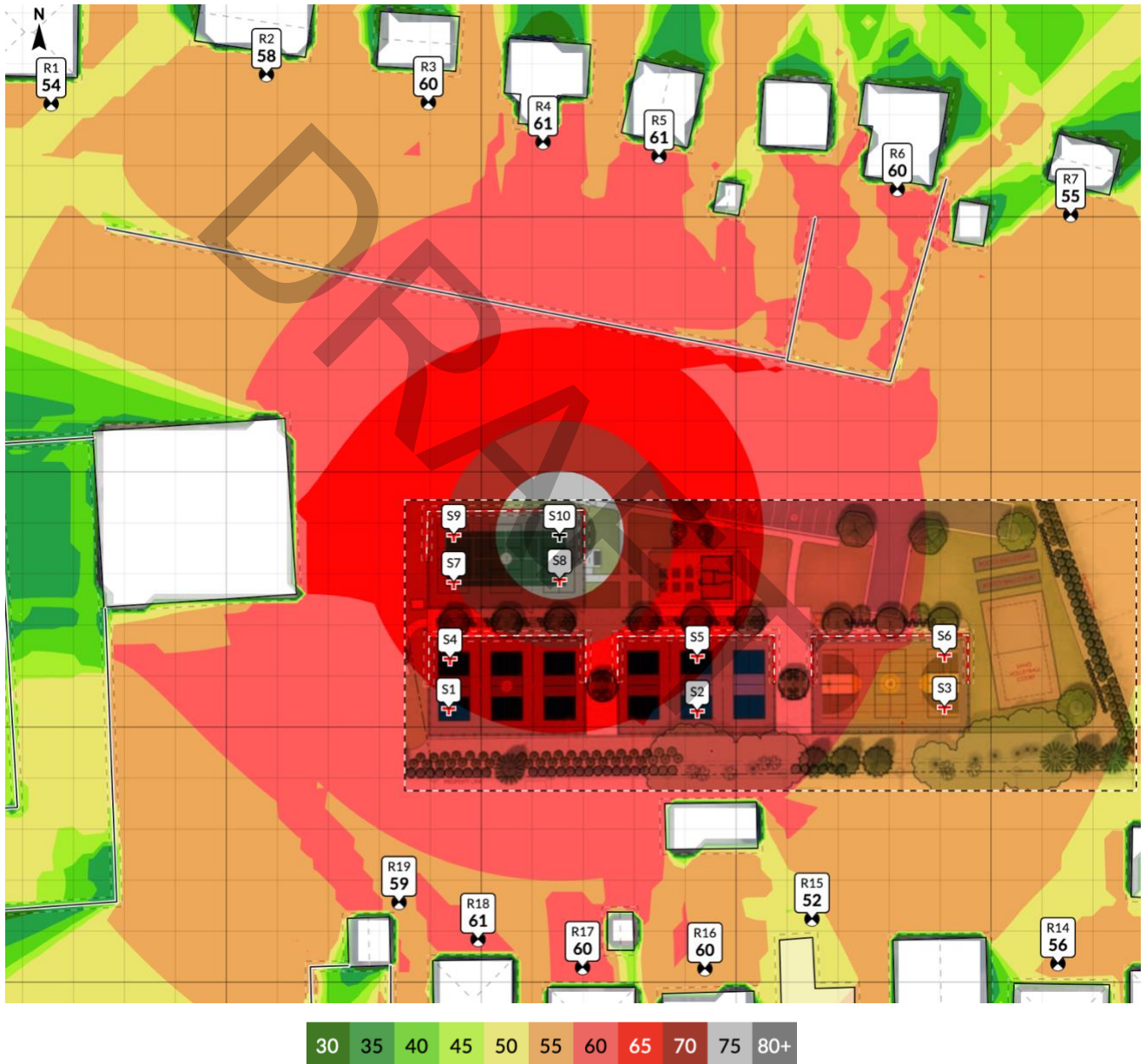


Figure 11: Noise Map, No Barriers, S10, North and South Receivers

With Planned 10' Reflective Barriers on N Half of Courts (May 2025 Plans)

Zone 2

The May 2025 plans³ call for the addition of 10' acoustically reflective barriers on the north half of each court: these would extend along the north side of each court and down the north half of both the east and west sides of each court, as shown in the plans as of May 2025 (Fig. 5). When these barriers block the clear line-of-sight between source and receiver, they will cause the noise level to drop: for example, Figure 12 below shows the predicted noise level from S6 to the east receiver positions (the same as in Fig. 11 above) when the barriers are added. Since the sound path from S6 is obstructed by the barrier, the predicted levels at these positions have now dropped to 46 dBA or below, below the target limit of 52 dBA.



Figure 12: Noise Map, 10' Reflective Barriers, S6, East Receivers

³ "Rendered Site Plan w pb bocce tennis": Tucker Pickleball: Site Plan (May6)

However, if we simulate sound from the south end of the same court (S3), we see the level is much greater due to the unobstructed sound path (Fig. 13). **The levels in this case are predicted from 54-56 dBA at R10-R13, exceeding the target limit of 52 dBA.** At the very least any sound barriers need to extend down the full east side of each court to obstruct the sound path toward these east receiver positions.

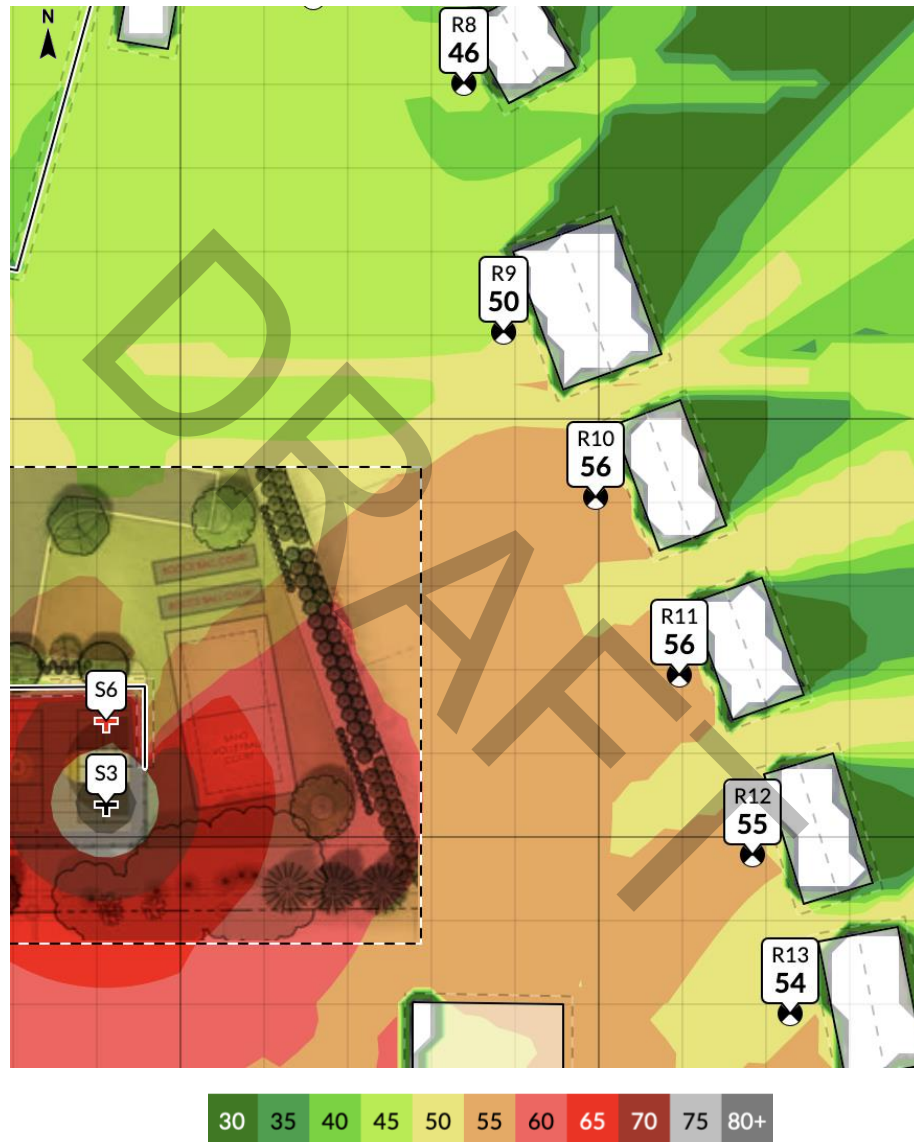


Figure 13: Noise Map, 10' Reflective Barriers, S3, East Receivers

Zone 3

Sources near the barrier will be reduced more in overall noise level. Figure 14 below shows the predicted noise map from S10 with the 10' reflective barriers. Levels at R2-R6 and R4 are predicted to be below the target level. Levels are still greater to the south, but due to the greater traffic noise closer to Lavista Road and the commercial zoning, these levels may be more tolerable to the south. The south receiver levels are slightly increased due to the reflection off the barriers in this simulation: if greater noise reduction is desired to the south, quilted absorbent barriers could be used instead.

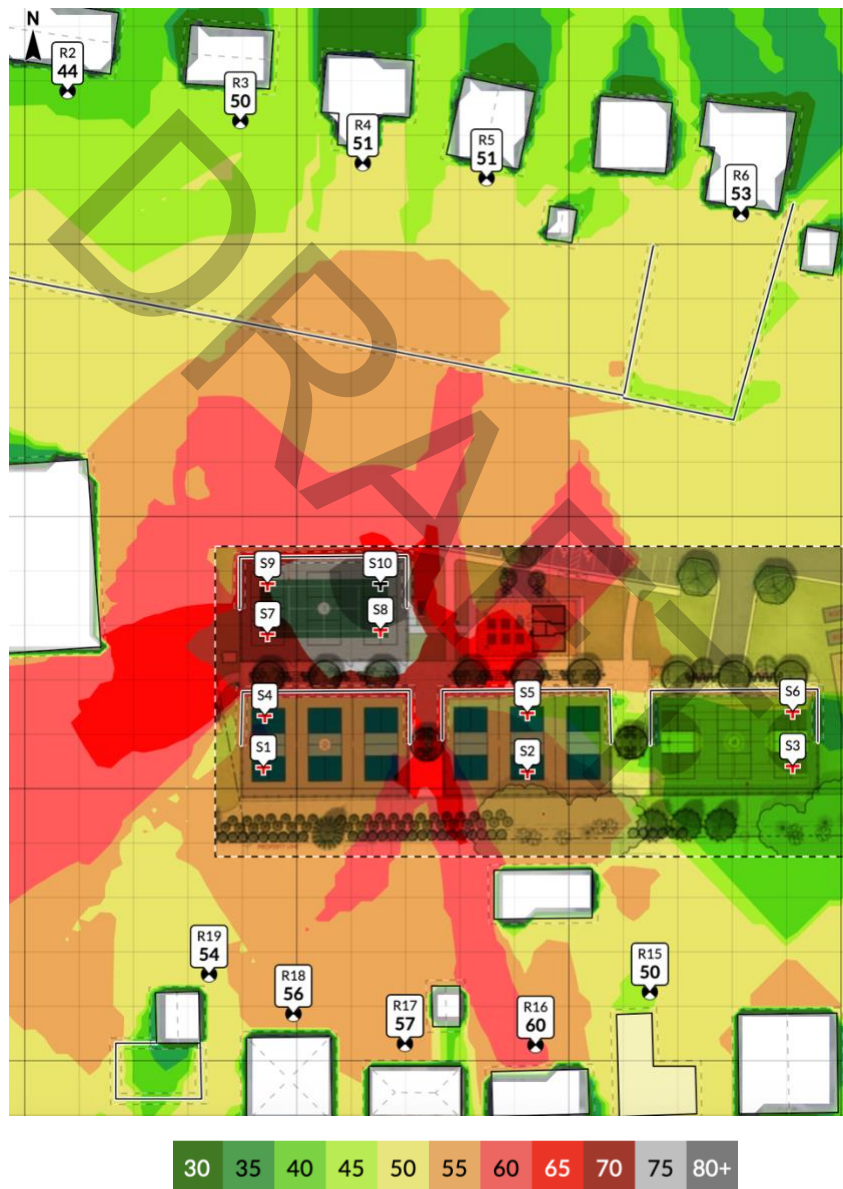


Figure 14: Noise Map, 10' Reflective Barriers, S10, North and South Receivers

In contrast to Figure 14 above, if we merely move the source to the south edge of the same court (S8), the level increases significantly to the north due to the smaller angle of sound diffraction over the barrier, as shown below in Figure 15. **Levels in this scenario are predicted from 56-60 dBA at R2-R5, exceeding the target limit of 52 dBA.** Levels to the south are predicted to decrease from S8, due to sound obstruction from the barrier on the court to the south.

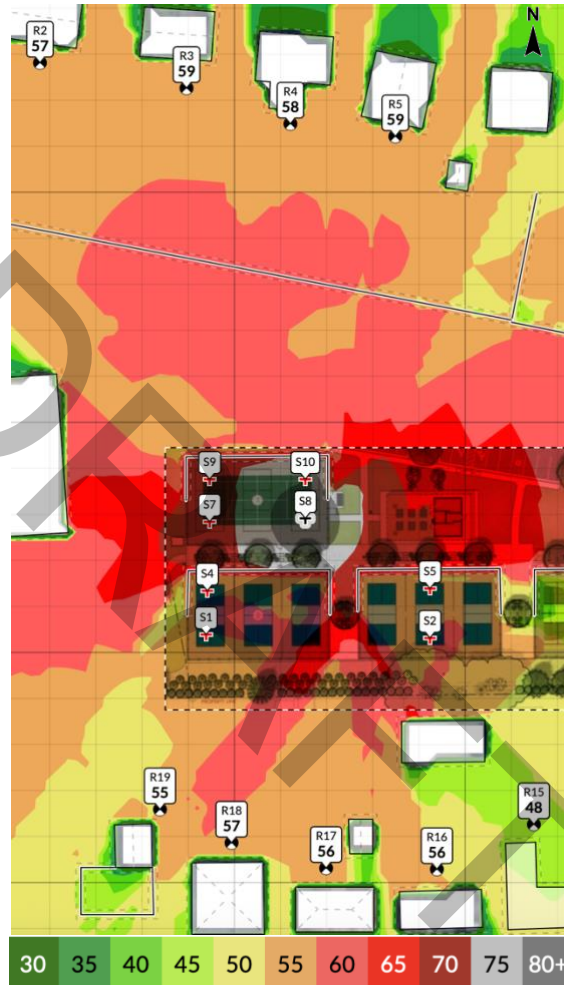


Figure 15: Noise Map, 10' Reflective Barriers, S8, North and South Receivers

Some source-receiver combinations are omitted for concision's sake, but in general **the 10' barriers in the existing plans are not predicted to give adequate noise mitigation for pickleball sound.**

With 12' Reflective Barriers, Extended

Zone 1

Due to the issues in the previous section, here we show a simulation with barriers extended down the full east and west sides of each court. The barriers will also extend down the west side of the west courts to prevent strong reflections off the rec center. In addition, the height of the barriers is increased to 12'. This change solves many, but not all of the issues shown in the previous section. For a source on the middle courts, the northern part of the courts (S5) is sufficiently mitigated towards the north receiver positions, but **levels from the south parts of the court (S2) are predicted to meet the target level except at R5**, as shown below in Figure 16.

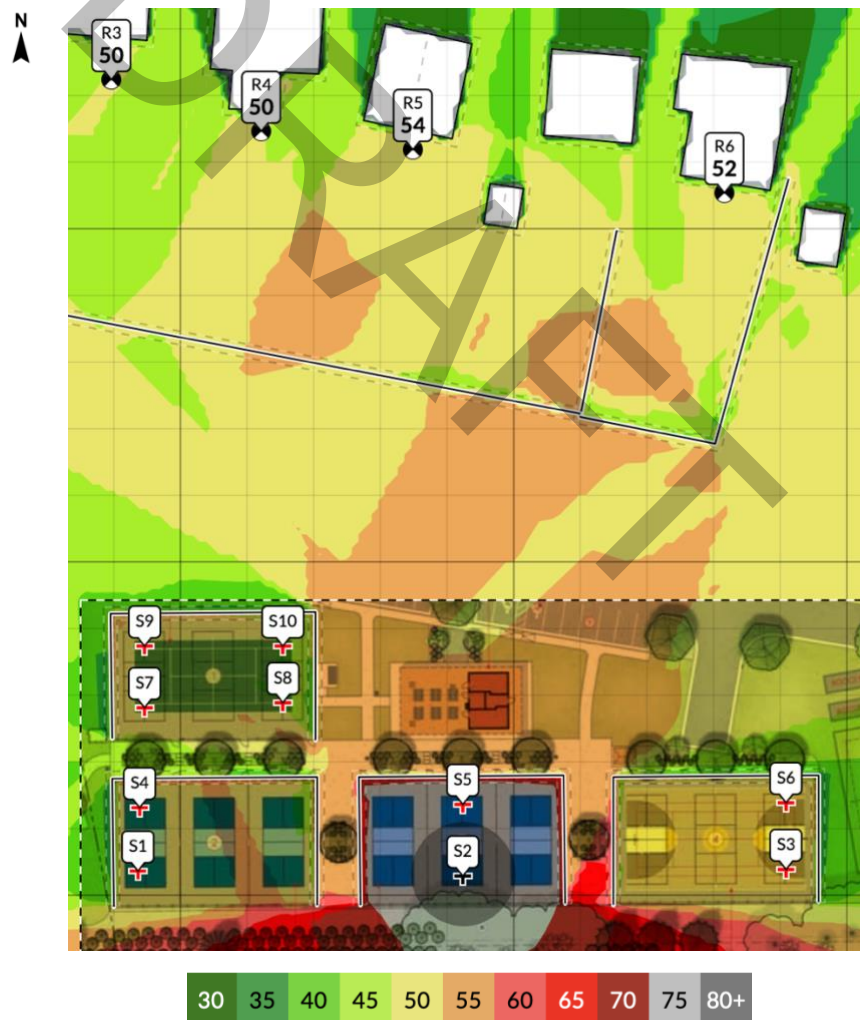


Figure 16: Noise Map, 12' Reflective Barriers (Extended), S2, North Receivers

Zone 2

Figure 17 below shows the predicted noise map from S3 to the east receiver positions again: **the direct sound path is blocked now, reducing levels below 52 dBA at R8-R13, which is within the target range.**

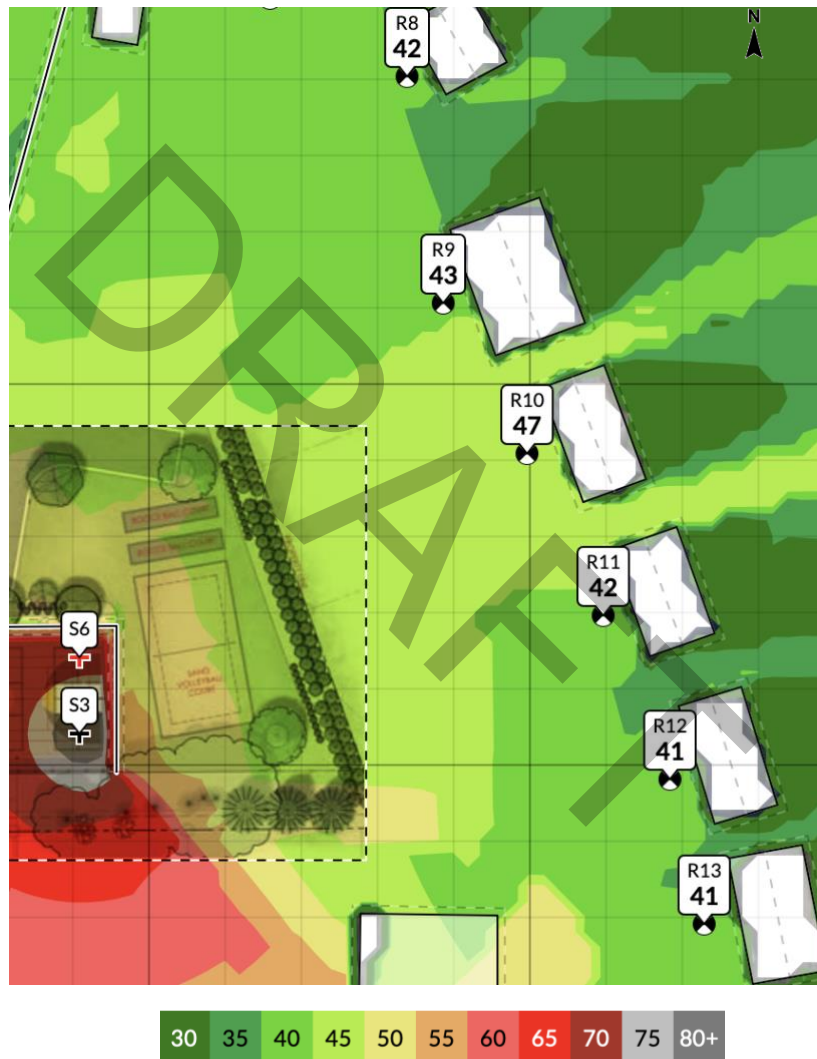


Figure 17: Noise Map, 12' Reflective Barriers (Extended), S3, East Receivers

As Figure 18 below shows, the predicted levels to the north (R6 and R7) are predicted to be below the target limit of 52 dBA from S3. Levels remain in the range around 64 dBA at the south commercial receiver positions (R14-R15). This is within the mixed-use zone daytime noise limit of 70 dBA but is above PSMC's target limit of 52 dBA; however, if necessary, it could be mitigated somewhat by using absorbent quilted barriers.

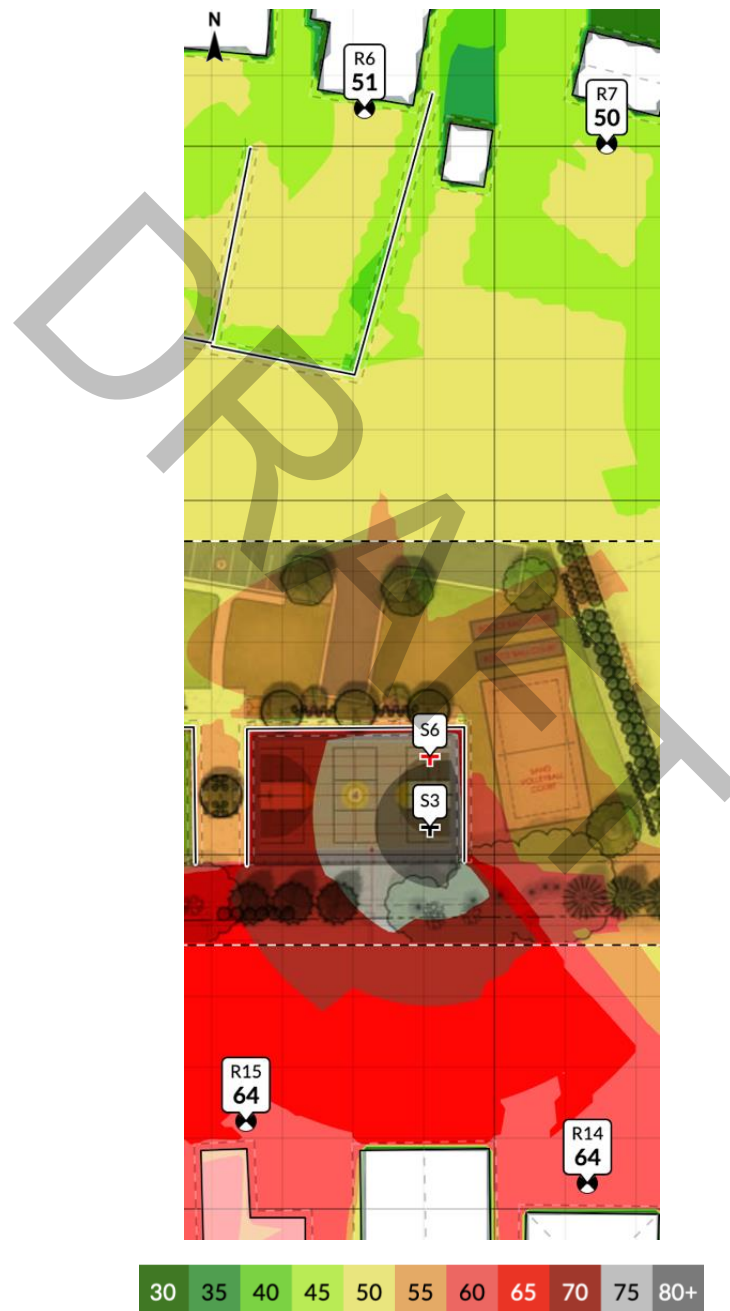


Figure 18: Noise Map, 12' Reflective Barriers (Extended), S3, S and N Receivers

Because of the issues encountered above, an additional source point (S11) was simulated on the west side of Zone 2, as shown in Figure 19 below. As the figure shows, diffraction over the top of the barrier is still predicted to reduce noise below the target limit at R9-R12. **However, diffraction around the side of the barrier is predicted to yield levels above the target limit at R13.** While measurements on site showed greater background noise from traffic, especially at low frequencies, at R13, it may still be advisable to reduce pickleball noise at this property at 52 dBA or below since it is a residential building.

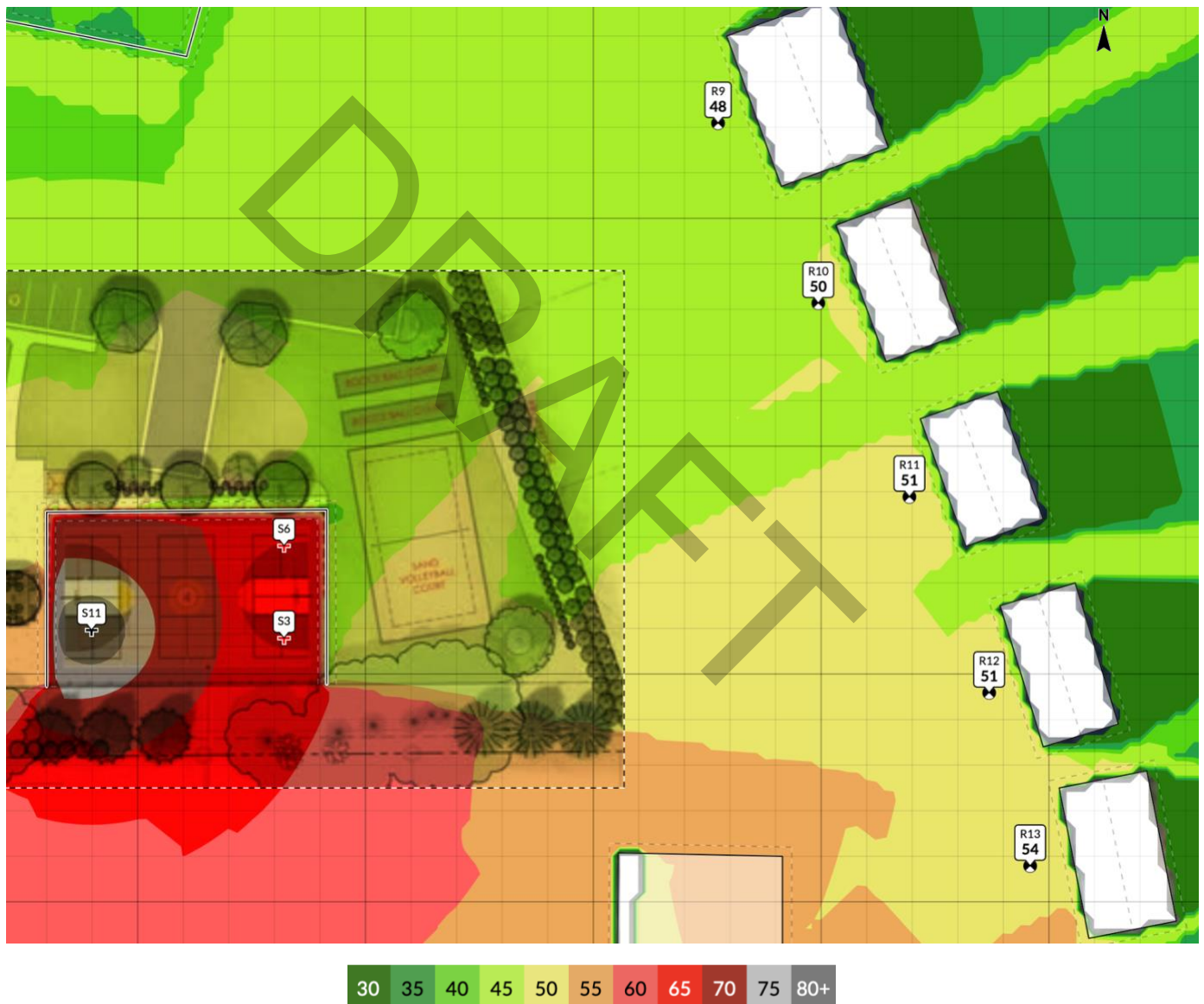


Figure 19: Noise Map, 12' Reflective Barriers (Extended), S11, East Receivers

To reduce levels at R13, the barrier would need to extend along the south side of Zone 2 as well. **Figure 20 below shows the fully enclosed 12' barrier around the court, which reduces levels at R13 below the target limit.**

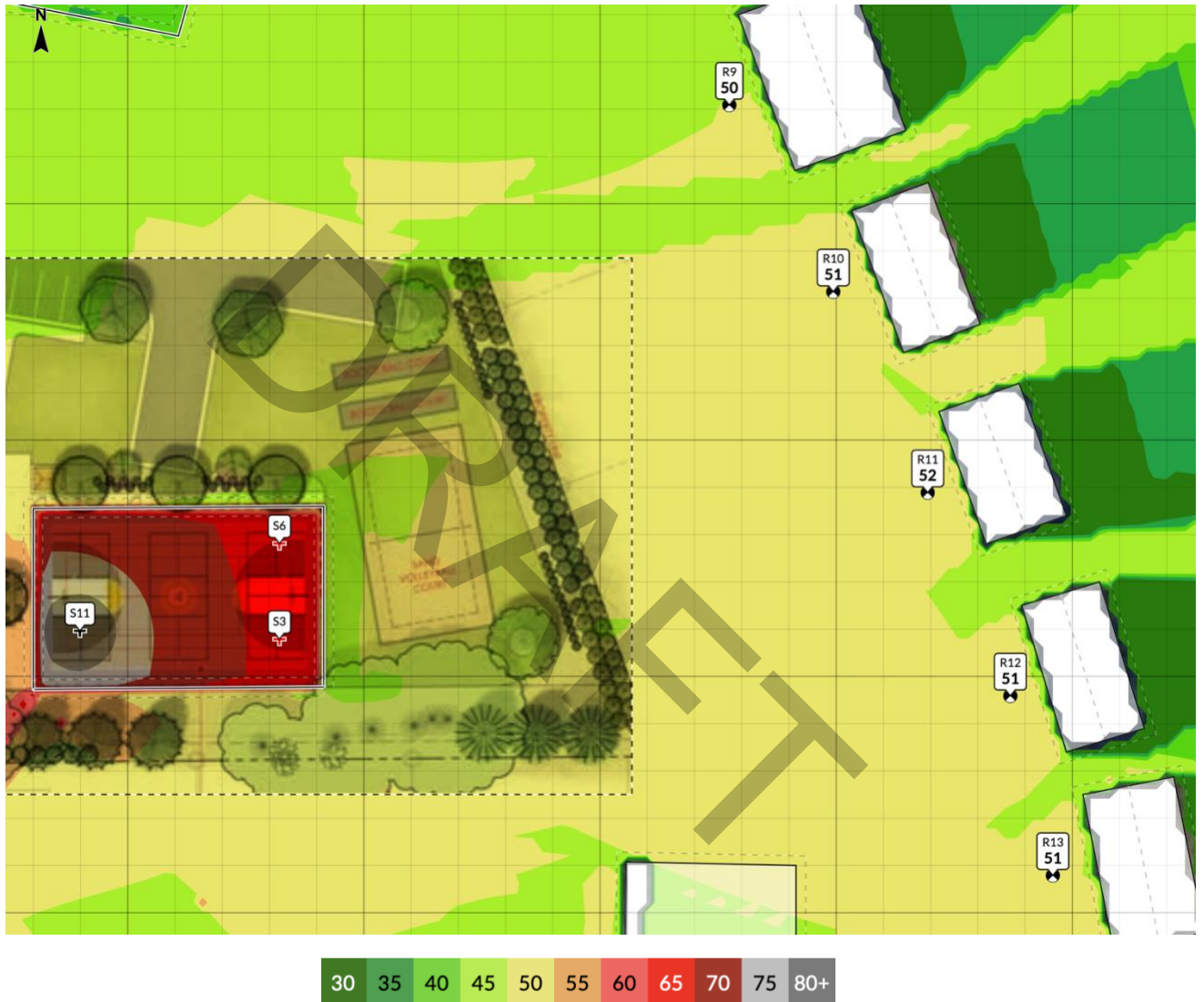


Figure 20: Noise Map, 12' Reflective Barriers Fully Enclosing Zone 2, S11, East Receivers

Zone 3

For sources on the south side of the NW court (S8), levels are predicted to be reduced to the north but still exceed the target limit, with levels from 54-56 dBA at R2-R5, as shown below in the Figure 21. Levels at these north receiver positions could perhaps be reduced by another 1-2 dB by using absorbent materials on the north side of the SW court, but again at some expense. Even assuming this step was taken, the levels at R3 and R4 would still exceed the target limit.

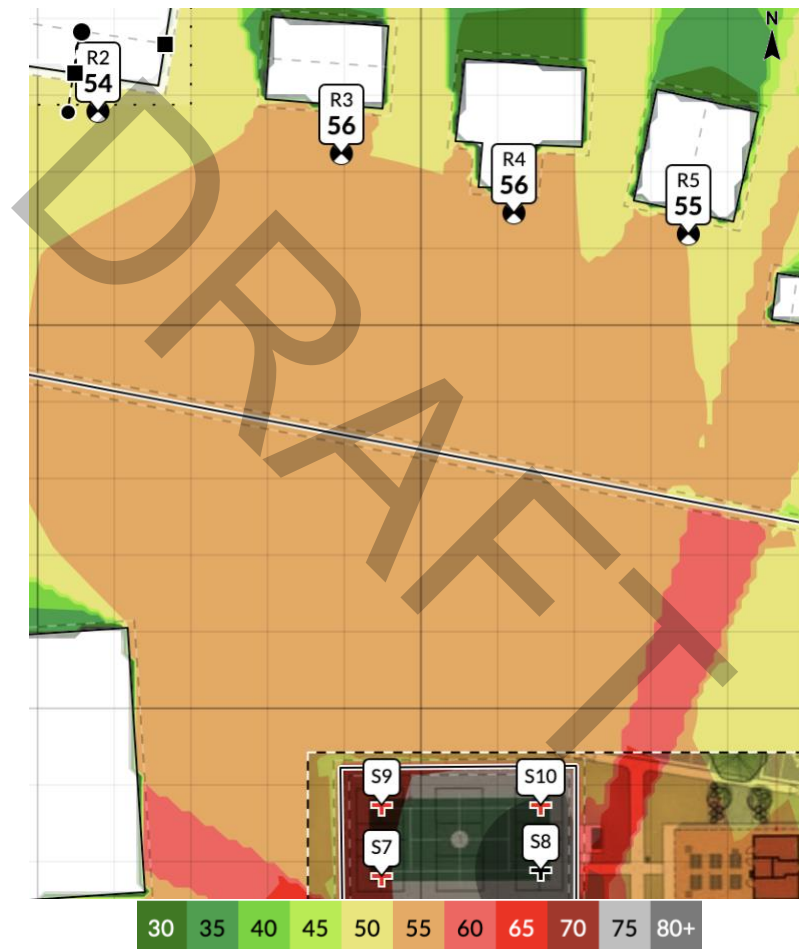


Figure 21: Noise Map, 12' Reflective Barriers (Extended), S8, North Receivers

If levels from Zone 3 were to be fully mitigated (that is, reducing the levels at the northern receiver points to 52 dBA LAFmax or below), the northern court barrier would need to be extended to a height of about 16'. It is very difficult to source mass-loaded vinyl noise barrier materials at this size, and in addition the risk of wind damage increases greatly. When a barrier of over 14' high is needed, the usual solution is a block or precast concrete wall or a highway barrier; therefore, it may not be plausible it is to mitigate noise from the northern court under the May 2025 plan using only a barrier.

Another option which may be difficult to enact would be the restriction of pickleball play to quiet equipment: PSMC has tested and catalogued a variety of balls and paddles which are designed to reduce noise output. PSMC's "Blue List" of approved quiet equipment is included as Appendix B. Restriction to quiet equipment is sometimes enacted by private clubs; however, as the Tucker Recreation Center is a public facility any such restriction would be difficult to enforce.

Due to the dual-use nature intended for the north court (Zone 3), it will be difficult to place 3 pickleball courts there, since the holes for net posts for the tennis court will be located in the middle court. **Therefore, a solution for Zone 3 could involve reducing the number of pickleball courts to 2, and oriented east-west (1 on each side of the tennis net). This would shift sound propagation to the east-west axis and away from the homes on Morgan Road.**

An added benefit of this solution is that the pickleball courts could be shifted towards the northern barrier, making a steeper angle of diffraction and yielding greater sound mitigation. Figure 22 below shows the predicted noise level from S10 to the northern receiver positions when play is oriented along an east-west axis. **All northern receiver positions are predicted to be within the target range from Zone 3 once the courts are rotated 90 degrees.**

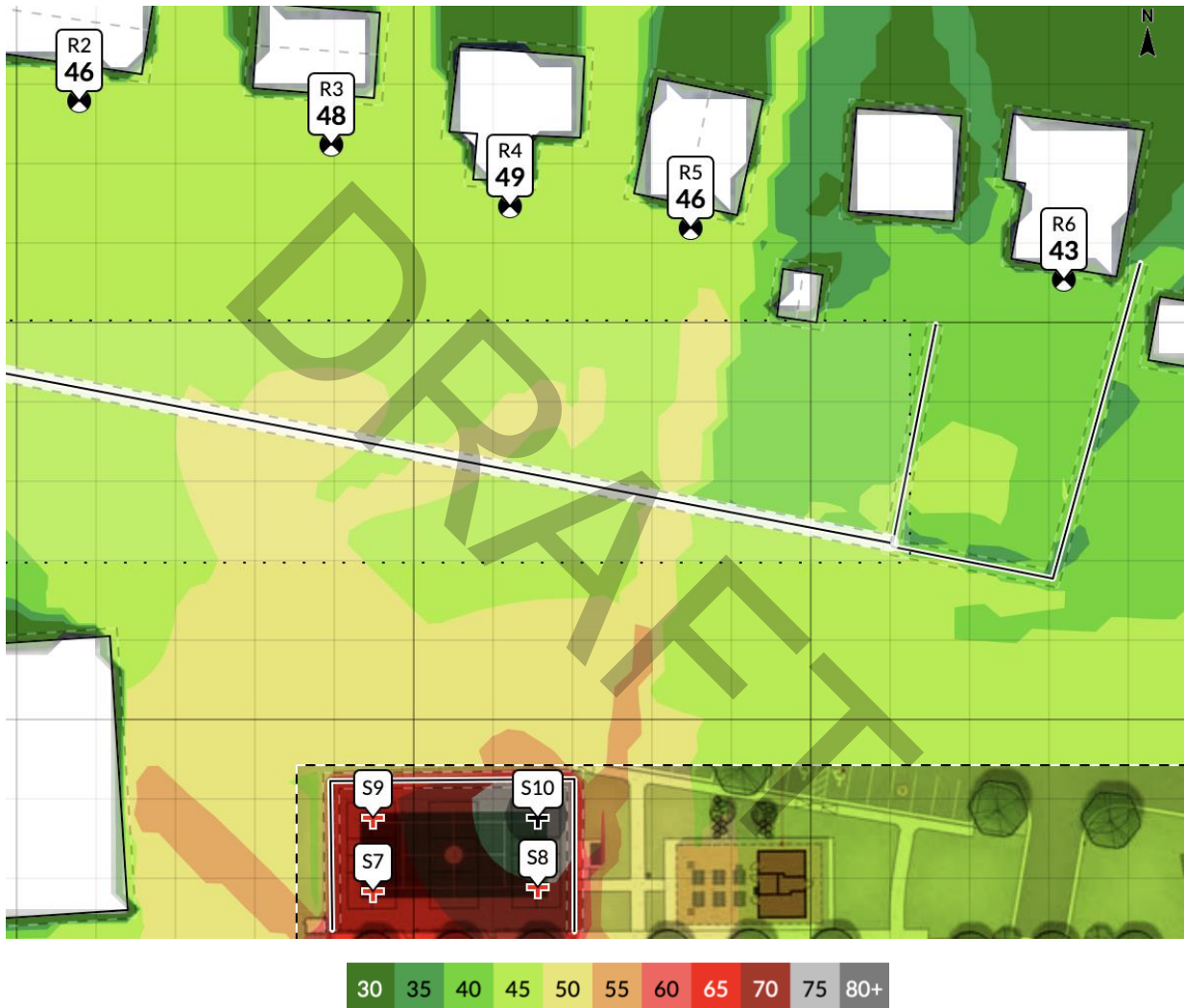


Figure 22: Noise Map, 12' Reflective Barriers (Extended), S10, East-West Orientation, North Receivers

The tradeoff of rotating the Zone 3 courts is that they will propagate more sound to the eastern receiver positions. Figure 23 below shows the predicted noise map from S9 to the eastern receiver positions once the Zone 3 courts have been oriented east-west. Levels are predicted at 53-54 dBA from R9 to R12. **However, since R9, R10, and R12 are commercial properties, the biggest concern is 53 dBA at R11, which slightly exceeds the target limit. When traffic was present on Chamblee Tucker Road, greater background noise levels were measured at R11, which would be expected to provide greater masking to pickleball noise at R11.** If this is not acceptable, the Zone 3's eastern barrier's height could be increased slightly to decrease the noise level at R11.

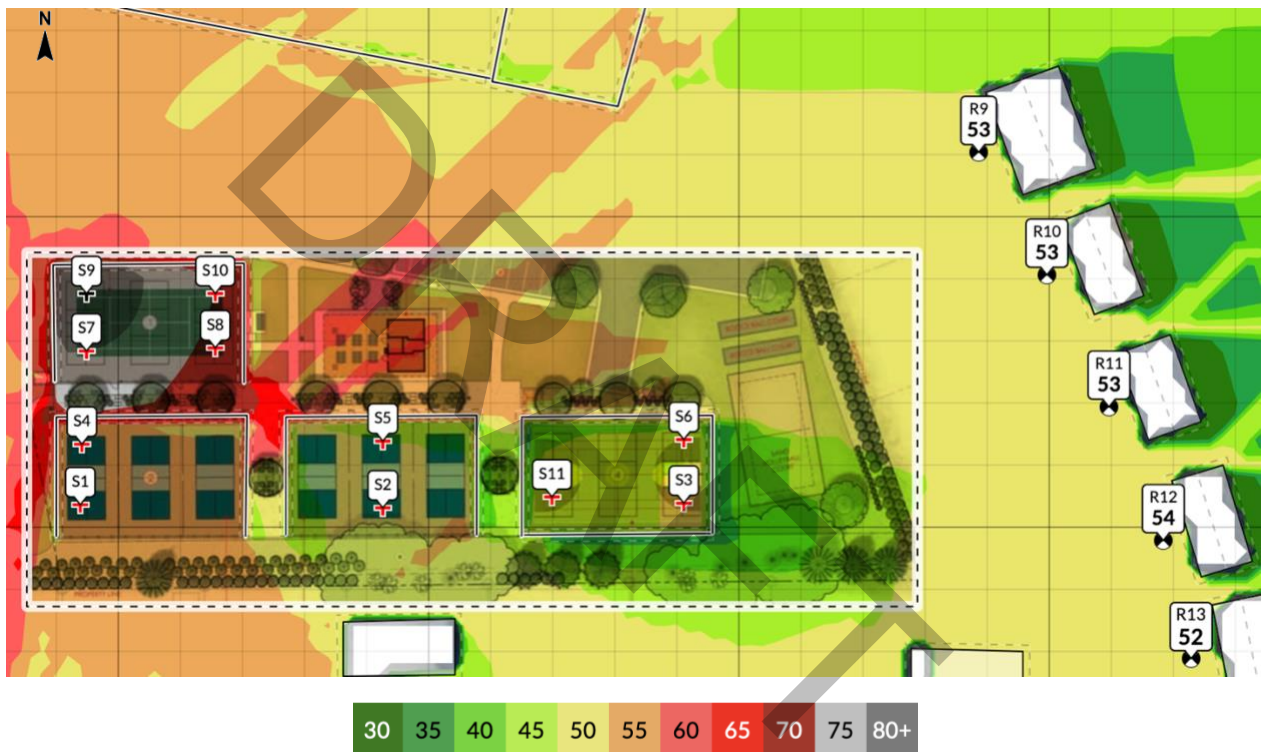


Figure 23: 12' Reflective Barriers (Extended), S9, East-West Orientation, East Receivers

Additional Issues: North Receiver Positions

The 12' barriers shown above have mitigated sound for all positions except sources along the south edge of Zones 1 and 2 to northern receiver positions. In particular, the following source-receiver positions are predicted to slightly exceed the target limit of 52 dBA along Morgan Road, under a worst-case condition, like highly skilled players using “noisy” paddles:

- S2-R5: 54 dBA
- S11-R6: 54 dBA

The added berm, hedges, and tree canopy included in the current plans may add up to 2 dB of sound reduction at R6, if the trees planted are dense enough to ensure blockage of all sound paths to that residence.

To reduce the S2-R5 sound path to the target limit, the northern barrier on the center court along the south side would need to be about 2' higher, or about 14' total. As mentioned, it is more expensive to source fence and barrier materials, but it is the best mitigation option available. However, the possibility of wind damage needs to be considered for 14' barriers. Figure 24 below shows the predicted noise map from S2 to the northern receiver positions when the northern barrier height is increased to 14'.



Figure 24: 14' Reflective Barriers on Center Court, S2, North Receivers

Fully Enclosed Courts, 14' Absorptive Barriers

If the City wishes to ensure all levels below 52 dBA (at commercial as well as residential properties), then more extensive mitigation measures are required to reduce levels at the nearest commercial properties to the south. Without installing roof structures above the courts, the most aggressive mitigation strategy would be to use **14' absorptive barriers that fully enclose the courts on all sides for Zone 1 courts**. An additional benefit of using absorptive barriers is that they will reduce the noise levels on the courts and reduce the annoying “flutter echo” which can occur between parallel walls on the courts themselves.

Figure 25 below shows the predicted noise map from S4 to the south with 14' absorbent barriers on all sides (similar to the Insulquilt IQ21 material). **Even with this extreme mitigation measure, the predicted level still exceeds the target level at R17.**

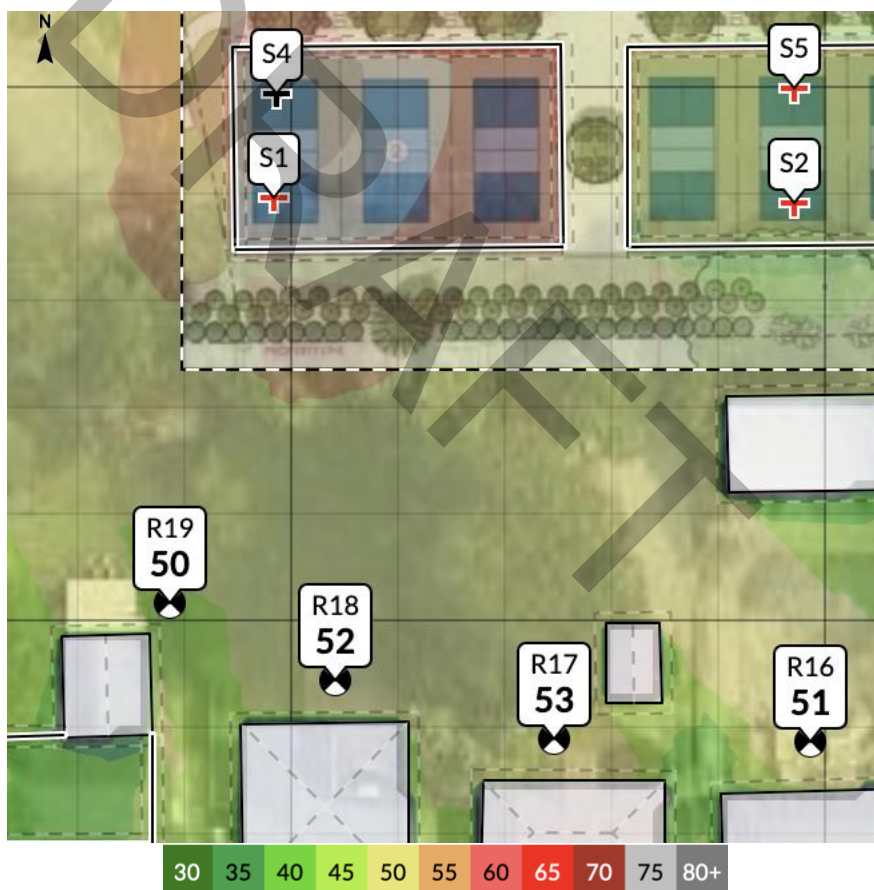


Figure 25: 14' Absorptive Barriers on SW Court, S4, South Receivers

This effect is also court-dependent: Figure 26 below shows a new source (S12) added on the north end of the eastmost court within Zone 1. **Again, even with the 14' absorptive barriers, the noise level is predicted to exceed the target level at R16 and R18.**

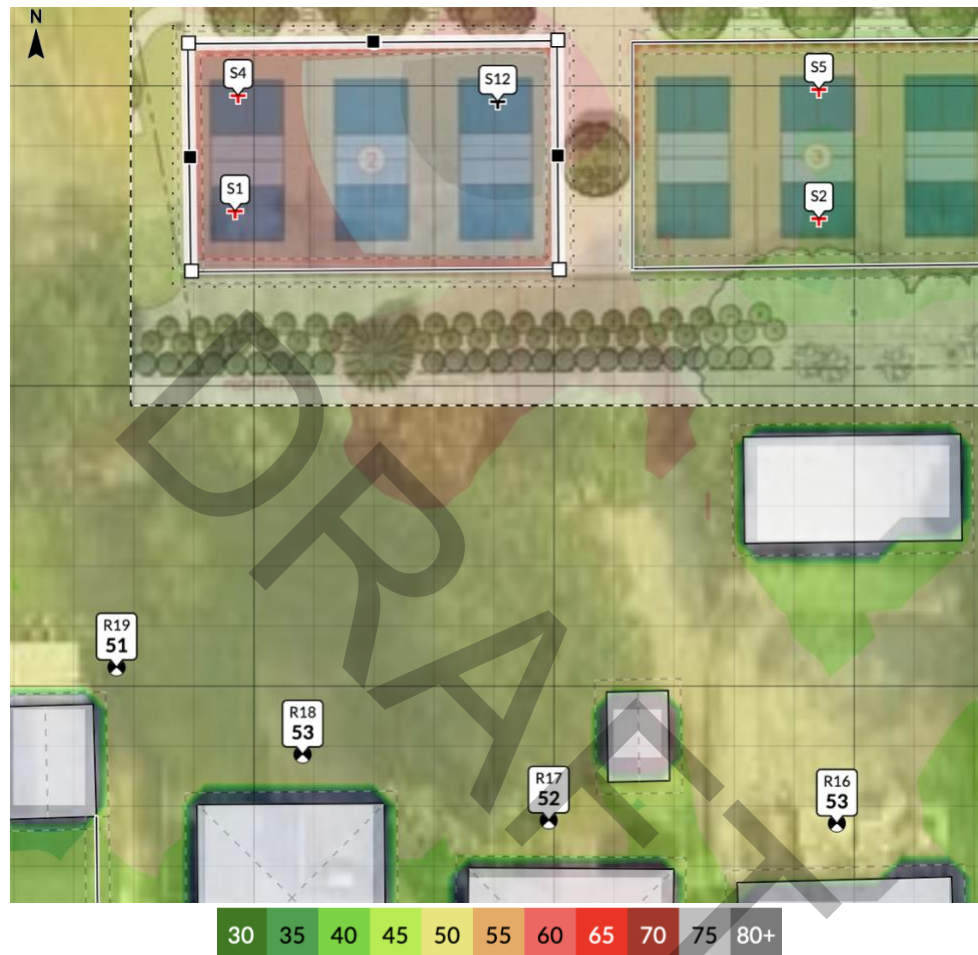


Figure 26: 14' Absorptive Barriers on SW Court, S12, South Receivers

However, **all other source/receiver combinations are predicted to be below the target limit if 14' fully enclosing absorptive barriers are installed around all pickleball courts. In addition, sources in Zones 2 and 3 are predicted to be within the target level using only 12' barriers.** To fully mitigate levels at these receiver positions, a fabric roof cover might be considered to add another 2-3 dB of sound mitigation to the diffracted sound component over the top of the barriers. It should be noted that when courts are fully enclosed on all sides it may increase risk of security issues if the courts cannot be visually inspected from outside.

Another design option which may be less expensive would be to fully enclose all six of the Zone pickleball courts with the 14' absorptive barrier. The predicted levels in this scenario are similar to that shown above, while reducing the total length of barriers required. In addition, this would create a slightly more open feel on these six courts and improve airflow, while also providing a waiting area between the two groups of courts for other players waiting to play. Figure 27 shows the predicted noise map for this scenario for source S4: **noise levels still slightly exceed the target level at R17.**

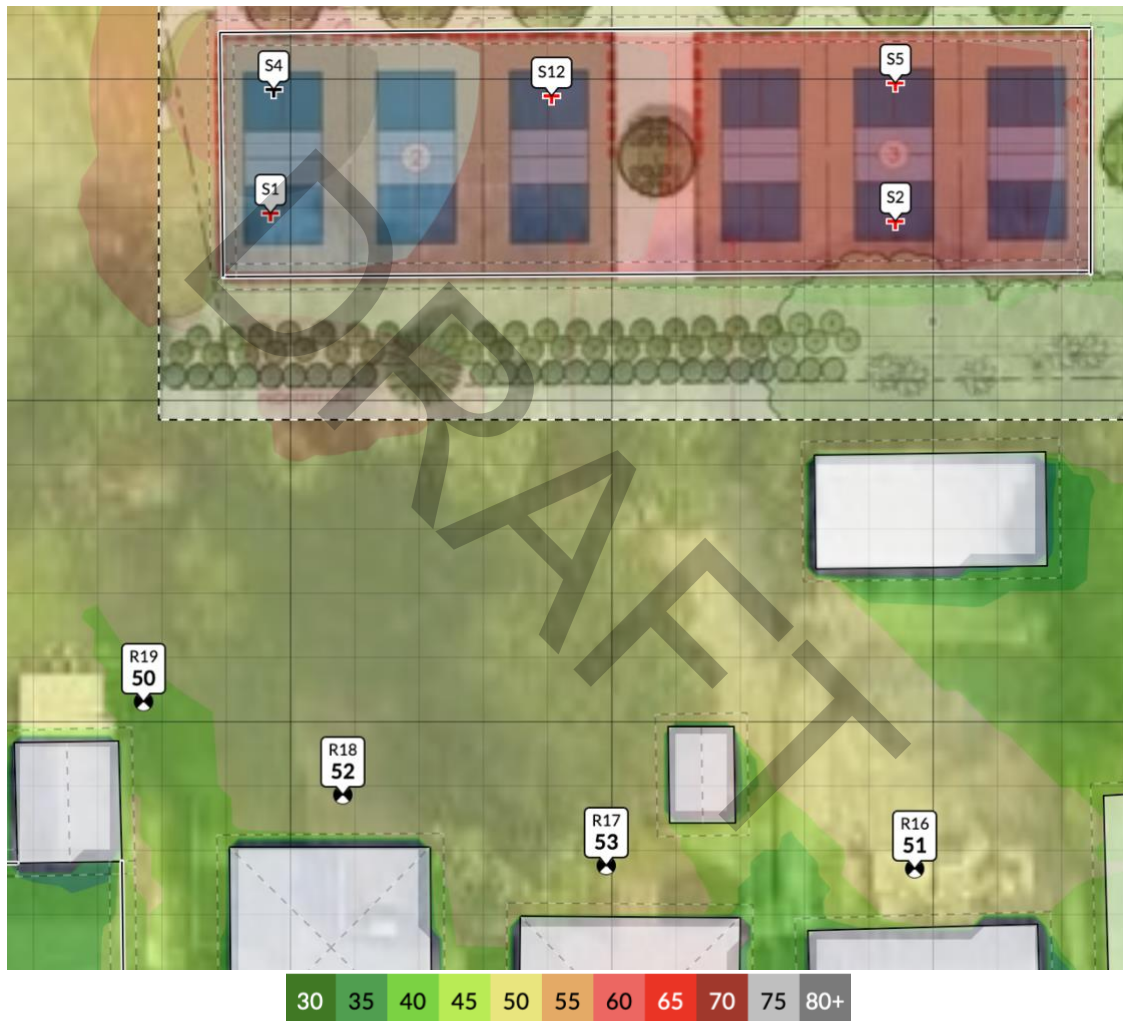


Figure 27: 14' Absorptive Barriers Surrounding Zone 1, S4, South Receivers

Although a target of 52 dBA is not predicted to be met for these receiver positions, a 1 dB difference may not be perceptible at these south receiver positions, especially given the greater traffic noise from Lavista Road.

Tucker Recreation Center Conclusions and Recommendations

- Due to the close distance between the planned courts and many residences, pickleball play is predicted to yield high noise levels which require sufficient sound mitigation.
- The municipal noise code specifies only nighttime limits within residential properties, in addition to a 70 dBA limit in commercial or mixed-use zones. PSMC recommends keeping pickleball noise levels below 52 dBA LAFmax to reduce the risk of community annoyance from pickleball strikes, based on ambient noise measurements in the area and our experience with other pickleball sites. For properties to the east, a slightly higher limit may be tolerable due to the greater masking traffic noise from Chamblee Tucker Road.
- With no barriers in place, levels are predicted to be highly annoying, especially at the residential properties to the north.
- Levels are predicted to be higher at the commercial receiver positions to the south; however, most of these are commercial properties functioning indoors and there is a greater level of masking traffic noise present.
- The 10' northern barriers in the May 2025 plans are not predicted to sufficiently mitigate noise from the courts in their proposed layout.
- **A 12' extended barrier would mitigate levels at many properties; however, the center court's northern barrier would need to be extended to 14' high to ensure noise levels within the target limit along Morgan Road.**
- **The northern courts (Zone 3) need to be reduced from 2 to 3 courts, and oriented east-west. This is predicted to reduce levels along Morgan Road below the target limit.**
- **If the City wishes to reduce noise levels below the target limit of 52 dBA LAFmax at all commercial properties as well, the courts on Zone 1 need more extensive mitigation measures, such as fully-enclosing 14' absorptive barriers. Even in this case, certain source positions are predicted to exceed the target limit at some receiver positions along Lavista Road.**
- **An additional fabric roof cover may be needed to fully meet the target noise level at all nearby properties.**

Henderson Park

Overview of the Site

Located at 2803 Henderson Park Road, the community park includes Lake Erin, walking trails, a dog park, fishing pier, playground, restroom facilities, picnic shelters, a community garden, soccer fields and four tennis courts.

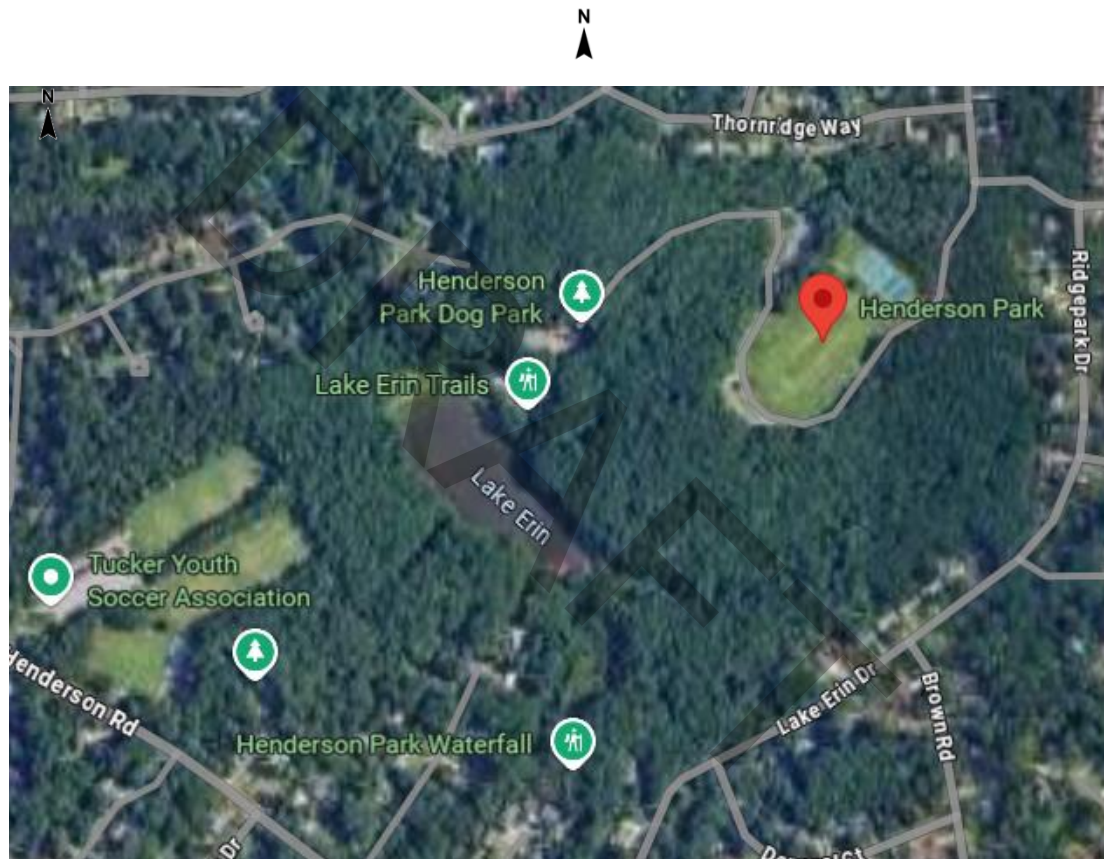


Figure 28: Overview of Henderson Park

Based on the existing tennis courts, pickleball play is being considered at the west side of Henderson Park. The existing courts could accommodate several options and court configurations, including dual-use (tennis and pickleball), dedicated pickleball courts or a combination of the dual use and dedicated pickleball courts. These options would allow for permanent tennis nets to remain in place at all times and pickleball would utilize a wheeled net system.

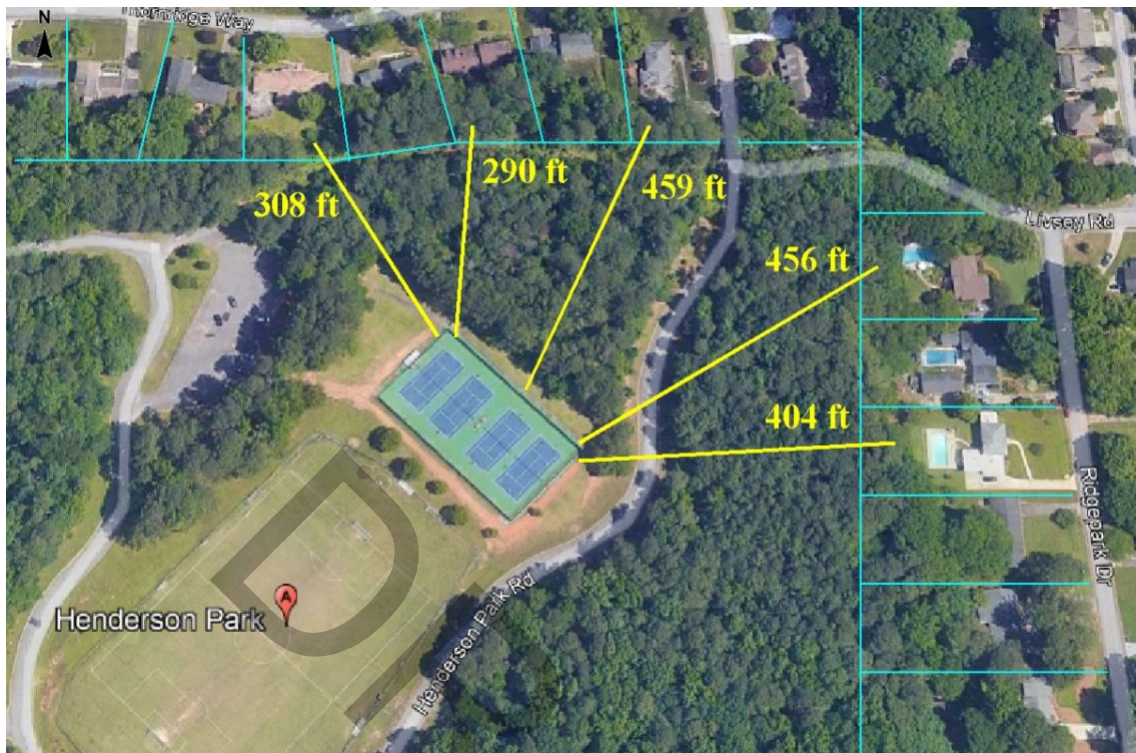


Figure 29: Approximate Distances to Residences around Henderson Park

Single-family homes border the north and east sides of the park; however, a vegetative buffer, primarily composed of mature deciduous and fir trees with undergrowth, separates the courts from the residences. The ground is soft, exhibiting a low coefficient of sound reflection. The nearest outdoor recreation areas of the homes are located over 300 feet from the closest edge of the courts, with the residences themselves situated at greater distances. The housing consists of a mix of single-story and multi-story structures.



The tennis courts and soccer field are at the highest elevation of the park. The surrounding residences are 30' to 75' lower than court level, as shown in the color diagram in Figure 30.

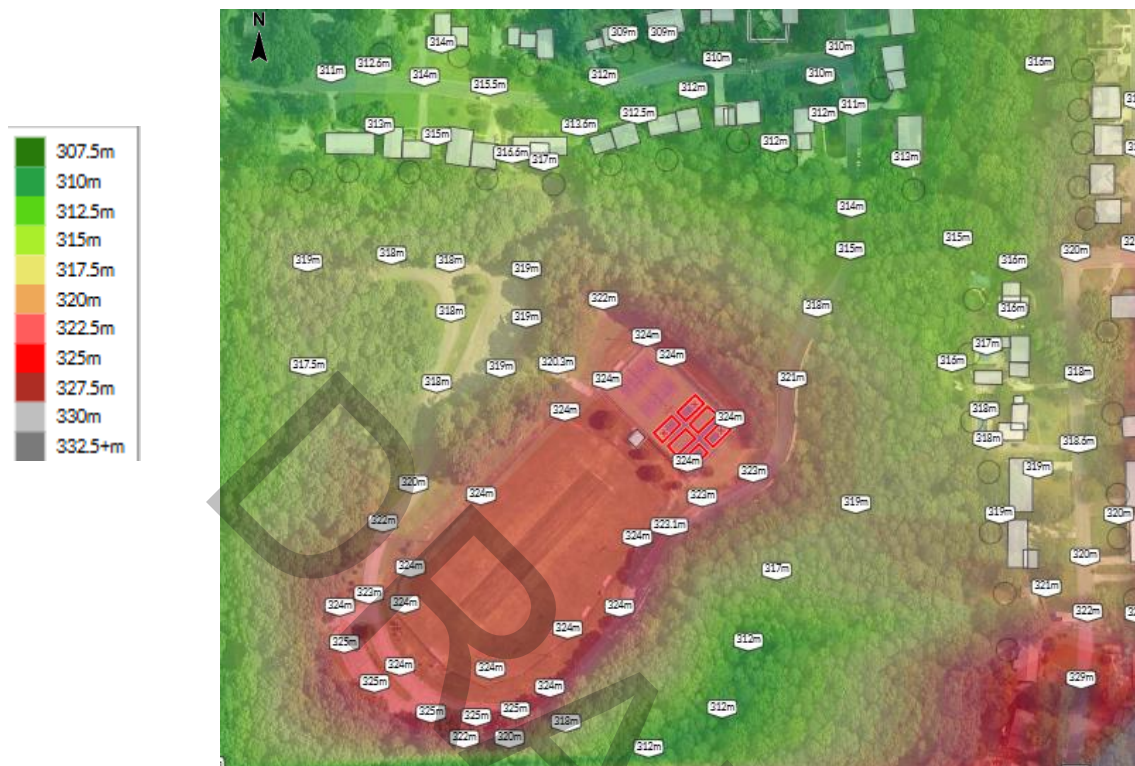


Figure 30: Color Chart of Elevations



A configuration of 12 pickleball courts over the existing four tennis courts is shown in Figure 31, with six source points identified at locations corresponding to the most forceful (loudest) shots on the courts.

The direction of play is approximately north-south, corresponding to the primary axis of sound propagation. Maximum sound pressure levels (LAFmax) from the hardest hits are expected to decrease by approximately 6 dB at a 90° angle relative to the direction of play.

Figure 31: Source Points, S1-S6

With No Barriers

The PSMC established sound level target limit is 50 dBA (LAFmax).

The predicted sound levels (LAFmax) at the surrounding residences when there are no barriers is shown in the following Figures.



Figure 32: Henderson No Barrier, Source Point S1

The PSMC established sound level target limit is 50 dBA (LAFmax).

Source
S3



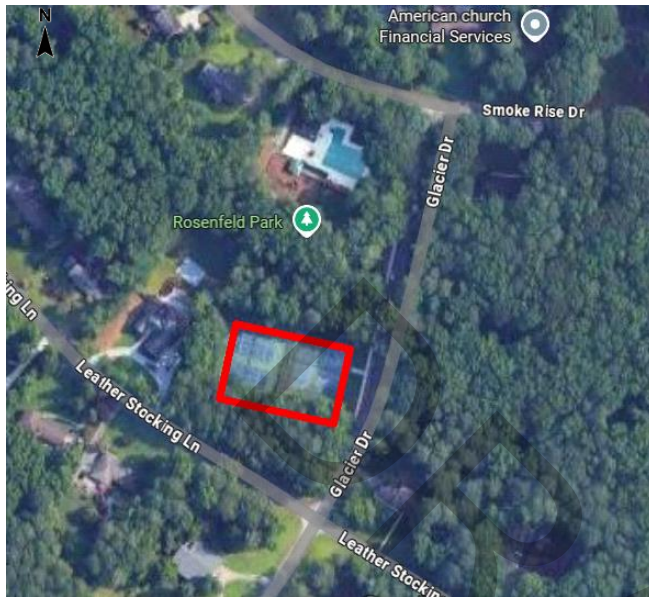
Figure 33: Henderson No Barrier, Source Point S3

Henderson Park Conclusions and Recommendations

- Henderson Park is a heavily wooded yet quiet environment, with no direct line of sight to the courts from surrounding residences. The planned pickleball courts, added to the existing tennis courts, would be located more than 300' from the outdoor use areas of the nearest homes. This combination of distance, ground attenuation, and vegetation contributes to effective sound mitigation.
- The orientation of the pickleball courts directs sound propagation primarily toward the soccer field and the more distant residences to the north, which are partially shielded by a berm and the slope of the intervening terrain.
- After accounting for elevations, directional factors, and other relevant parameters, modeling predicts **that maximum sound levels will remain at or below the conservative target limit of 50 dBA (LAFmax), without the need for additional sound barriers or attenuation measures.** While residents may occasionally perceive distant pickleball activity under unusual atmospheric conditions, predicted sound levels are expected to be temporary and within acceptable limits.

Rosenfeld Park

Overview of the Site



Rosenfeld Park, located at 2088 Glacier Drive in Smoke Rise between Leather Stocking Lane and Smoke Rise Drive, was acquired from the Smoke Rise Bath & Racquet Club.

At the time of acquisition, four tennis courts (outlined in red) and a public pool were incorporated into the Parks and Recreation system. A dog park has subsequently been added to the facility.

Figure 34: Rosenfeld Park Overview



(north)

Figure 35: Rosenfeld Park Redevelopment Overview

A June 2023 Park Improvements Plan is under consideration for converting the four (aging) tennis courts into three tennis courts and parking. The full-size plan is included in Appendix A. The City engaged PSMC to study the feasibility of creating dual use pickleball and tennis courts, recognizing that there are homeowners nearby who have commented on the sound from pickleball play that is taking place on the courts currently.

While the pool is popular with children during the day, the pickleball courts are drawing significant numbers of players, resulting in parking issues on Glacier Dr and Leather Stocking Lane. The two western tennis courts are lighted; however, the primary time of use is in the morning from 9:00 - 11:30 a.m. The condition of the surface of the courts now makes them practically unplayable for tennis. Pickleball players have chosen the two eastern tennis courts, oriented north-south, to be used for beginner lessons and “less competitive” recreational pickleball play. The two western tennis courts, oriented east-west, have higher skilled pickleball players and noisier paddles.



The proposed design includes removal of the existing retaining wall and seating/viewing area located south of the current tennis courts. This modification is expected to result in a minor change to sound reflections in that direction.

Figure 36 shows the approximate distances to nearby residences from the edge of the existing tennis court area.

Residences at 200' or less from pickleball courts typically require sound mitigation of some type to limit the highest impulse sounds to an acceptable level.

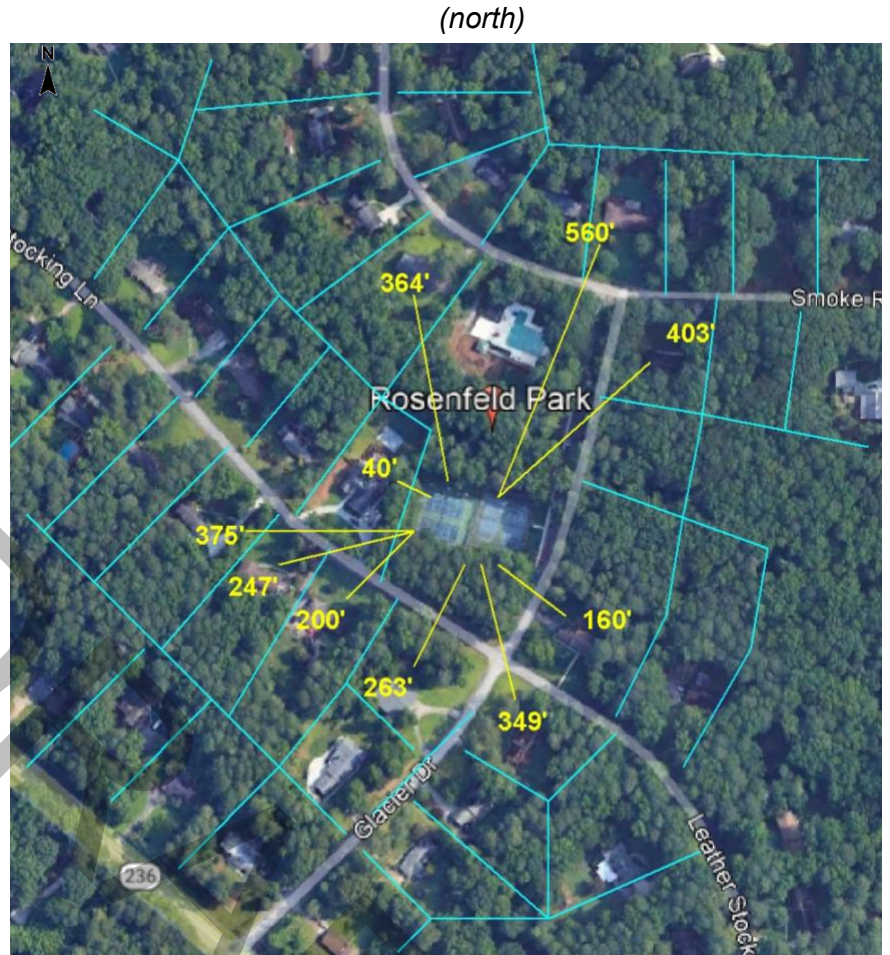


Figure 36: Rosenfeld Park Approx Distances from Court Edges to Residences



Although trees and shrubs are present, numerous homes have a direct line of sight to the courts, and the vegetation density at this location is insufficient to substantially attenuate

sound. During site inspection, pickleball activity was clearly audible from many surrounding yards.

When the pool is in use, it provides some masking of pickleball noise for properties to the northwest, north, and northeast, resulting in noticeable local sound mitigation.

Significant elevation variations around Rosenfeld Park influence sound propagation. The green 'belt' depicted in the chart represents a lower-lying area containing a small riverbed, while the homes to the north and south (shown in red) are situated at higher elevations.

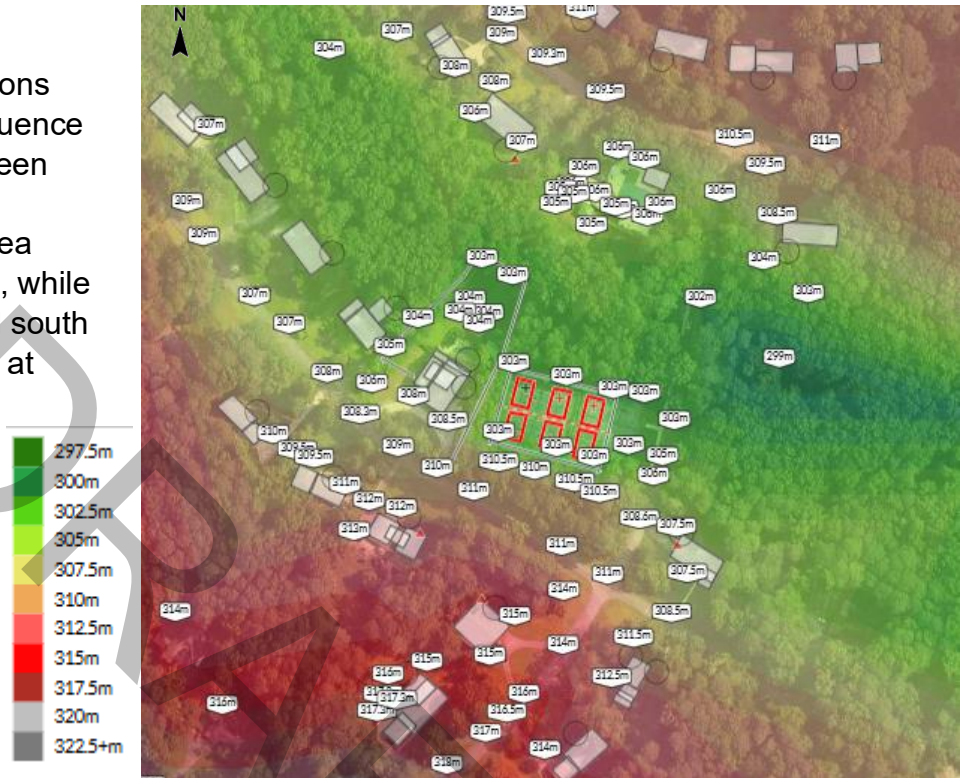


Figure 37: Rosenfeld Park Color Chart of Elevations

Source Points S1-S4



Figure 38: Rosenfeld Park Source Pts

Address	Distance Meters	Distance Feet
5428 Leather Stocking Lane	28.4	93
5417 Leather Stocking Lane	128.2	420
5429 Leather Stocking Lane	90.7	297
5439 Leather Stocking Lane	71.4	234
2018 Glacier Dr.	88.3	290
2023 Glacier Dr.	107.6	353
5476 Leather Stocking Lane	66.8	219
5481 Smoke Rise Dr	124.5	408
5474 Smoke Rise Dr	185.6	609
5462 Smoke Rise Dr	179.9	590
5446 Smoke Rise Dr	185.9	610
5449 Smoke Rise Dr	118.8	390



Figure 39: Rosenfeld Park Distances from Source Pts

With No Barriers

The predicted sound levels (LAFmax) at the surrounding residences when there are no barriers is shown in the following Figures. Separate views are shown because of the directional nature of pickleball sound.

Source Pt S1 - residences to the north



Source Pt S1 – residences to the west



Source Pt S1 – residence to the east



Source Pt S1 - residences to the south

Figure 40: Rosenfeld Park Color dB Charts with No Barriers

From Source Point S1, with no barriers, the predicted sound levels at the nearest residences exceed the target limit of 50 dBA in all directions except to the east.

With Various Barrier Options

The worst-case scenario is mitigating sound to the nearest residence to the west, 5428 Leather Stocking Lane. Different barrier heights and locations were simulated, and it was determined that a 10' high barrier would limit sound to 50 dBA at the backyard level with the Sound Source at S1; however, to meet the target limit at the second story windows, it would require a 17' high barrier.

With the Sound Source at S2, a 22' high barrier is predicted to be required to get the sound level to 51 dBA at the second-floor windows. This is because the further distance of the source from the barrier creates an angle which permits diffraction of sound going over the barrier.

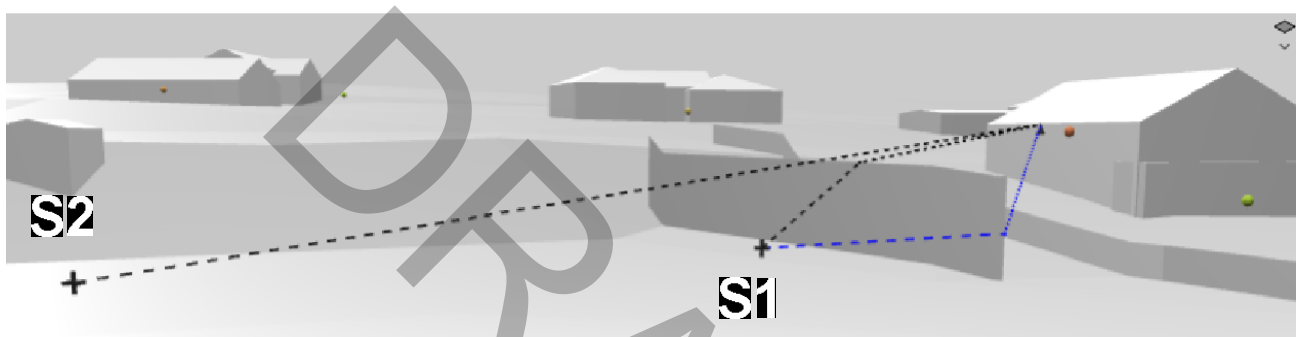


Figure 41: Rosenfeld Park Sound Ray Diagram

Setting aside this closest residence, various barrier heights, locations and materials were simulated to find a combination that would achieve the target limit. Barrier heights over 12' usually suggest the use of walls or highway style materials, which are significantly more expensive than chain link fences with panels attached; therefore, a model was tested with 12' high absorption style panels on all four sides.

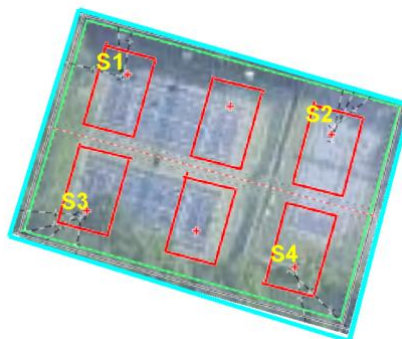


Figure 42: Rosenfeld Park 12' Barrier Diagram

Sound absorption panels are more expensive, but when there are parallel barriers, a flutter echo results, and multiple sound paths are created that can go over barriers.

With 12 feet Absorption Barriers on Four Sides:

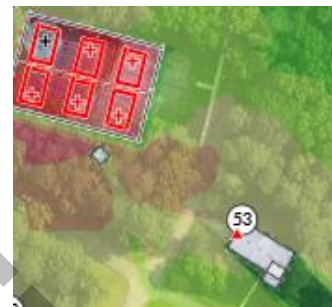
Source Pt S1 - residences to the north



Source Pt S1 – residences to the west



Source Pt S1 – residence to the east



Source Pt S1 - residences to the south

Figure 43: Rosenfeld Park Color dB Charts with 12' Barriers

With the Sound Source at S1, sound levels at residences to the north and west (except the nearest house) are predicted to be within the target limit; however, sound from S1 goes over the southern and eastern barriers resulting in levels of 53 dBA and above.

With the Sound Sources at S3 and S4 on the south courts, the same phenomenon occurs with sound going over the 12' barriers on the north fences and creating unacceptable levels at homes to the north on Smoke Rise Drive.

Designs with four-sided barrier levels as high as 16' were tested and the predicted results were sound levels above 50 dBA. Increasing the heights of barriers creates more reflected sound, even with absorbing materials.



Figure 44: Rosenfeld Park Color dB Charts, S3 with 12' Barriers

Rosenfeld Park Conclusions and Recommendations

- Rosenfeld Park currently supports a vibrant and highly active pickleball community across five courts, despite deteriorating surfaces and the use of temporary nets. While play is not continuous throughout the day and evening, activity could increase if the courts remain open. Noise from the pool area, when children are present, provides partial masking of pickleball sounds for properties north of the courts.
- A renovation plan has been proposed to convert the facility to three tennis courts with additional parking, with dual-use courts for pickleball considered as an option. The placement of pickleball courts on either side of the tennis nets, aligned north-south, was analyzed, taking into account one residence located less than 100' from the proposed courts and others within 300' of the nearest pickleball sound source points.
- The municipal noise code establishes limits only for nighttime periods on residential properties. Based on ambient noise levels and PSMC's experience with other pickleball sites, it is recommended that pickleball sound levels be maintained below 50 dBA (LAFmax) to minimize potential community annoyance.
- **PSMC assessment indicates that, without barriers, the proposed dual-use court design would result in pickleball sound levels at multiple residences exceeding the target limit of 50 dBA (LAFmax), a threshold generally considered acceptable by homeowners.**
- **After simulating multiple barrier height, location and mitigation material options, it is our conclusion that simply increasing the height of barriers will not result in successfully limiting the sound from pickleball to below 50 dBA (LAFmax).**
- Possible alternative solutions include:
 - Cover the courts with a fabric or a solid structure that also has sound mitigation capabilities. This could enable more hours and days of play, less affected by weather issues, and potentially lighted play at night without annoying homeowners.
 - Designate specific courts for either tennis or pickleball, not both, and redesign the layout to enable better sound mitigation.

VIII. Authors' Credentials

Braxton Boren is an Associate Professor of Audio Technology at American University in Washington, DC. He has a BA Summa Cum Laude in Music Technology from Northwestern University, a master's degree in physics from the University of Cambridge, and a PhD from the Music and Audio Research Laboratory at New York University. He served as a postdoctoral researcher in the Mechanical Engineering Department at Princeton University for two years before beginning his position at American University.

Professor Boren is a Full Member of the Acoustical Society of America and the Audio Engineering Society. He teaches courses on acoustics, the human auditory system, and digital signal processing. His research focuses on computer sound simulation, noise, and room acoustics in sound critical spaces. He has served as an expert witness in multiple civil cases related to noise pollution, including from pickleball courts. His work has been featured in *National Geographic*, *Science*, *BBC Radio*, and the *New York Times*.

Dale H. Van Scoyk is a graduate of Purdue University, awarded a Bachelor of Science degree in Electrical Engineering. He has MBA training from Arizona State University. Member of the Acoustical Society of America and associate member of the Institute of Noise Control Engineering, INCE-USA

He has over 25 years of experience in industrial equipment design and manufacturing. He has authored white papers and delivered presentations for the Institute of Electrical and Electronics Engineers (IEEE) on topics including electromagnetic noise measurement and suppression, light-wave spectrum analysis, perceived light pollution, and LED lighting technologies.

Dale is a resident of Bonita Springs, FL and a year-round pickleball competitor in Wisconsin and Florida. In addition to his role as Owner and General Manager of PSMC, he is a USA Pickleball Certified Referee, an Ambassador and a PPR Certified Pickleball Instructor. He works with municipalities, commercial indoor and outdoor pickleball facility builders, and individual homeowners throughout the United States on resolving pickleball sound issues.

IX. Disclaimer

The sound levels in this report are as measured or they are estimates of what levels should be expected. Actual levels will vary over time, and they are player and equipment dependent. Sound level is probabilistic, meaning that it has averages and other statistical characteristics including standard deviations and sound level probability distribution curves, but pickleball sound level has no exact single level.

This report makes no guarantee of performance of the sound mitigation methods described. In addition, it is not possible to determine what any person believes is an acceptable sound level. The measurements and estimates of background sound levels are also probabilistic in nature; these levels will vary from one neighborhood to another and from one measurement method to another over time.

Our recommendations for sound barrier types assume that the site will have proper structural support, designed by others. This should include an analysis of the wind loading limitations of fences and a plan to protect installed sound barriers from flood water.

Appendix A: Current Proposals for Courts

Tucker Recreation Center: Site Plan, May 2025



Rosenfeld Park: Master Plan, Concept B (June 2, 2023)



Appendix B: Blue List of Quiet Pickleball Paddles and Balls



The Pickleball Paddle Blue List

List updated: January 12, 2025

Introduction: The following paddles have been selected and qualified for 'Blue List' status through a testing procedure that uses a combination of metrics in addition to loudness (sound pressure). This includes measuring the 'pitch' and duration of the sound produced when a pickleball is struck by a paddle (the "decay time").

This new version of the Blue List categorizes paddles as "Reduced Sound", which means quieter than ordinary paddles and "Extra Quiet" and it includes paddle covers that can be added to any paddle to reduce the sound level produced.

The metrics and criteria were selected after reviewing with players and non-players the sound characteristics of a typical pickleball hit. The categories were established by PSM LLC as a means of recommending paddles to communities and pickleball clubs that are attempting to mitigate the sound of pickleball to an acceptable level without overly restricting a players' paddle preferences.

Test Procedure: PSM LLC is a pickleball acoustics consulting firm. We have assembled a tall (16 feet) echo free (or anechoic) ball drop chamber for testing pickleballs and paddles. An ordinary tournament approved pickleball is dropped into the chamber and it reaches a speed of about 19 mph just before it strikes a rigidly mounted paddle at a slight angle to cause the bouncing ball to travel away from the paddle face after the hit.

A calibrated microphone is mounted in this chamber and a computer outside of the chamber analyzes the microphone output using REW and Audacity software

Criteria: The paddles on this list are in two categories, "Reduced Sound" and "Extra Quiet". "Reduced Sound" paddles have a measured sound level of at least 3 decibels below typical ½ inch thick honeycomb poly-core fiberglass face models and a prime "pitch" below 900 Hz. "Extra Quiet" paddles are quieter still, with a sound level of 6 decibels, or more, below ordinary models and a main pitch below 700 Hz. In addition, all of these paddles have vibration decay times of the primary vibration mode (to less than 10% of its initial peak value) of under 6 milliseconds. This ensures that there is no well defined "pitch" to the sound produced.

Using This List: PSM LLC updates this list as it tests and identifies additional paddles that meet the criteria and as suppliers release the models.

Updating This List: To arrange additional paddle or pickleball testing, contact PSM LLC via email at us at bob@pickleballsound.com

For an updated version of [The Blue List](#), see the Pickleball Sound Labs web page at [pickleballsoundlabs.com](#) as well as the Pickleball Sound Mitigation Facebook group page. [The Pickleball Paddle Blue List](#) is copyright free.

THE PICKLEBALL PADDLE BLUE LIST
PICKLEBALL SOUND LABS
www.pickleballsoundlabs.com

Reduced Sound Models

(paddles are listed alphabetically by vendor name)

Paddle Vendor	Paddle Model Name	Notes
CRBN	1 & 2	
CRBN Pickleball Rocks Edition	Model 1 Marked "Recreational Play"	1
Diadem	Warrior	
E6	16s	
Electrum	E Pro II	
Focus	Silencer	
Gearbox	CX11, CX14, GX5 & GX6	
Joola	Ben Johns 16 mm, Radius	
Joola	Simone Jardim 16 mm	
One More	Vibe	
One More	Pro Custom	
One Shot	Stealth	
PIKKL	VANTAGE Pro 16mm	
Pro Drive	DRIVE	
Pro Kennex	Pro Speed	
Pro Pickleball	Infinity Widebody 16 MM	
TMPR	Tantrum and TC-16	
Versix	Pro XL	
Wild Monkeys	Grizzly	
Wowly	Surge XL	
Wolfe	Bite	

Reduced Sound Paddle Guidance: Tests have shown that many paddles that are at least 16 mm thick with carbon fiber surfaces and deemed to be "Control" models by paddle suppliers are generally quieter and have a lower main pitch sound and are likely to qualify for the "Reduced Sound" list but they may not have been tested by Pickleball Sound Labs

Extra Quiet Paddles and Paddle Attachments:

The following products are several decibels quieter than the Reduced Sound Models listed above and they have an audio pitch about an octave lower than ordinary fiberglass face paddles.

Diadem	Vice and Hush	1
Master Athletics	Q1	1
NINEFOUR	Apex Series 3k	2
Owl Sports	Founders Edition, Owl CX, CXE and the Silent Storm	2
Pro XR	Quiet Luxury	1
Stafford	Blackbird	2

Attachments/Covers that reduce the sound level produced by any paddle:

The Pickleball Muffler (may be used with any paddle)	This is a paddle attachment/cover	1
Quiet Strike	Removable Attachment Pads	1
Quiet SHHOT	Removable Attachment Pads	1

Paddles (or pad attachments) that qualify as "Quiet" generally have additional design features on the face or internally that substantially reduce both sound level and pitch. These paddles are generally specifically designed to achieve a low sound level of about 8 decibels below ordinary fiberglass face paddles with a pitch about an octave lower.

Note 1: Not USA Pickleball Approved For Tournament Play

Note 2: The Quietest Tournament Approved Paddles

Pickleballs

Somewhat Popular Quieter Balls: The Onix Fuse and Onix Pure 2 (higher bounce) outdoor models

The quietest USA P tournament approved ball: Monarch Outdoor ball by Dicks Sporting Goods

Other Quiet Balls:

The Gamma Librarian: this is a foam ball that is the very quietest ball tested

The Diadem Quiet Ball

The Accel Digital 3D printed ball (available in several colors and firmness variations)

The LOUDEST tournament approved ball tested by PSM LLC was the Dura Fast 40 although we have measured even louder sound levels from some less expensive discount store models.