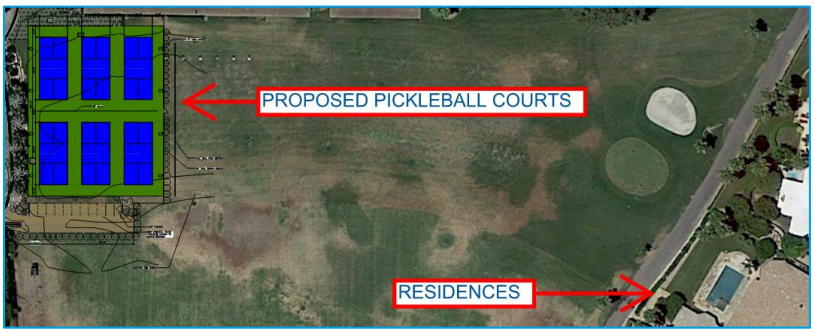
New Pickleball Courts, Initial Noise Study

Indian Wells Country Club # 2465-67241-00

INTRODUCTION

This report contains a summary of existing site noise levels, reference pickleball gameplay noise and initial feedback regarding new pickleball courts at the Indian Wells Country Club in Indian Wells, CA.



Key Takeaways

- Indian Wells exterior noise standards limit daytime noise at residential property lines to **55dBA**, with increased noise level allowances for shorter time periods, and a **maximum of 75dBA** not to be exceeded for very short periods.
- Ambient noise levels along the eastern residential property line were measured between 45-82dBA (1 second intervals), resulting in an overall level of **55dBA averaged over ~2hr duration**, with typical levels around 48dBA without contributions from individual noise events such as golf cart pass-by.
- Reference pickleball gameplay noise measurements resulted in short term levels reaching 73dBA (1 second intervals) from hitting noises, with the longer-term **average of ~60dBA over ~30min** of relatively continuous gameplay.
- **Distance (~400ft) is predicted to reduce reference pickleball noises to below code exterior sound limits. However, the intermittent and attention-grabbing nature of pickleball "pop" paddle impact noise will be audible at the residences.**
- A combination of distance and barrier treatment would help reduce the highly variable and individual patron specific nature of pickleball associated noise emissions (intensity/ equipment/ movement / vocal/ etc.) and lower the likelihood of annoyance/complaints from nearby residences. We recommend stakeholders consider incorporating barrier treatments around the perimeter of the courts, at the East and South sides of the courts at minimum. Treatment could be as simple as applying a mass loaded noise curtain system to a 10ft or 12ft tall chain link fence. For planning, consider fence design provisions to accommodate future barrier treatments, which would relate to fence height and possibly other non-acoustical characteristics such as wind load, etc.

INDIAN WELLS NOISE RESTRICTIONS

Below we discuss aspects of the Indian Wells noise code. Only the City personnel can offer formal code interpretation, however we identify critical aspects for consideration:

- We understand that the IWCC property is within the *Open Space, Golf and Recreation* zoning with *Residential, Very Low Density Residential* zoning properties approximately 400ft to the immediately-adjacent eastern property line from the proposed new pickleball courts location.
- Indian Wells Municipal Code *Chapter 9.06 – NOISE* provides exterior noise standards by day (7:01am-10pm) and night (10pm-7:00am) time periods and cumulative duration to govern noise transfer to residential property lines. The exterior noise standards generally limit daytime noise at residential property lines to 55dBA with increased noise level allowances for short cumulative time periods, with a maximum of 75dBA (+20) not to be exceeded for very short cumulative periods (<1 minute/hour).

§ 9.06.040. Noise standards.

(a) Exterior Noise Standards.

(1) Standards for Residential Properties. The following exterior noise standards, unless otherwise specifically indicated in this Chapter for all residential properties shall be:

55 dBA	7:01 a.m. to 10 p.m.
50 dBA	10:01 p.m. to 7 a.m.

(2) Noise Level Categories. It is unlawful for any person at any location within the City to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, that exceeds, when measured on any other residential property the exterior residential noise standard by:

City of Indian Wells, CA

§ 9.06.040 § 9.06.041

Decibels		Cumulative Period
(i)	+3	30 minutes/hour
(ii)	+5	15 minutes/hour
(iii)	+10	5 minutes/hour
(iv)	+15	1 minute/hour
(v)	+20	Not to be exceeded.

(3) Ambient Noise Level. If the ambient noise level exceeds that permitted by the noise limit categories specified in subsections (a)(2)(i) and (a)(2)(ii) of this Section, the allowed noise limit shall be increased in five (5) dBA increments in each category to encompass the ambient noise level. If the ambient noise level exceeds the noise level category set forth in subsection (a)(2)(v), the maximum ambient noise level shall be the noise limit set forth in subsection (a)(2)(v) of this Section.

- Section 9.06.070 Variances procedure establishes a method for an operator to request alternative compliance from the Planning Commission.

- Per 9.06.020 Definitions, “Noise Level” is described as the A weighted sound pressure level obtained by using a sound level meter at slow response. While there are other metrics that correspond better to the pickleball noise type, we intend to generally follow the precedent set by the code as written.

  The reported levels in this report are in terms of the A-weighted Equivalent Level (unless otherwise noted) which corresponds best to the code, is a common metric for community noise concerns and best represents human response to time-varying noise levels; Equivalent Level is the steady A-weighted level that contains the same amount of energy as the actual time-varying A-weighted level during a given period of time; this is essentially an average sound pressure level where the averaging is based on energy. We have included general measurement durations for references; for example, pickleball hitting noises are short transient sounds which are better characterized by short measurement samples (e.g. 1 second) whereas longer term and relatively constant ambient noises are better characterized by longer term measurement samples.

BACKGROUND

- It is widely accepted that the average healthy ear can perceive sound level changes of 3dBA; that a change of 5dBA is readily perceptible, and that an increase (or decrease) of 10dBA is perceived as twice (or half) as loud.
- It is important to note that impulsive sounds are much more detectable & attention-grabbing than bland, constant sounds.
- The activity of pickleball generates intermittent and impulsive noises, especially the characteristic “pop” from the hard paddles striking a relatively hard ball, which are easily detectable in a bland and relatively quiet environment, such as typical residential environments. For this reason, the intermittent pickleball activity sounds, especially hitting noises or shouting, are detectable even in the presence of similar yet bland ambient background noise.

MEASUREMENTS OF AMBIENT & REFERENCE PICKLEBALL NOISE

Ambient Level

- We conducted measurements of ambient noise levels on September 23, 2024, from approximately 7:05am-8:55am. Site noise levels primarily comprised of relatively constant distant automobile/street and water fountain noise, fluctuated with intermittent golf cart/maintenance cart pass-by events, and included typical golf course driving range activities (golf ball swings/hits, patron talking, etc.).
- During our time onsite, we measured site noise to range between 45-82dBA (1 second intervals), resulting in an overall level of **55dBA averaged over ~2hr measurements** duration, with typical levels around 48dBA. The upper end of the range includes very short duration noise events such as from golf cart pass-by or when maintenance equipment (blowers) approached the measurement location. The lower end of the range represents time periods without cart noise and relatively low golf driving range activity.

Paradise Pickleball Reference Noise Level

- We conducted measurements of Pickleball court activity noise levels on September 23, 2024, from approximately 9am-9:50am at the nearby local court Paradise Pickleball.
- Court activity included three active courts, including foursome gameplay, twosome gameplay and an instructional foursome participating in a lesson. The players appeared to vary in overall intensity and experience level. Measurements were conducted at a distance of approximately 60ft from active court edge.
- We measured Pickleball game play noise to range between 50-73 dBA (1 second intervals), resulting in an overall **60dBA averaged over 30 minutes** of relatively continuous play, including some natural gaps in play activity, with various types of noises including:
    - Paddle/ball hitting noise ranges in level with the intensity of the strike as well as paddle/ball material characteristics. Paddles and balls appeared to vary. Hitting noise “pop” sound associated with the upper end of the measured range, with an impulsive, intermittent noise characteristic.
    - Player vocal noise varied with patron excitement (cheers, boos, exclamations). This noise type represents the lower-mid region of the measured range. Player vocal noise was significantly less attention grabbing than paddle/ball hitting noises.
    - Movement noise which fluctuated with intensity of play (squeaks, scuffs, running). This noise type represents the lower end of the measured range. Movement noise was significantly less attention grabbing than paddle/ball hitting noises.
- We understand that up to (6) new courts are anticipated in the proposed court location at Indian Wells, implying the possibility of twice the activity than we measured from the three active courts Paradise Pickleball. From a sound energy perspective, twice the sound energy would result in +3dBA additive correction to the reference level which we have applied to our analysis below.

NOISE CONTROL ANALYSIS & DISCUSSION

Distance

- Over the ~400ft distance between the proposed court location and the nearest eastern property line, reference pickleball hitting noise levels are predicted to drop to **~64 dBA**, with longer term average pickleball activity noise levels dropping to near **51 dBA (30min duration).** The long and short-term reference pickleball noise emission levels infer compliance with the code limits.
- While the overall time-averaged levels of the pickleball reference noise are anticipated to comply with the code limits, it is important to note that the intermittent and attention-grabbing nature of the pickleball hit impulse noise will likely be clearly audible during quieter time periods for typical ambient noise conditions at residences (e.g. 48dBA without contributions from individual noise events such as golf cart pass-by).

Actual future noise will be driven by player specific characteristics associated with intensity of play, equipment types and vocal noises rather than quantity of players and could at times be higher than our reference measurements.

For these reasons, barrier treatments should be considered to minimize complaints from the community.

Distance + Additional Losses from Barrier Treatments

- Due to the highly varying nature of pickleball noise that will fluctuate with intensity of play, equipment type and patron vocal efforts, it is possible that future pickleball noise increases above the reference level.
- For this reason, stakeholders should consider incorporating barriers for further reduction of pickleball associated noises to reduce the annoyance/complaint from the new noise type; for reference of the combined effect of barrier and distance, a 10ft barrier would drop reference pickleball hitting noise to ~53dBA, a 12ft barrier would drop hitting noise to about ~50dBA which brings the hitting noise similar to ambient noise levels.
- We recommend stakeholders to consider incorporating barrier treatments around the East and South sides of the courts at minimum, however the north side may be a future consideration to shield homes to the north. This could be as simple as applying a noise curtain system to a tall chain link fence. General barrier characteristics are discussed below.
- General Barrier Overview and Characteristics
    - In principle, barrier treatments will provide attenuation to reduce noise transfer in the direction of residences.
    - For barriers to work, they must be tall and wide enough to break line of sight to the receiving location (residences) and are ideally positioned as close as possible to the noise source, which is the court area in this case. Absorptive treatments on interior faces and nearby reflective surfaces further improve barrier performance by preventing noise buildup/reflections.
    - Barrier construction must be non-porous, weather resistant and of sufficient mass to prevent transmission through the barrier (commonly 5psf, however lighter-weight options are possible for pickleball due to its higher frequency characteristic, such as 1psf minimum).

        Many common material possibilities can satisfy requirements, such as sandwiched plywood, virtually any thickness of concrete or CMU, stucco, 18ga steel or proprietary barrier solution products such as *IAC Noishield* which can be selected to include integral absorption. Related *IAC Noise-Foil* are metal panels that can be direct attached to solid barrier substrate to provide absorption.

        There are also products that can be attached to chain link or other fence structures, such as Soundseal BBC-EXT-N or Kinetics KBC-100RBQ or Acoustifence or similar mass loaded curtains with attachment grommets and ideally with integral absorptive finish.

- Ideally, barriers should be constructed so that there are no openings between the barrier panels and between the barrier and the ground. Any openings will reduce barrier performance.
- Note that foliage/trees/shrubs are not effective for noise control as they are porous and do not meet mass requirements. For example, 100ft of trees might provide about 3dB of attenuation due to excess ground attenuation, however greenery can be useful in providing a psychological sense of privacy or for aesthetics.
- Berms are actually higher performing than barrier walls, which can be advantageous if project space allows incorporation. In practice, berms are typically difficult to build up due to sloping needs (typically 2:1) and end up being about 4 times wider than they are high.

Other Possible Pickleball Noise Mitigation Strategies

- Administrative control: Restrict court time and monitor player vocal output.
- Use the quietest balls and paddles available. These can reduce but not eliminate pickleball “pop” sound.
    - Paddles: Some paddles have been tested by others to identify paddles with lower noise signatures. Quieter paddles may reduce approximately 3 to 7 dBA compared to loudest paddles; with noise reduced through reduced paddle vibration, shifted sound energy to below 1000Hz and increased damping.
        - The green paddle list by Sun City includes recommended paddles for lower noise: https://springbrookhills.com/resources/Documents/Board/Sun%20City%20Green%20Zone%20List.pdf
        - Administrative control from an approved list can be challenging to manage, however a loaner paddle program could be implemented so that all players could use the same model of a quieter paddle.
    - Balls: While many plastic balls are approved for play, some balls produce slightly lower sound levels when struck by the paddle. It is important to note that the sound level difference among balls is much less than the difference among paddles, anecdotal data from peer research suggest approximately 1 to 3dBA reduction, and dependent on paddle.
    - We recommend studying for quietest combination of paddle and ball to compare sound levels and reactions before decisions are made regarding facility paddle and ball requirements.
- Masking Sounds, such from water fountain can help to reduce annoyance from offending sounds. Additional fountains or differing fountain characteristics could be studied to elevate the ambient noise environment in a non-offense way to neighbors.

- REPORT COMPLETE -