

August 2, 2022

Mr. Brad Walldorf, PE
City of Scottsdale, Project Manager
Public Works. Capital Project Management
7447 E. Indian School Rd, Suite 205
Scottsdale, AZ 85251

Subject: Asher Hills Park “Pickleball Courts”– Noise Study and Abatement Recommendations – City of Scottsdale, AZ

Dear Mr. Walldorf:

MD Acoustics, LLC (MD) is pleased to provide this noise study and recommendations report as it relates to proposed operations at the pickleball and basketball courts to be constructed on the projected Asher Hills Park located on the east side of Scottsdale Road and Asher Hills Drive intersection in the City of Scottsdale, AZ. This study has been prepared to assess the potential operational noise impact on adjacent land uses. For your reference, Appendix A contains a glossary of acoustical terms.

1.0 Assessment Overview

This assessment evaluates the Project Noise Levels from the pickleball courts and compares the projected noise levels to the local noise regulations. Exhibit A below shows the site location, with a red outline around the area under evaluation. Exhibit B provides the site plan. MD measured the baseline noise condition at the site location during a 24-hour period. MD used Type 1 sound level meters that meet ANSI S1.4 engineering standards.

Exhibit A: Site Location



Exhibit B: Site Plan



2.0 Local Acoustical Requirements

The City of Scottsdale Municipal Code addresses noise in terms of nuisances, disturbances, and reasonability. Section 19-24 defines an unreasonable noise as a noise that a reasonable person of normal sensibilities would find excessive and that can be heard at least one hundred (100) feet from the business. Appendix B Section 5.012 from the Municipal Code outlines the use regulations for most residential districts describing municipal uses as permitted but no noise limits are established. On the other hand, Section 5.2808 outlines the noise limits for the Theme Park district defining that intrusive noise from park activity shall not create a noise level in excess of the ambient noise level or the exterior noise level standard. The exterior noise levels standard for residential zones in proximity to the Theme Park district is 45 dBA for nighttime (11 pm to 7 am) and 55 dBA for daytime (7 am to 11 pm).

The City does not provide a specific decibel limit to the noise level; however, the City Code does prohibit nuisance noise. Nuisance noise is subjective by definition. Factors that could be considered in determining whether or not sound is considered nuisance noise include the time of day the noise occurs, the duration of the noise, the type of noise, proximity to residential sleeping facilities, the nature and zoning of the area within which the noise occurs, and so forth. In this study, the ambient noise level will be compared to the projected operational noise level at the closest sensitive receivers to estimate the noise impact on said locations.

In addition, MD has compared the noise level projections to other local noise ordinances (e.g. Town of Gilbert). The Town of Gilbert has an exterior limit of 55 dBA at the affected property line from 5 AM to 10 PM. Besides, the Town of Paradise Valley has a noise limit for stationary sources of 56 dBA for 7 AM to 10 PM, and 45 dBA for 10 PM to 7 AM and on all Sundays and legal holidays.

3.0 Study Method and Procedure

Existing Noise Condition/Baseline

The project site is surrounded by residential properties to the north, east, and south and a commercial use is located to the west. Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. One (1) long-term (LT) 24-hour measurement was conducted at the project site from 4:00 PM July 26, 2022, to 4:00 PM July 27, 2022. Additionally, three (3) short-term (ST) 15-min measurements were conducted at the closest residential areas. Exhibit C shows the noise measurement locations.

Long-term noise data indicate that the ambient noise level at the site ranges from 38 dBA Leq during the early morning hours to 55 dBA Leq during the afternoon. The quietest level for the projected park hours was 42 dBA at 5 AM, and 41 dBA at 10 PM. The short-term noise data show that levels at the nearest residential property lines measured 47 dBA at the hour measured (4 PM). Additional field notes and photographs are provided in Appendix B.

Exhibit C: Noise Monitoring Locations



Stationary Noise Level Prediction Modeling

SoundPlan Acoustic Modeling Software (SP) was utilized to model the operational noise levels from the project site. SP acoustical modeling software is capable of evaluating stationary noise sources (e.g., pickleball paddles hitting the ball, players shouting, chatting, crowds cheering, etc.). SP's software utilizes algorithms (based on inverse square law) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and

sensitive receptor locations. In addition, SP can model the noise sources as point sources, line sources, and area sources. SP is typically accurate within ± 3 dBA.

Two future worst-case scenarios were modeled using measured sound level data from pickleball courts. The first scenario projects the hourly equivalent noise level with the pickleball court modeled as an area source with a sound pressure level of 65 dBA at 5 feet from the court edge. The second scenario considers the maximum instantaneous noise level with the sound pressure level of 75 dBA at 5 feet from the court edge. This involves all the activities during the game, such as serving the ball, hitting the ball, and the players chatting. The model incorporates the topography at the project site, and building heights, and shows how sound propagates to the surrounding area. Appendix C provides the spectra and noise levels used as a reference. MD has previously conducted similar pickleball court/sports park noise studies within the Town of Gilbert, Mesa, and Palm Springs and this data was utilized to develop said acoustical model.

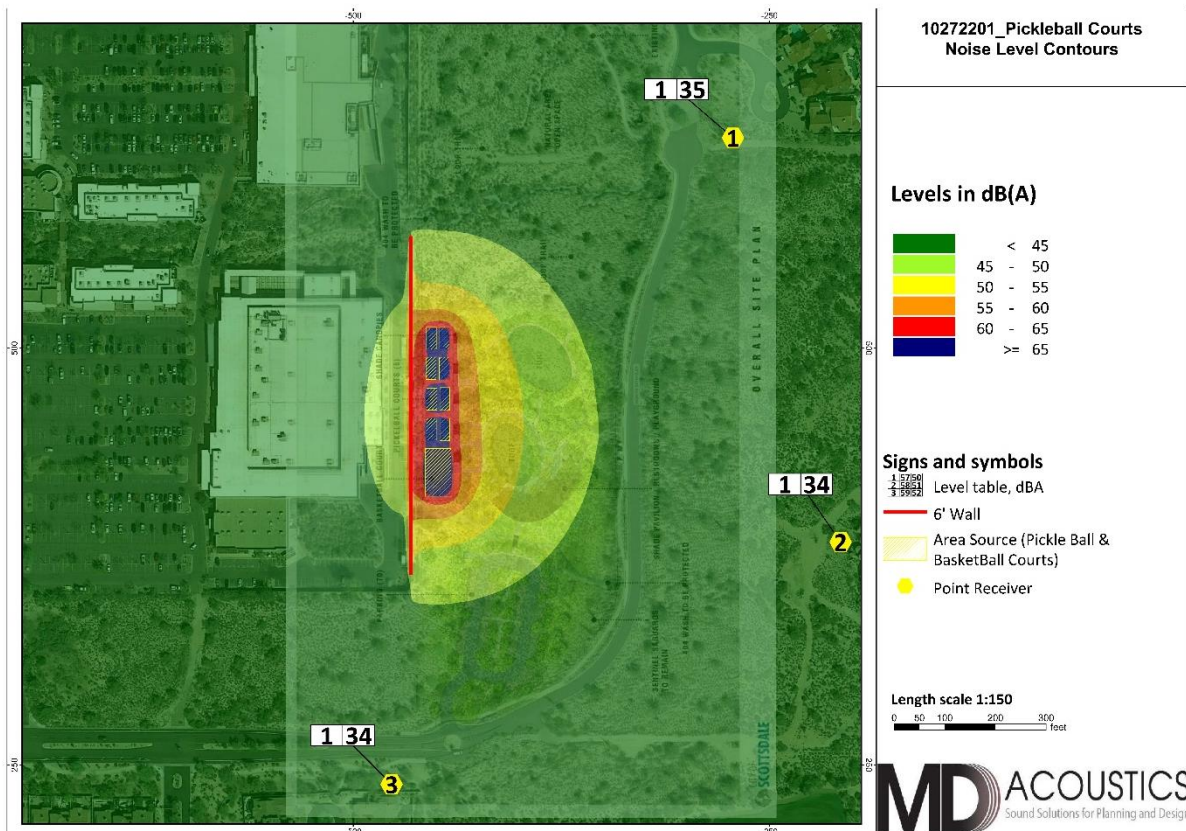
4.0 Findings and Recommendations

4.1 Project Only Operational Noise Levels

The worst-case stationary noise was modeled using SoundPLAN software. A total of three (3) sensitive residential receivers (located northeast, east and south) were modeled to evaluate the Project's operational noise impact. A receptor is denoted by a yellow dot. The SoundPLAN inputs and outputs are provided in Appendix D.

Exhibit D illustrates the operational noise level contour for the courts. This represents the hourly equivalent noise level Leq at sensitive receivers that may be affected by the project operational noise.

Exhibit D: Operational Noise Level Contours



Additionally, MD evaluated the potential impact for the maximum noise level at the sensitive receivers. The maximum noise levels represent the instantaneous level when the courts are in use, and the contours are shown in Exhibit E.

Exhibit E: Maximum Noise Level Contours

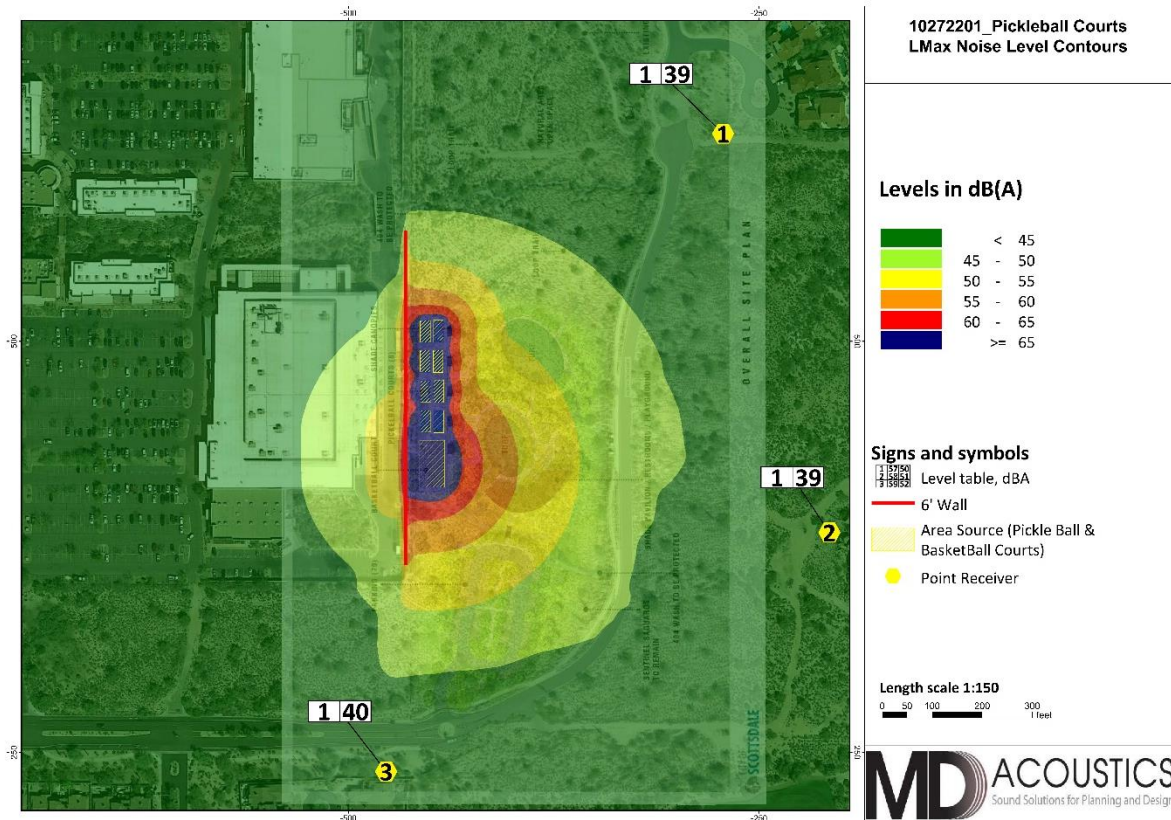


Table 1 summarizes the project plus ambient noise scenarios. Two times of the day were selected to represent the worst-case condition; the morning at 5 AM and the night at 10 PM. Project plus ambient noise level projections are anticipated to measure up to 43 dBA at nearby receptors. The instantaneous maximum level would be up to 40 dBA at receiver 3.

Table 1: Predicted Operational Noise Levels (dBA)

Receptor ¹	Existing Ambient 5 AM	Existing Ambient 10 PM	Project Noise Level (dBA, L _{eq})	Project Max Noise Level (dBA, L _{max})	Total Equivalent (dBA, L _{eq}) morning	Total Equivalent (dBA, L _{eq}) night	Change in Noise (L _{eq})
1 – Residential (north)	42	41	35	39	43	42	1
2 – Residential (east)	42	41	34	39	43	42	1
3 – Residential (south)	42	41	34	40	43	42	1

1. See Exhibits D and E for receptor location.

Table 2 provides the characteristics associated with changes in noise levels. The change in levels can be used to evaluate the human perception of different scenarios.

Table 2: Change in Noise Level Characteristics¹

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

1. https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

Although there is a change in noise, the overall noise change would be from “not perceptible” to “just perceptible”. Figure 2 in Appendix A shows the common indoor and outdoor noise levels associated with different sources. As shown in that figure, the project plus ambient noise levels fall within the range given for typical urban daytime.

As shown in Table 1, the operational noise level would be similar to or lower than the quietest ambient noise level and the impact would be less than significant. Therefore, no mitigation is required at this point.

5.0 Conclusions

MD is pleased to provide this noise study and recommendations for the Asher Hills Park courts. The noise contours and projected operational noise levels were modeled using SoundPlan Acoustic Modeling Software and real-world reference sound levels for pickleball courts. If you have any questions regarding this analysis, please call our office at (602) 774-1950.

Sincerely,
MD Acoustics, LLC



Francisco Irarrazabal
Acoustical Consultant



Drew Gibson
Acoustical Consultant

Appendix A
Glossary of Acoustical Terms

Glossary of Terms

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

C-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the C-weighted filter network. The C-weighting filter greatly de-emphasizes very high frequency components of the sound and slightly de-emphasizes the very low frequency components. A numerical method of rating human judgment of loudness.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

dB(C): C-weighted sound level (see definition above).

dB(Z): Z-weighted sound level (see definition of dB above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Maximum Sound Level (LMAX): This is the highest sound level measured during a single noise event. Lmax does not consider the number and duration of these events, and cannot be totaled into a one-hour or 24-hour cumulative measure of impact.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting

corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

Human Sensitivity to Sound: In general, the healthy human ear can hear between 20 Hz to 20,000 Hz. Frequencies below 125 Hz are typically associated with low frequencies or bass. Frequencies between 125 Hz and 5,000 Hz are typically associated with mid-range tones. Finally, frequencies between 5,000 and 20,000Hz are typically associated with higher range tones.

The human ear is sensitive to changes in noise levels, depending on the frequency. Generally speaking, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz (A-weighted scale) and perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. At lower and higher frequencies, the ear can become less sensitive depending on a number of factors. Figure 1 provides a brief summary of how humans perceive changes in noise levels.

Figure 1: Change in Noise Level Characteristics¹

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/Environment/noise/regulations_and_guidance/polguide/polguide02.cfm

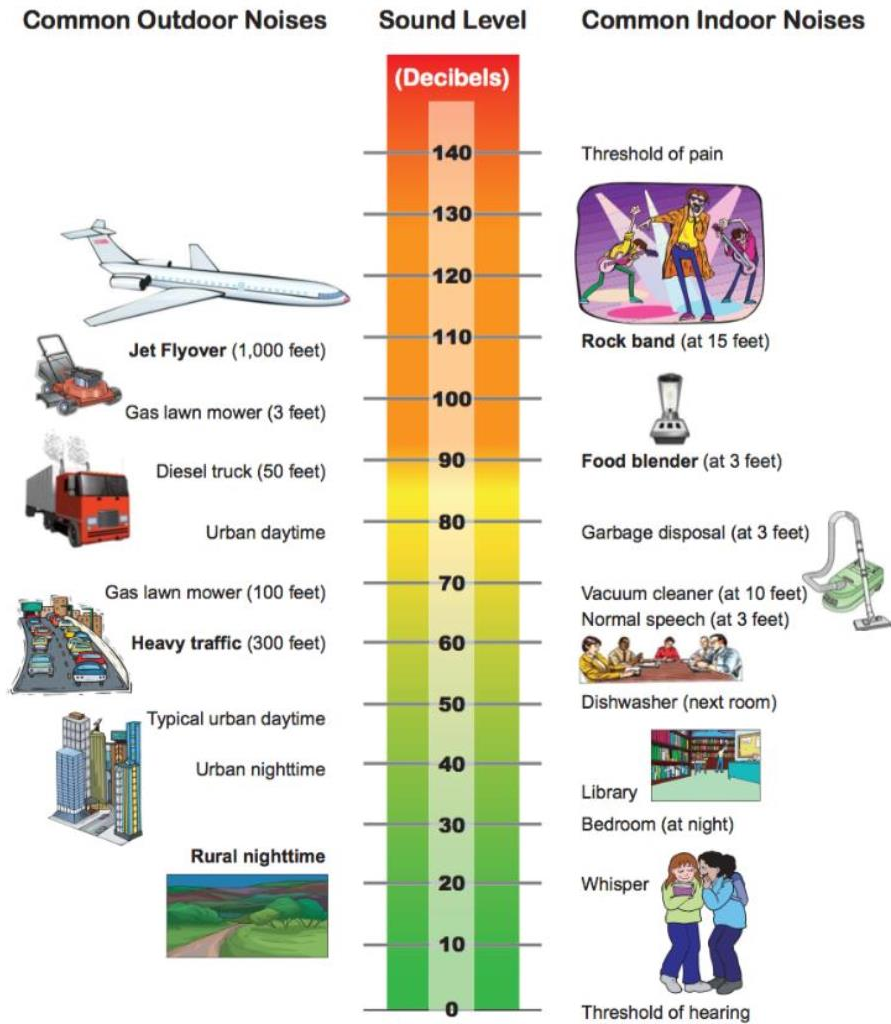
L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly, L50, L90 and L99, etc.

Noise: Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum. Figure 2 provides the sound level associated with common noise sources.

Figure 2: Common Sound Levels
Common Indoor and Outdoor Noise Levels



Note: Sound is perceived differently by every individual



Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

Appendix B
Field Noise Measurement

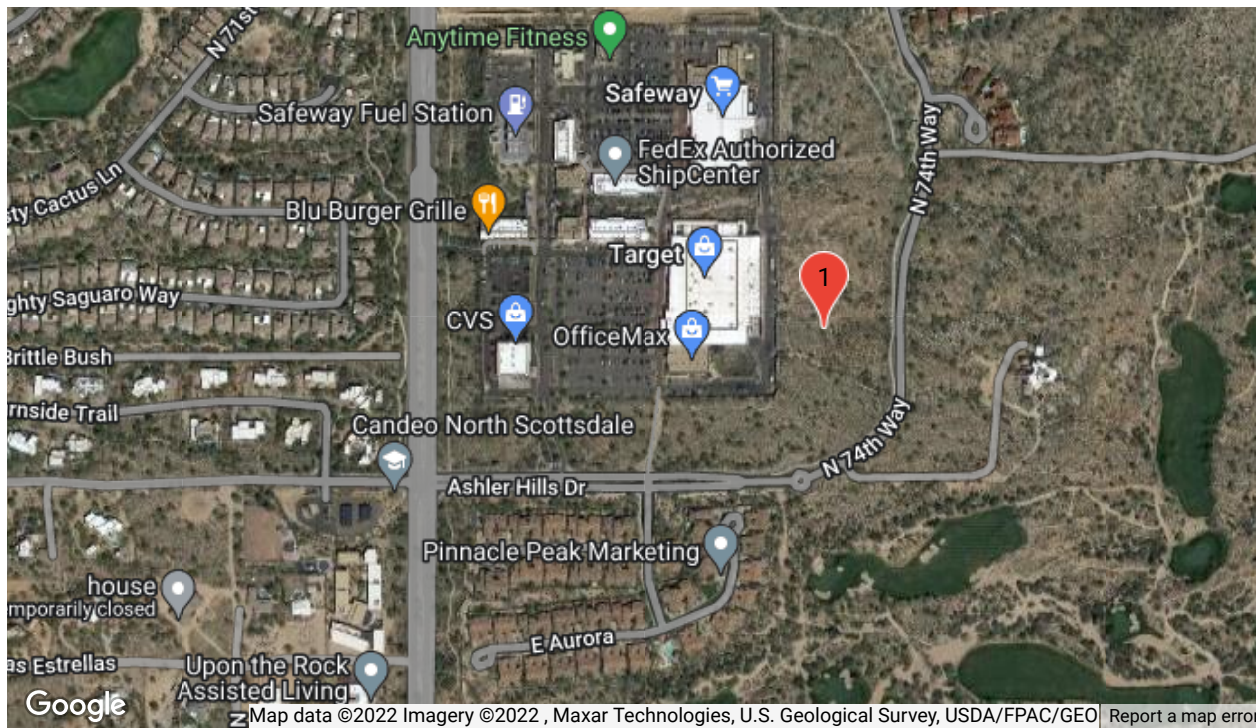
24-Hour Continuous Noise Measurement Datasheet

Project Name: Pickleball Courts
Project: #/Name: 1027-2022-001
Site Address/Location: Asher Hills Park
Date: 07/26/2022
Field Tech/Engineer: Fco. Irarrazabal

Site Observations:

Open Field environment. The site borders a commercial center to the west and low-density residential to the north, east, and south. Very low-frequency traffic along N 74th Way. Noise consisted of desert nature scape sounds and some aircraft traffic. Light rain was reported at 8 am and wind speed ranged from 0-15mph during the measuring period.

Sound Meter: 831, Larson Davis **SN:** 0003168
Settings: A-weighted, slow, 1-hr, 24-hour duration
Site Id: LT1



24-Hour Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts

Site Address/Location: Asher Hills Park

Site Id: LT1

Figure 1: LT1 - Looking South



Figure 2: LT1 - Looking West



Table 1: Baseline Noise Measurement Summary

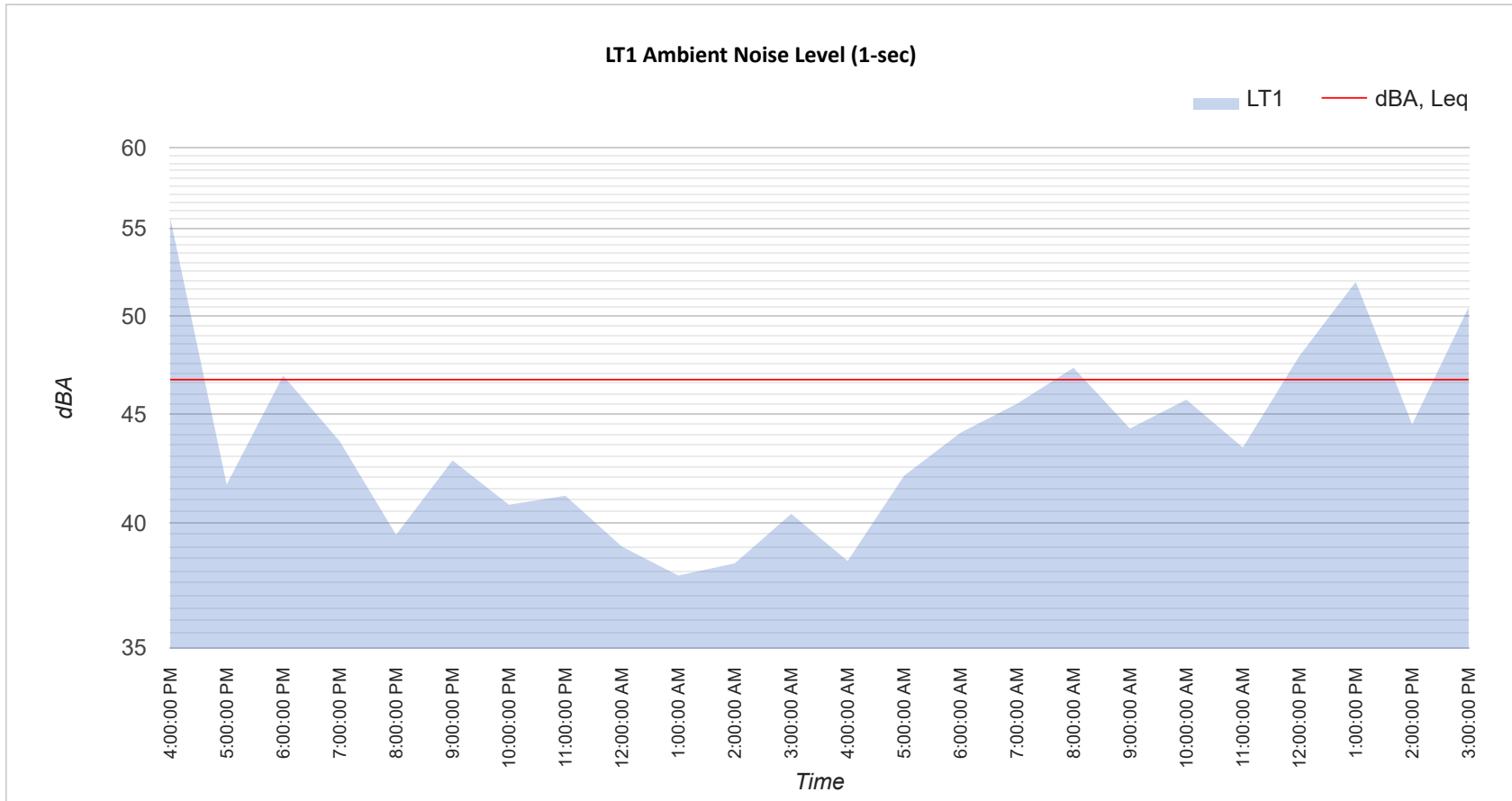
Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
LT1	4:00 PM	4:00 PM	46.7	80.2	34.9	53.9	50.7	46	43.6	38.6

24-Hour Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts
Site Address/Location: Asher Hills Park
Site Id: LT1

Site Topo: Soft Slope
Meteorological Cond.: 93°F, cloudy, winds 9 mph WSW
Ground Type: Soft Site, desert

Noise Source(s) w/ Distance:
266ft from N 74th Way CL



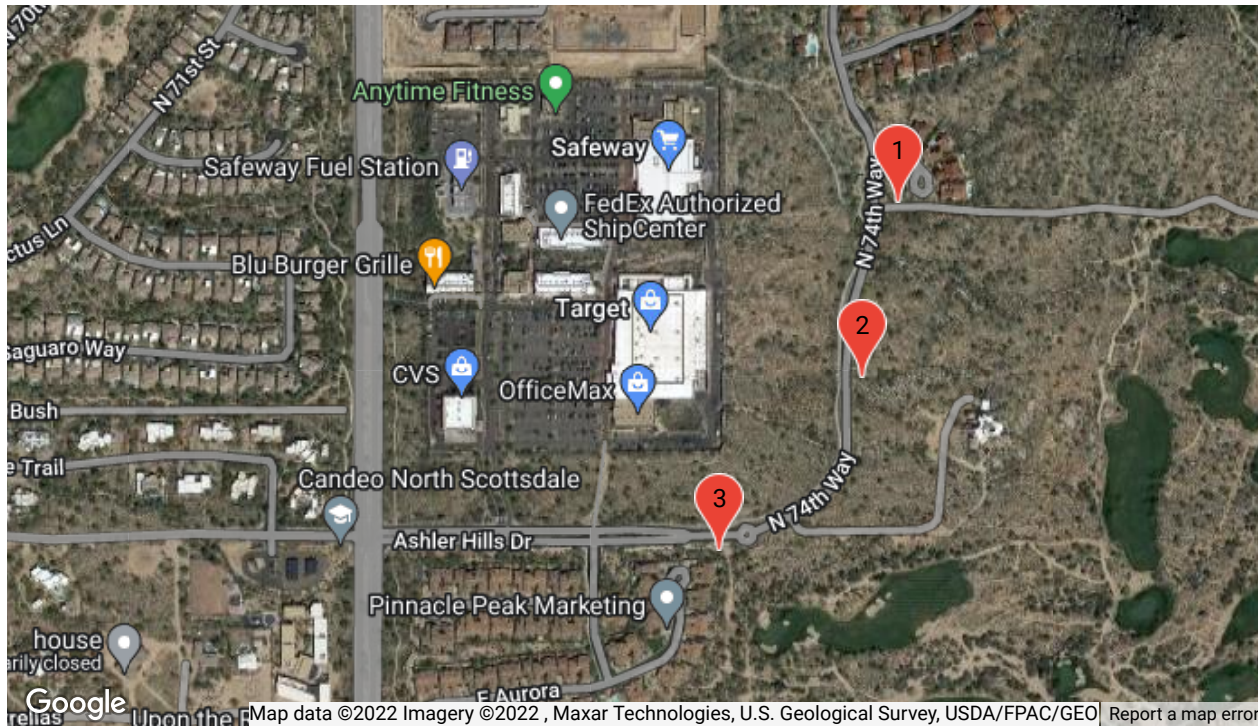
LT1				
Date	Time	Leq	Lmax	Lmin
7/26/2022	4:00:00 PM	55.6	80.2	36.3
7/26/2022	5:00:00 PM	41.7	53.6	35.9
7/26/2022	6:00:00 PM	46.9	65.2	38.4
7/26/2022	7:00:00 PM	43.7	63.0	36.9
7/26/2022	8:00:00 PM	39.5	52.5	34.9
7/26/2022	9:00:00 PM	42.8	51.6	36.5
7/26/2022	10:00:00 PM	40.8	54.4	36.9
7/26/2022	11:00:00 PM	41.2	54.3	36.7
7/27/2022	12:00:00 AM	39.0	53.3	36.9
7/27/2022	1:00:00 AM	37.8	44.9	36.4
7/27/2022	2:00:00 AM	38.3	39.9	37.2
7/27/2022	3:00:00 AM	40.4	46.1	37.0
7/27/2022	4:00:00 AM	38.4	46.6	36.9
7/27/2022	5:00:00 AM	42.1	68.6	36.9
7/27/2022	6:00:00 AM	44.1	60.1	37.4
7/27/2022	7:00:00 AM	45.5	60.3	38.7
7/27/2022	8:00:00 AM	47.3	67.3	37.2
7/27/2022	9:00:00 AM	44.3	58.8	38.2
7/27/2022	10:00:00 AM	45.7	63.1	38.6
7/27/2022	11:00:00 AM	43.4	57.7	36.9
7/27/2022	12:00:00 PM	47.9	65.9	38.6
7/27/2022	1:00:00 PM	51.9	67.1	37.5
7/27/2022	2:00:00 PM	44.5	60.4	37.4
7/27/2022	3:00:00 PM	50.5	76.4	38.4

15-Minute Continuous Noise Measurement Datasheet

Project Name: Pickleball Courts
Project: #/Name: 1027-2022-001
Site Address/Location: Asher Hills Park
Date: 07/26/2022
Field Tech/Engineer: Fco. Irarrazabal

Site Observations:
Low-density residential area next to an open field. Very low-frequency traffic along N 74th Way. Noise consisted of desert nature scape sounds and some aircraft traffic.

Sound Meter: 831, Larson Davis **SN:** 0003168
Settings: A-weighted, slow, 1-sec, 15-minute interval
Site Id: ST1, ST2, ST3



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts

Site Address/Location: Asher Hills Park

Site Id: ST1, ST2, ST3

Figure 1: ST1 - Looking East



Figure 2: ST1 - Looking North



Figure 3: ST2 - Looking North



Figure 4: ST2 - Looking East



Figure 5: ST3 - Looking North



Figure 6: ST3 - Looking West



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts

Site Address/Location: Asher Hills Park

Site Id: ST1, ST2, ST3

Table 1: Baseline Noise Measurement Summary

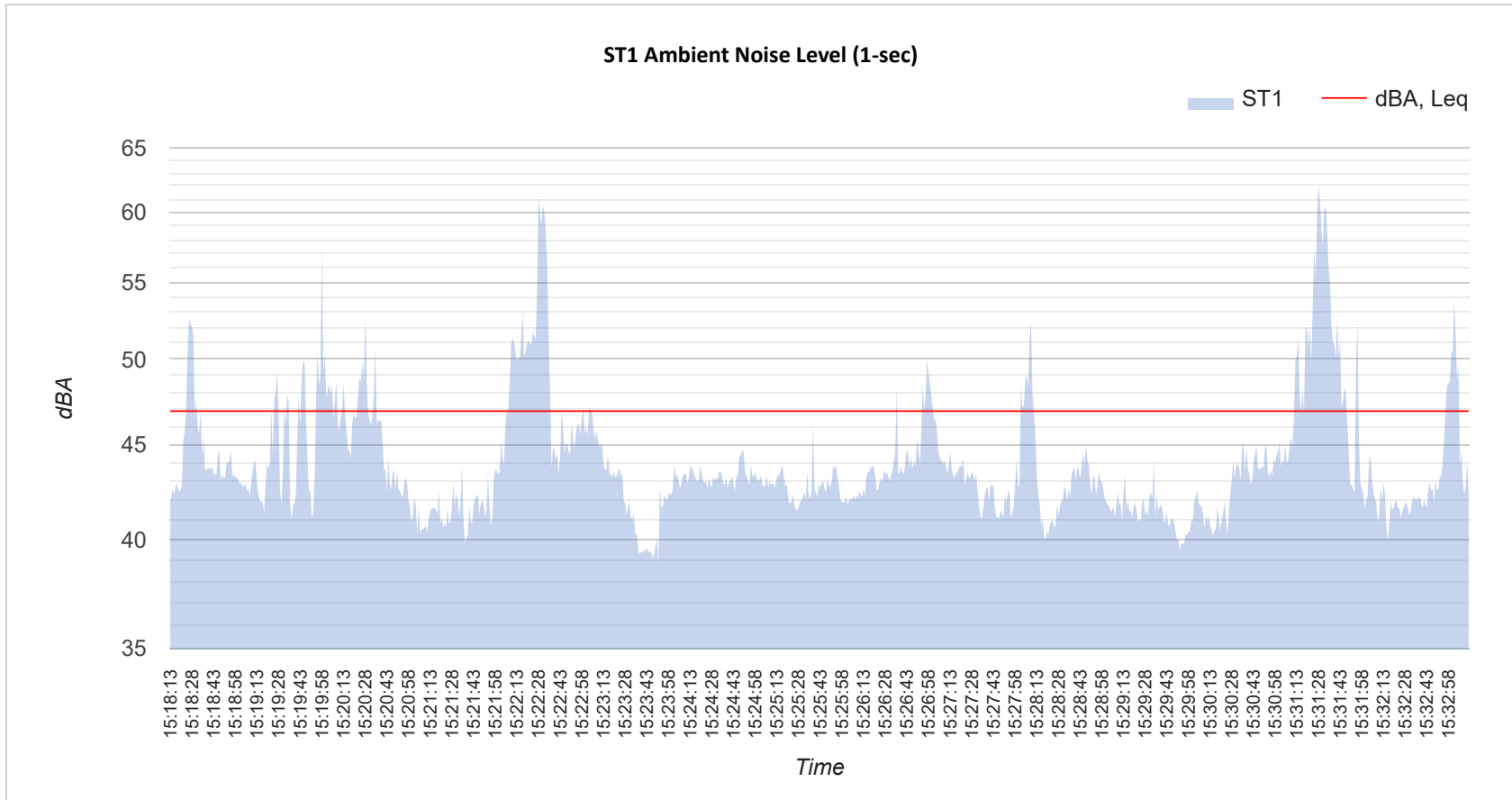
Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
ST1	3:18 PM	3:33 PM	46.9	61.7	39.1	55.2	49.9	44.7	43.2	41.1
ST2	3:38 PM	3:53 PM	47.4	64.3	34.5	56.8	50.6	43.7	40.3	36.1
ST3	4:06 PM	4:21 PM	47.3	60.0	41.1	53.8	49.7	47.3	45.7	43

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts
Site Address/Location: Asher Hills Park
Site Id: ST1

Site Topo: Soft Slope
Meteorological Cond.: 93°F, cloudy, winds 9 mph WSW
Ground Type: Soft Site, desert

Noise Source(s) w/ Distance:
78ft from N 74th Way CL



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts

Site Topo: Soft Slope

Noise Source(s) w/ Distance:

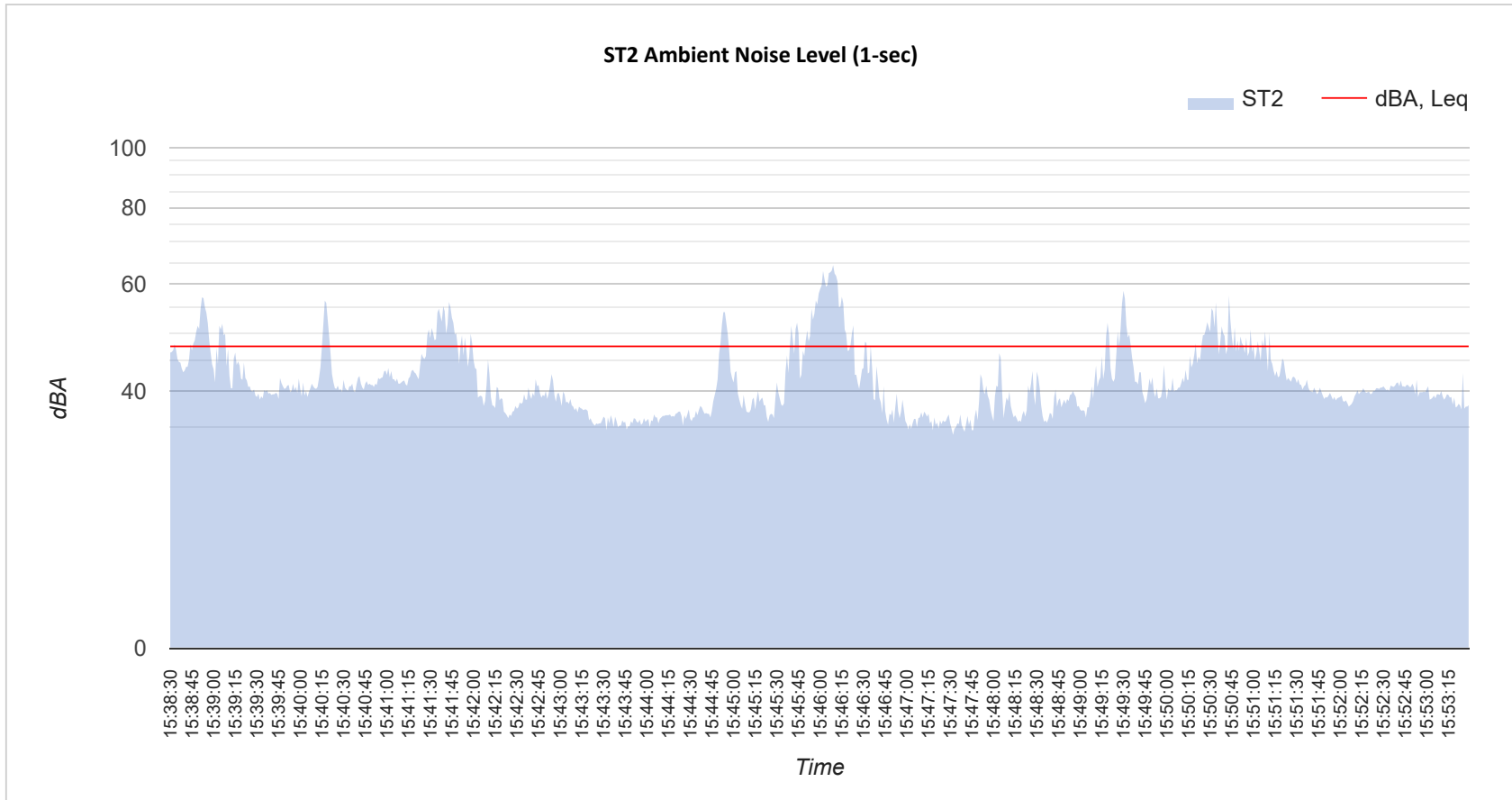
Site Address/Location: Asher Hills Park

Meteorological Cond.: 93°F, cloudy, winds 9 mph WSW

50ft from N 74th Way CL

Site Id: ST2

Ground Type: Soft Site, desert

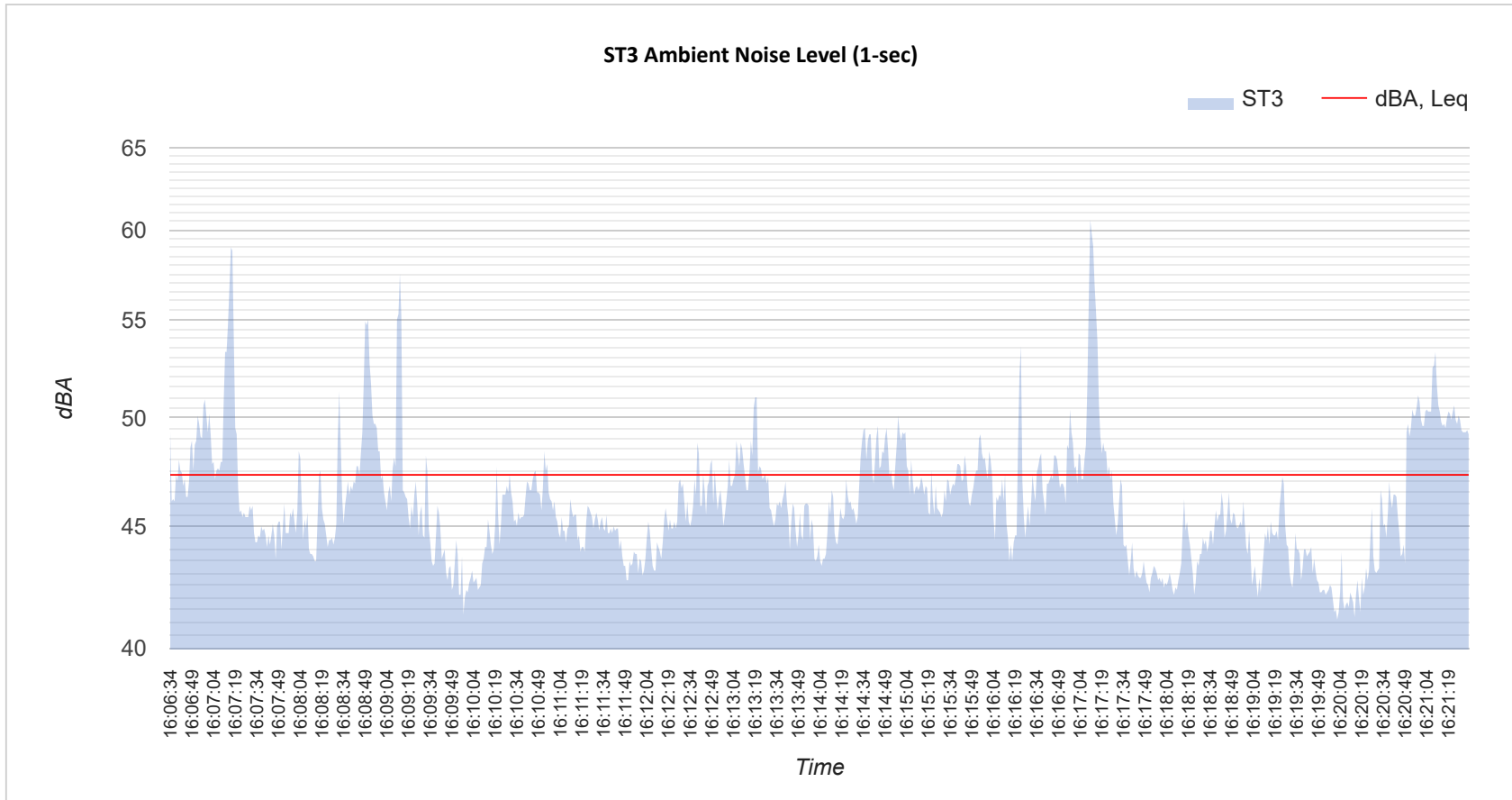


15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Pickleball Courts
Site Address/Location: Asher Hills Park
Site Id: ST3

Site Topo: Flat
Meteorological Cond.: 93°F, cloudy, winds 9 mph WSW
Ground Type: Soft Site, desert

Noise Source(s) w/ Distance:
75ft from N 74th Way CL



Appendix C
Reference Noise Level for Pickleball Courts

5-Minute Continuous Noise Measurement Datasheet

Project Name: Leisure World Pickleball Court
Project: #/Name: 0970-2022-001
Site Address/Location: 908 S Power Rd Mesa, AZ 85206
Date: 06/20/2022
Field Tech/Engineer: Fco. Irarrazabal

Site Observations:
All courts were active with 4 players. Meter 5' to the East of Court 2. The game ended by the end of the recording.

Sound Meter: 831C, Larson Davis **SN:** 10563
Settings: A-weighted, slow, 1-sec, 5-minute interval
Site Id: ST1, ST2, ST3, ST4, ST5, ST6, ST7, ST8



5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Leisure World Pickleball Court
Site Address/Location: 908 S Power Rd Mesa, AZ 85206
Site Id: ST1, ST2, ST3, ST4, ST5, ST6, ST7, ST8

Figure 1: ST1 - Looking West



Figure 2: ST2 - Looking North



Figure 3: ST3 - Looking North



Figure 4: ST4 - Looking South



Figure 5: ST5 - Looking South



Figure 6: ST6 - Looking East



5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Leisure World Pickleball Court

Site Address/Location: 908 S Power Rd Mesa, AZ 85206

Site Id: ST1, ST2, ST3, ST4, ST5, ST6, ST7, ST8

Figure 7: ST7 - Looking North



Figure 8: ST8 - Looking East



5-Minute Continuous Noise Measurement Datasheet - Cont.

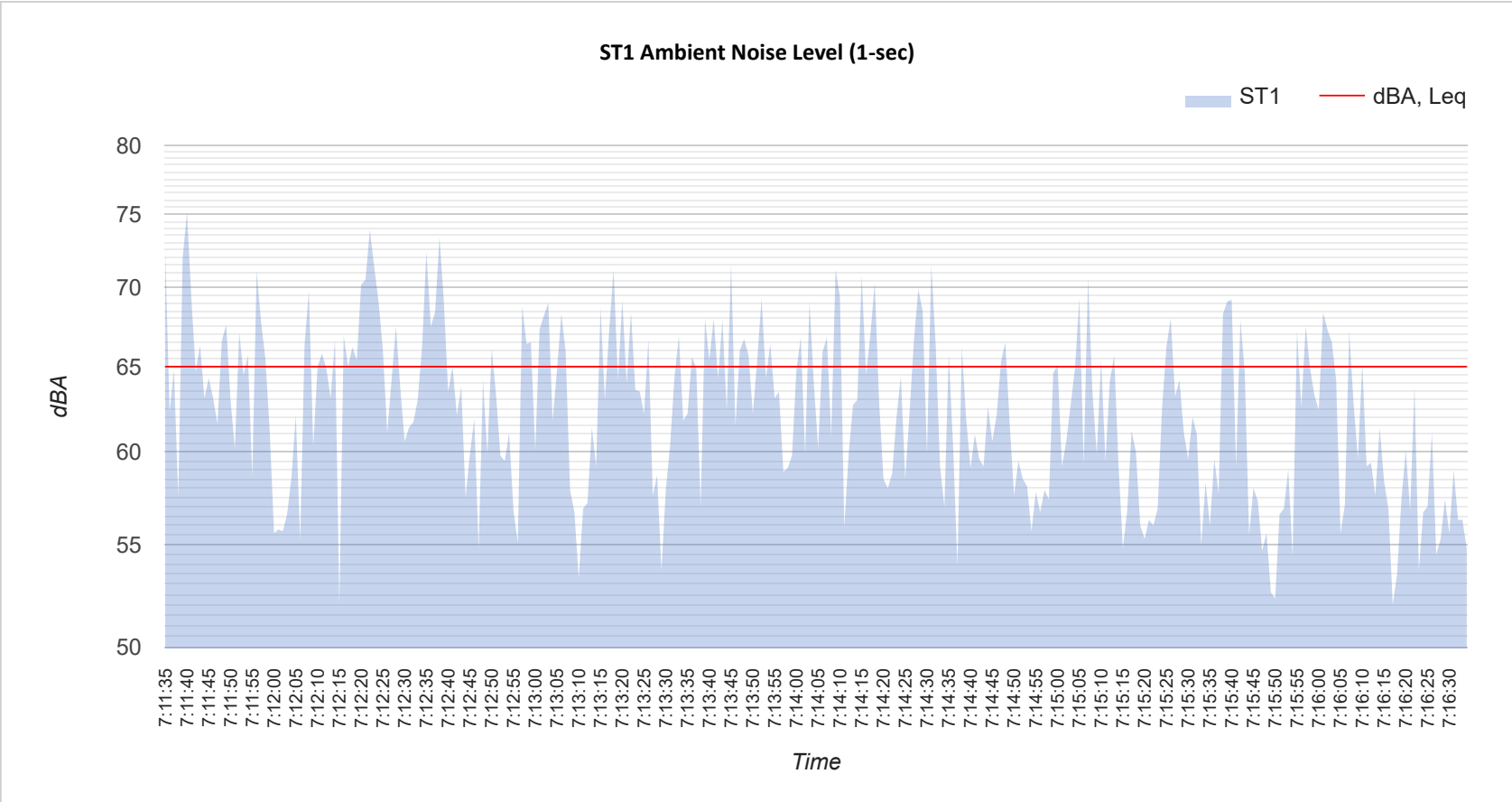
Project Name: Leisure World Pickleball Court
Site Address/Location: 908 S Power Rd Mesa, AZ 85206
Site Id: ST1, ST2, ST3, ST4, ST5, ST6, ST7, ST8

Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
ST1	7:11 AM	7:17 AM	65	74.2	52.0	71.6	69.2	66.2	62.5	56
ST2	7:17 AM	7:23 AM	65.2	74.9	53.0	72.2	69.3	65.9	62.5	56.1
ST3	7:23 AM	7:29 AM	57.6	67.9	47.4	64.2	62	58.1	55.2	50.3
ST4	7:33 AM	7:39 AM	48.2	53.9	42.9	52.6	50.9	49	47.4	44.1
ST5	7:39 AM	7:45 AM	66	78.1	53.7	75.7	70	65.7	62.6	57.3
ST6	7:45 AM	7:51 AM	64.4	75.1	54.5	71.8	68.4	65.1	61.8	56.3
ST7	7:51 AM	7:57 AM	61.5	73.0	52.0	69.1	65.3	61.6	58.5	54.7
ST8	7:59 AM	8:05 AM	52.1	60.3	49.8	56.2	54	52.1	51.3	50.5

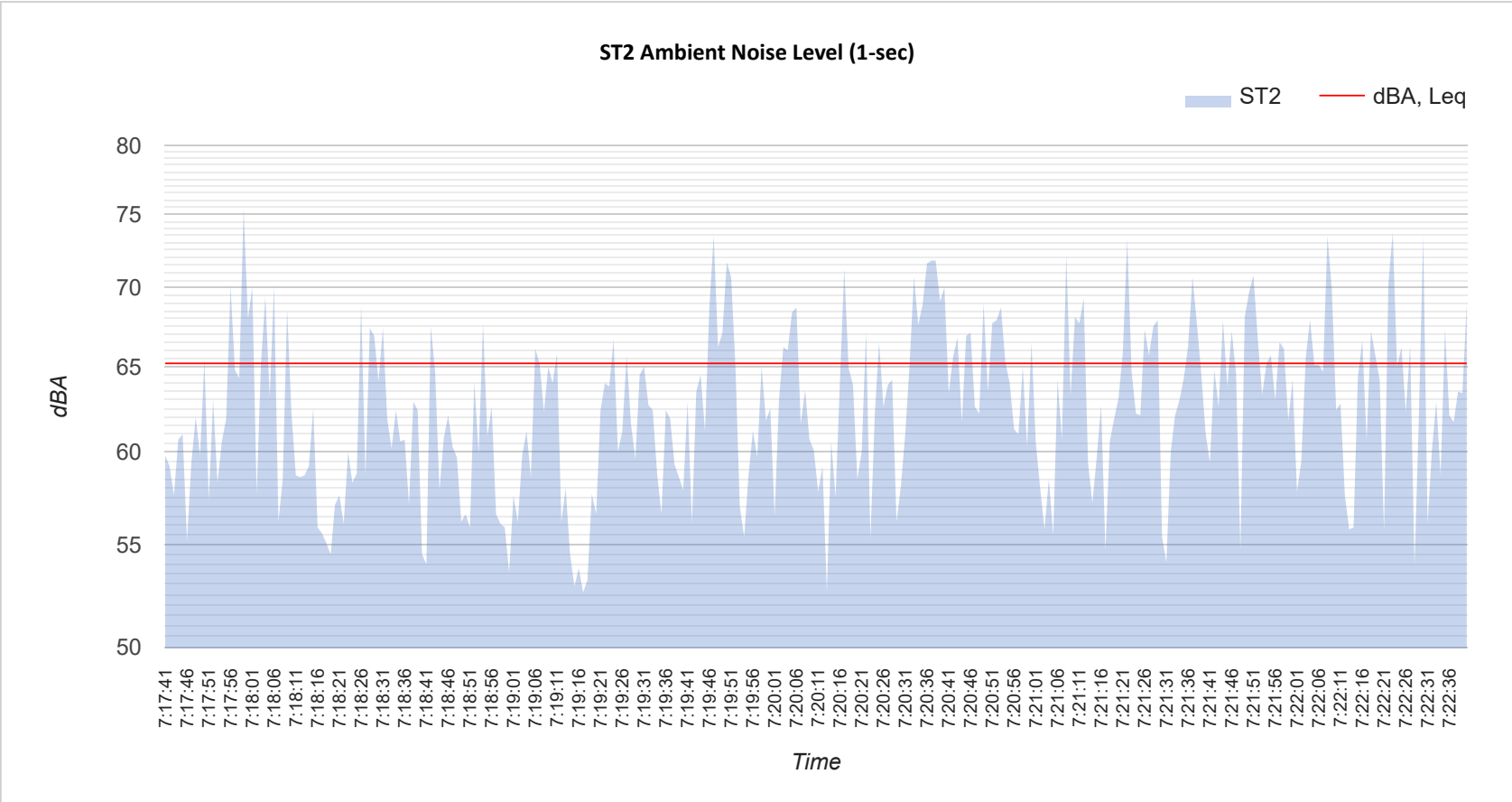
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE	5' to the East of Court 2.
Site Id:	ST1	Ground Type:	Hard, Pickleball court	



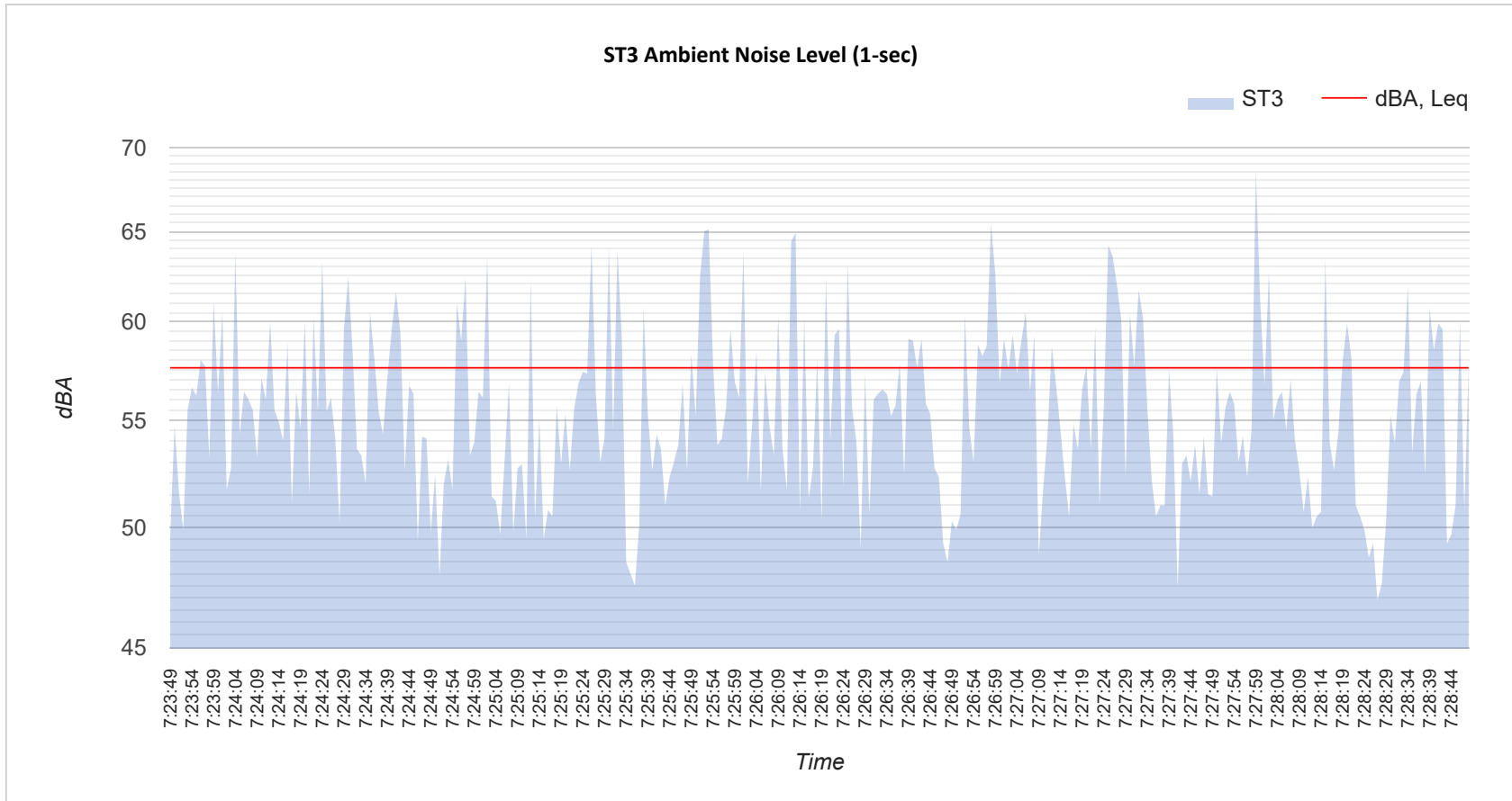
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE	5' to the East of Court 4.
Site Id:	ST2	Ground Type:	Hard, Pickleball court	



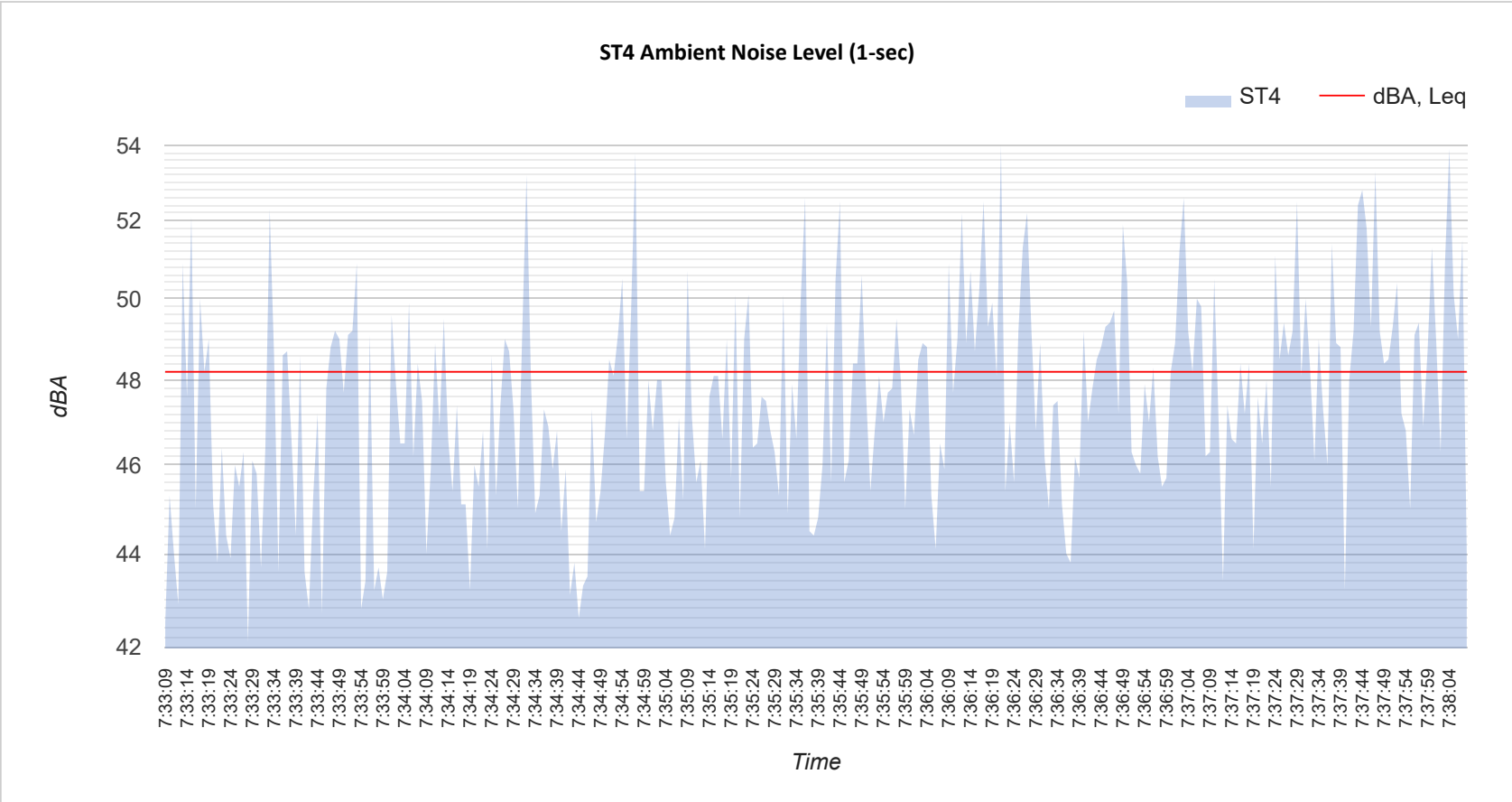
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:	
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE		5' from the north wall, behind maint. bldg
Site Id:	ST3	Ground Type:	Hard, Pickleball court		



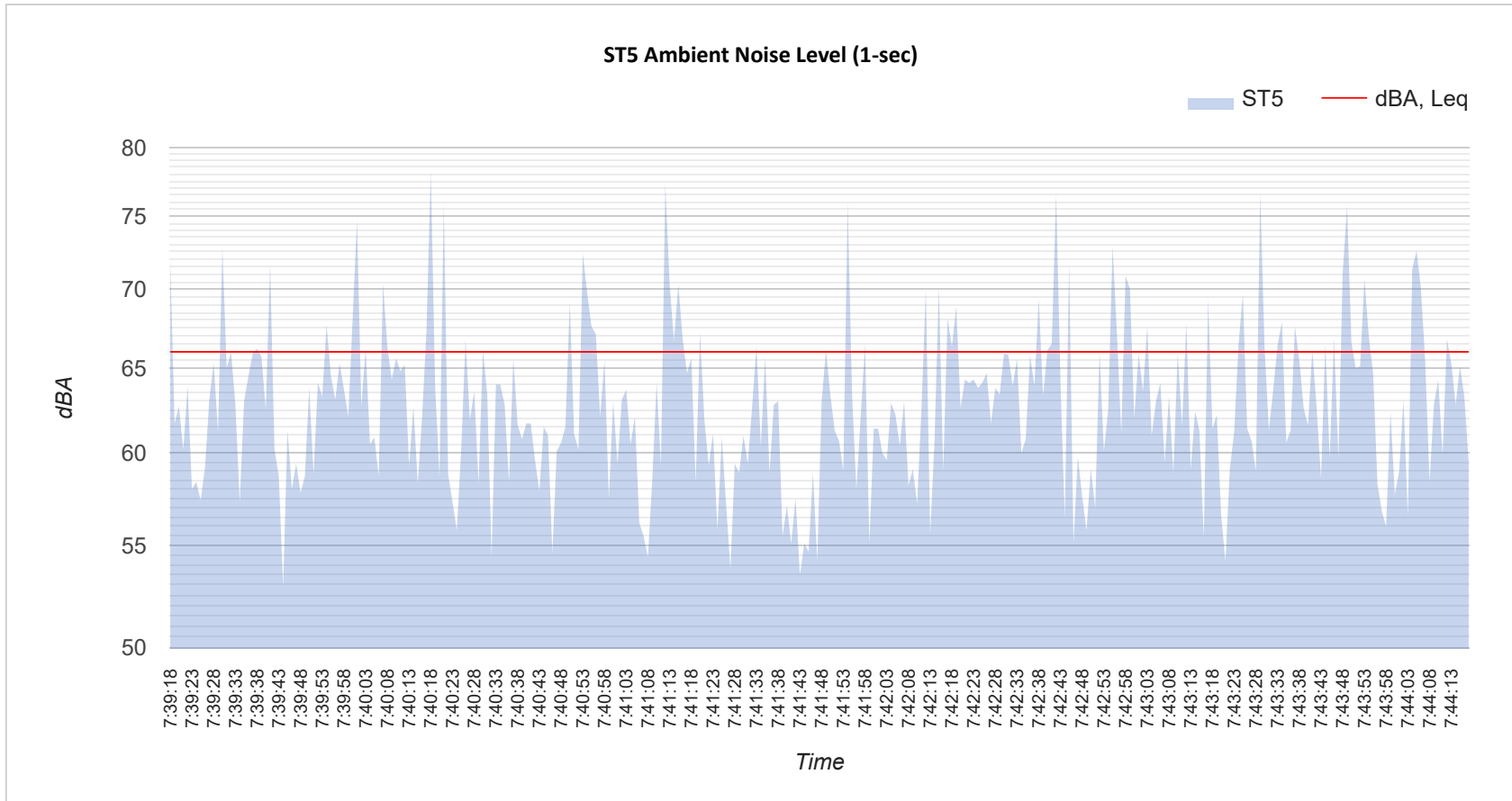
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:	
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE	15' north of the wall. NW residence patio area.	
Site Id:	ST4	Ground Type:	Hard, Pickleball court		



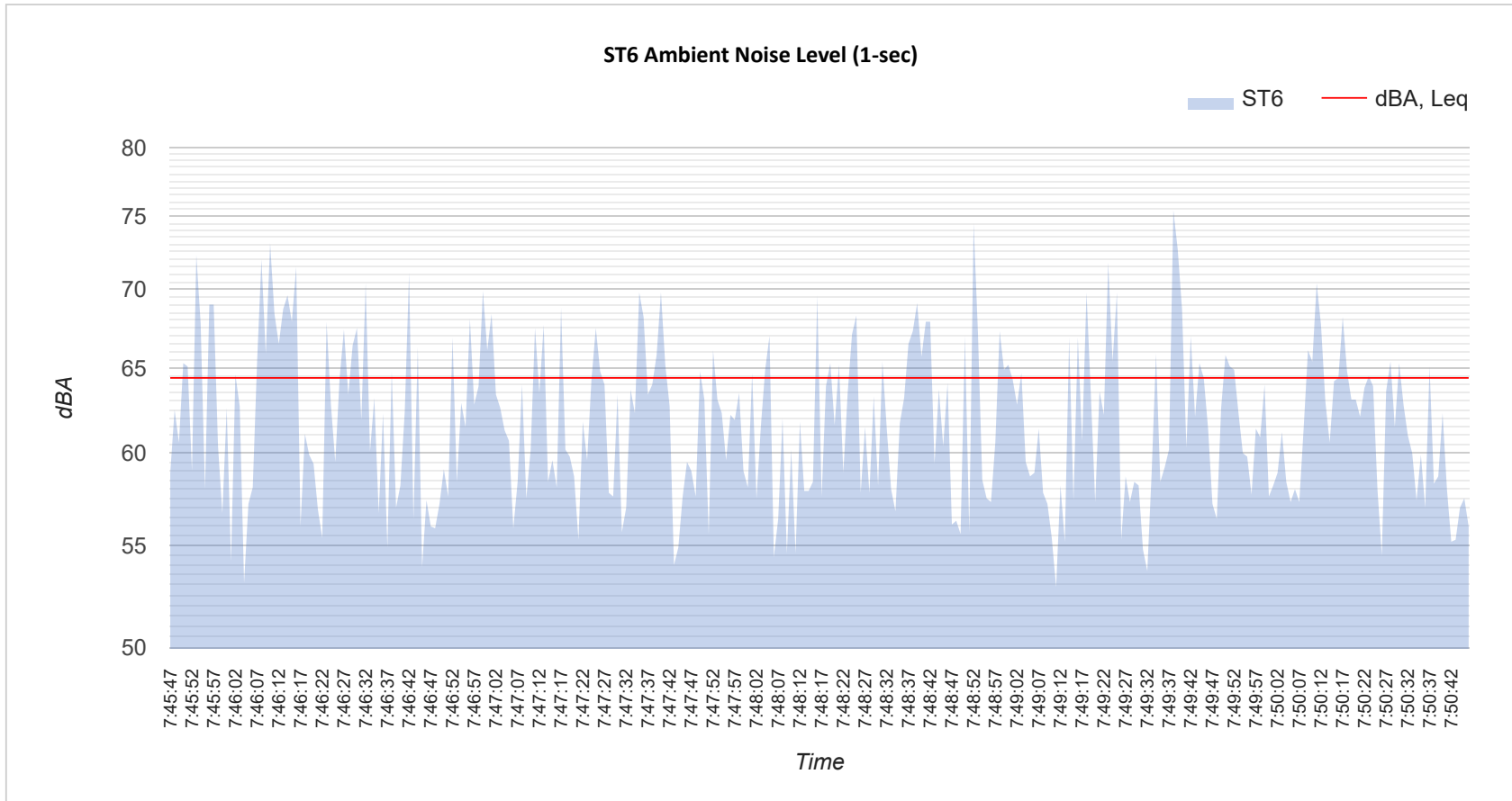
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE	5' to the North of Court 8.
Site Id:	ST5	Ground Type:	Hard, Pickleball court	



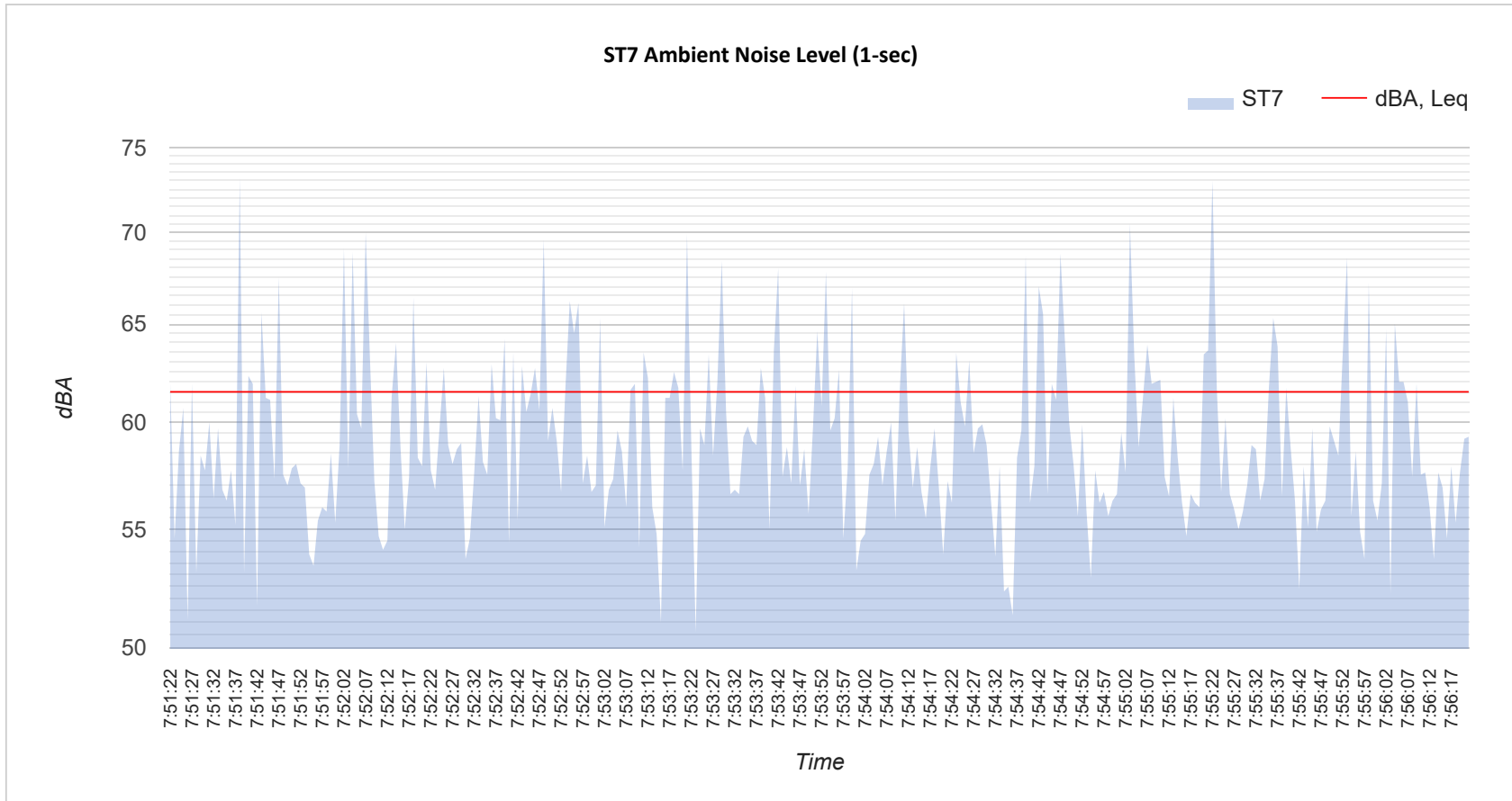
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:	
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE		10' to the west of Court 6.
Site Id:	ST6	Ground Type:	Hard, Pickleball court		



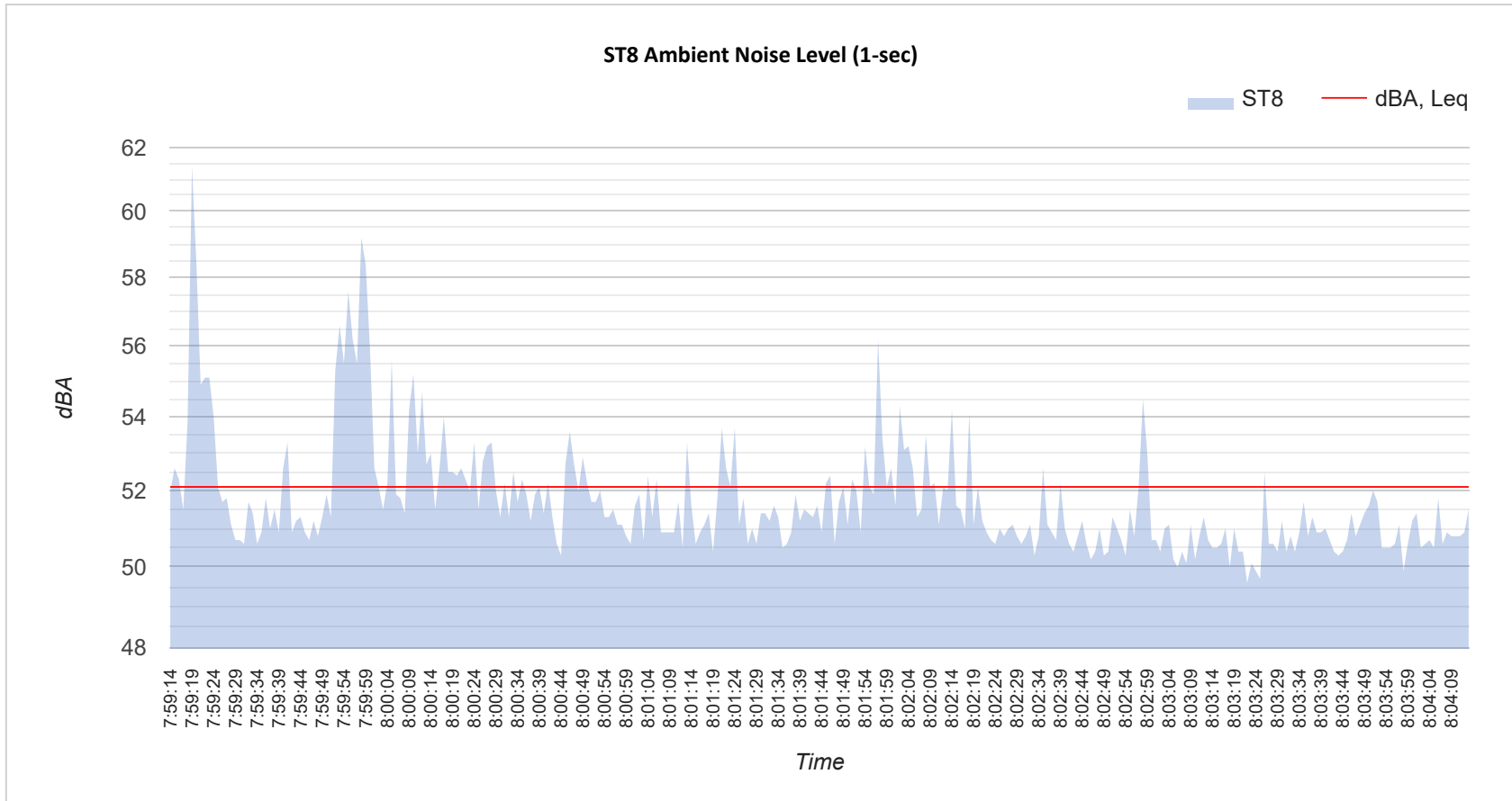
5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:	
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE		15' south of court 5.
Site Id:	ST7	Ground Type:	Hard, Pickleball court		



5-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Leisure World Pickleball Court	Site Topo:	Flat	Noise Source(s) w/ Distance:
Site Address/Location:	908 S Power Rd Mesa, AZ 85206	Meteorological Cond.:	79°F, clear and sunny, winds 5 mph ESE	140' West of the west wall, across pond.
Site Id:	ST8	Ground Type:	Reflective water body (pond)	



Appendix D
SoundPLAN Inputs and Outputs

Pickleball Courts

Octave spectra of the sources in dB(A) - 001 - Pickleball Courts: Outdoor SP

3

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m ²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Basket Ball Court	Area	442.39			67.0	93.5	0.0	0.0	101.5	0	100%/24h	Pickleball Court	54.1	63.1	73.4	82.1	89.2	86.7	82.1	77.9	87.0
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.01			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.01			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	82.00			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.00			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6

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1

Pickleball Courts

Contribution level - 001 - Pickleball Courts: Outdoor SP

9

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Receiver R1 FI G Lr,lim dB(A) Leq,d 35.3 dB(A)						
Pickleball Court	Default industrial noise	Area		24.8	0.0	
Pickleball Court	Default industrial noise	Area		24.9	0.0	
Pickleball Court	Default industrial noise	Area		24.6	0.0	
Pickleball Court	Default industrial noise	Area		24.6	0.0	
Pickleball Court	Default industrial noise	Area		24.2	0.0	
Pickleball Court	Default industrial noise	Area		24.4	0.0	
Pickleball Court	Default industrial noise	Area		23.9	0.0	
Pickleball Court	Default industrial noise	Area		24.0	0.0	
Basket Ball Court	Default industrial noise	Area		30.7	0.0	
Receiver R2 FI G Lr,lim dB(A) Leq,d 33.7 dB(A)						
Pickleball Court	Default industrial noise	Area		20.2	0.0	
Pickleball Court	Default industrial noise	Area		20.2	0.0	
Pickleball Court	Default industrial noise	Area		20.8	0.0	
Pickleball Court	Default industrial noise	Area		20.6	0.0	
Pickleball Court	Default industrial noise	Area		21.3	0.0	
Pickleball Court	Default industrial noise	Area		20.9	0.0	
Pickleball Court	Default industrial noise	Area		21.8	0.0	
Pickleball Court	Default industrial noise	Area		21.4	0.0	
Basket Ball Court	Default industrial noise	Area		31.2	0.0	
Receiver R3 FI G Lr,lim dB(A) Leq,d 34.5 dB(A)						
Pickleball Court	Default industrial noise	Area		20.3	0.0	
Pickleball Court	Default industrial noise	Area		20.9	0.0	
Pickleball Court	Default industrial noise	Area		21.3	0.0	
Pickleball Court	Default industrial noise	Area		21.6	0.0	
Pickleball Court	Default industrial noise	Area		22.4	0.0	
Pickleball Court	Default industrial noise	Area		22.3	0.0	
Pickleball Court	Default industrial noise	Area		23.3	0.0	
Pickleball Court	Default industrial noise	Area		23.1	0.0	
Basket Ball Court	Default industrial noise	Area		31.8	0.0	

Pickleball Courts

Contribution spectra - 001 - Pickleball Courts: Outdoor SP

23

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Receiver R1		FIG Lr,lim	Leq,d 35.3 dB(A)																											
Basket Ball Court	Leq,d	30.7	-30.2	-23.4	-18.4	-15.2	-10.1	-7.0	-9.0	-5.9	-2.5	-1.5	1.9	5.4	8.5	11.2	12.8	16.9	24.5	23.5	24.5	21.9	19.0	15.7	11.2	4.9	-3.4	-15.2	-33.0	
Pickleball Court	Leq,d	24.4	-36.6	-29.8	-24.8	-21.6	-16.4	-13.4	-15.1	-12.1	-8.6	-7.7	-4.2	-0.7	2.9	5.5	7.2	10.7	18.0	16.8	18.0	15.9	13.2	10.1	6.0	0.3	-7.1	-17.5	-33.3	
Pickleball Court	Leq,d	23.9	-37.1	-30.3	-25.3	-22.1	-16.9	-13.9	-15.7	-12.7	-9.3	-8.3	-4.8	-1.3	2.2	4.8	6.5	10.2	17.6	16.4	17.7	15.2	12.4	9.2	4.9	-1.1	-9.0	-20.2	-37.1	
Pickleball Court	Leq,d	24.0	-37.0	-30.2	-25.2	-21.9	-16.8	-13.8	-15.6	-12.6	-9.1	-8.2	-4.7	-1.2	2.3	4.9	6.6	10.3	17.7	16.6	17.9	15.4	12.6	9.4	5.2	-0.7	-8.5	-19.4	-36.0	
Pickleball Court	Leq,d	24.2	-36.7	-29.9	-24.9	-21.7	-16.6	-13.5	-15.2	-12.2	-8.8	-7.8	-4.4	-0.8	2.7	5.3	7.0	10.5	17.9	16.6	17.8	15.7	13.0	9.9	5.7	-0.1	-7.7	-18.4	-34.5	
Pickleball Court	Leq,d	24.8	-36.0	-29.2	-24.2	-20.9	-15.8	-12.8	-14.3	-11.3	-7.9	-7.0	-3.5	0.0	3.5	6.1	7.8	11.0	18.3	16.8	17.7	16.7	14.1	13.2	9.2	3.6	-3.5	-13.6	-28.8	
Pickleball Court	Leq,d	24.9	-35.8	-29.0	-24.0	-20.8	-15.7	-12.7	-14.1	-11.1	-7.7	-6.8	-3.3	0.2	3.7	6.3	8.0	11.2	18.4	17.0	17.9	16.9	14.4	11.5	7.6	2.3	-4.5	-14.1	-28.6	
Pickleball Court	Leq,d	24.6	-36.3	-29.5	-24.5	-21.3	-16.2	-13.2	-14.8	-11.8	-8.4	-7.4	-4.0	-0.4	3.1	5.7	7.4	10.8	18.1	16.7	17.7	16.2	13.6	12.6	8.5	2.7	-4.7	-15.2	-31.0	
Pickleball Court	Leq,d	24.6	-36.2	-29.4	-24.4	-21.2	-16.1	-13.0	-14.6	-11.6	-8.2	-7.2	-3.8	-0.2	3.3	5.9	7.6	10.9	18.2	16.9	17.9	16.4	13.8	10.8	6.8	1.3	-5.8	-15.8	-30.9	
Receiver R2		FIG Lr,lim	Leq,d 33.7 dB(A)																											
Basket Ball Court	Leq,d	31.2	-26.6	-19.8	-14.8	-11.6	-6.5	-3.5	-5.3	-2.3	1.1	-0.8	2.7	6.2	9.6	12.2	13.9	19.0	25.8	23.8	23.9	21.5	19.0	18.3	14.3	8.3	0.3	-10.9	-27.8	
Pickleball Court	Leq,d	20.9	-37.2	-30.4	-25.4	-22.2	-17.1	-14.1	-16.0	-13.0	-9.6	-8.4	-5.0	-1.4	2.0	4.6	6.3	8.5	15.4	13.4	13.5	11.2	8.7	5.8	1.9	-3.4	-10.2	-20.5	-37.4	
Pickleball Court	Leq,d	21.8	-37.2	-30.4	-25.4	-22.2	-17.1	-14.1	-16.0	-13.0	-9.6	-8.4	-4.9	-1.4	2.2	4.8	6.5	8.8	15.7	13.7	13.8	11.5	12.7	9.6	5.6	0.1	-7.8	-19.4	-36.8	
Pickleball Court	Leq,d	21.4	-37.1	-30.3	-25.3	-22.1	-17.0	-14.0	-15.8	-12.8	-9.4	-8.2	-4.7	-1.2	2.4	5.0	6.7	8.9	15.9	13.9	14.0	11.7	9.4	6.7	3.2	-1.5	-8.6	-19.6	-36.2	
Pickleball Court	Leq,d	21.3	-37.4	-30.6	-25.6	-22.4	-17.3	-14.3	-16.2	-13.2	-9.9	-8.6	-5.1	-1.6	1.8	4.5	6.1	8.4	15.3	13.3	13.4	11.0	12.3	9.1	4.8	-1.1	-8.7	-20.2	-37.8	
Pickleball Court	Leq,d	20.2	-37.8	-31.0	-26.0	-22.8	-17.7	-14.7	-16.8	-13.8	-10.4	-9.0	-5.6	-2.1	1.5	4.1	5.8	7.8	14.7	12.7	12.6	10.1	7.4	7.1	3.0	-2.8	-11.3	-23.1	-40.8	
Pickleball Court	Leq,d	20.2	-37.7	-30.9	-25.9	-22.7	-17.6	-14.6	-16.6	-13.6	-10.3	-8.9	-5.4	-1.9	1.6	4.2	5.9	8.0	14.8	12.8	12.7	10.3	7.6	4.5	0.2	-5.6	-13.4	-24.4	-40.9	
Pickleball Court	Leq,d	20.8	-37.6	-30.8	-25.8	-22.6	-17.5	-14.5	-16.5	-13.5	-10.1	-8.8	-5.3	-1.8	1.7	4.3	6.0	8.1	15.0	13.0	13.0	10.6	10.7	7.8	4.2	-2.0	-10.1	-21.2	-39.2	
Pickleball Court	Leq,d	20.6	-37.5	-30.7	-25.7	-22.5	-17.4	-14.4	-16.3	-13.3	-9.9	-8.6	-5.2	-1.7	1.9	4.5	6.2	8.3	15.2	13.1	13.1	10.7	8.1	5.1	1.1	-4.6	-11.9	-22.3	-38.9	
Receiver R3		FIG Lr,lim	Leq,d 34.5 dB(A)																											
Basket Ball Court	Leq,d	31.8	-27.6	-20.7	-15.7	-12.5	-7.4	-4.4	-5.7	-2.7	0.7	1.6	5.0	8.6	11.9	14.5	16.2	18.8	25.8	24.0	24.5	22.5	20.7	18.9	16.6	11.8	5.5	-3.1	-16.1	
Pickleball Court	Leq,d	22.3	-36.6	-29.8	-24.8	-21.6	-16.5	-13.5	-15.2	-12.2	-8.8	-7.7	-4.2	-0.7	2.9	5.5	7.2	9.6	16.6	14.7	14.9	12.8	10.6	8.4	5.5	0.3	-7.1	-17.5	-33.3	
Pickleball Court	Leq,d	23.3	-35.9	-29.1	-24.1	-20.9	-15.8	-12.8	-14.3	-11.3	-7.9	-6.8	-3.4	0.1	3.6	6.3	8.0	10.4	17.4	15.6	15.8	13.8	11.8	9.8	7.3	2.1	-4.8	-14.5	-29.2	
Pickleball Court	Leq,d	23.1	-36.0	-29.2	-24.2	-21.0	-15.9	-12.9	-14.4	-11.4	-8.0	-7.0	-3.5	0.0	3.5	6.1	7.8	10.3	17.3	15.4	15.7	13.7	11.7	9.6	7.0	1.9	-5.0	-14.7	-29.5	
Pickleball Court	Leq,d	22.4	-36.5	-29.7	-24.7	-21.5	-16.4	-13.4	-15.1	-12.1	-8.7	-7.6	-4.1	-0.6	3.0	5.6	7.3	9.7	16.6	14.8	14.9	12.8	10.7	8.4	5.6	0.2	-7.2	-17.6	-33.3	
Pickleball Court	Leq,d	20.3	-37.5	-30.8	-25.8	-22.6	-17.5	-14.5	-16.5	-13.6	-10.2	-8.8	-5.4	-1.9	1.7	4.3	6.0	8.0	14.9	12.8	12.8	10.4	7.8	4.9	1.1	-5.2	-13.6	-25.4	-43.3	
Pickleball Court	Leq,d	20.9	-37.7	-30.9	-25.9	-22.7	-17.6	-14.6	-16.6	-13.6	-10.2	-8.9	-5.5	-2.0	1.6	4.2	5.9	8.3	15.3	13.4	13.5	11.4	9.1	6.7	3.6	-2.7	-11.1	-22.9	-40.8	
Pickleball Court	Leq,d	21.3	-37.0	-30.3	-25.3	-22.1	-17.0	-14.0	-15.8	-12.8	-9.5	-8.2	-4.8	-1.2	2.3	4.9	6.6	8.8	15.7	13.8	13.8	11.6	9.2	6.7	3.5	-2.5	-10.4	-21.5	-38.3	
Pickleball Court	Leq,d	21.6	-37.2	-30.4	-25.4	-22.2	-17.1	-14.1	-15.9	-12.9	-9.5	-8.3	-4.9	-1.4	2.2	4.8	6.5	8.9	15.9	14.0	14.2	12.0	9.9	7.5	4.5	-1.2	-9.1	-20.2	-37.1	

Pickleball Courts

Octave spectra of the sources in dB(A) - 002 - Pickleball Courts - LMAX: Outdoor SP

3

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m ²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Basket Ball Court	Area	442.39			67.0	93.5	0.0	0.0	101.5	0	100%/24h	Pickleball Court	54.1	63.1	73.4	82.1	89.2	86.7	82.1	77.9	87.0
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.01			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.01			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	82.00			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6
Pickleball Court	Area	82.00			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.8	55.8	66.0	74.8	81.9	79.4	74.7	70.5	79.7
Pickleball Court	Area	80.58			67.0	86.1	0.0	0.0	94.1	0	100%/24h	Pickleball Court	46.7	55.7	66.0	74.7	81.8	79.3	74.7	70.5	79.6

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1

Pickleball Courts
Mean propagation Lmax - 002 - Pickleball Courts - LMAX: Outdoor SP

Source	Time slice	Source type	Xmax	Ymax	Lw	Ko	S	Adiv	Agr	Abar	Aatm	ADI	Amisc	dLrefl	Ls	Cmet	Lr
			m	m	dB(A)	dB	m	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)	dB	dB(A)
Receiver R1			FI	G	Lmax,lim	dB(A)	Lmax 38.7 dB(A)										
Basket Ball Court	Lmax	Area			101.5	0	267.5	-59.5	1.4	-0.4	-4.2	0.0		0.0	38.7	0.0	38.7
Pickleball Court	Lmax	Area			94.1	0	233.5	-58.4	1.4	-0.7	-4.0	0.0		0.0	32.4	0.0	32.4
Pickleball Court	Lmax	Area			94.1	0	251.8	-59.0	1.4	-0.6	-4.1	0.0		0.0	31.9	0.0	31.9
Pickleball Court	Lmax	Area			94.1	0	246.2	-58.8	1.4	-0.5	-4.0	0.0		0.0	32.0	0.0	32.0
Pickleball Court	Lmax	Area			94.1	0	239.5	-58.6	1.4	-0.7	-4.1	0.0		0.0	32.2	0.0	32.2
Pickleball Court	Lmax	Area			94.1	0	217.7	-57.7	1.3	-0.9	-4.2	0.0		0.2	32.8	0.0	32.8
Pickleball Court	Lmax	Area			94.1	0	211.1	-57.5	1.3	-0.9	-4.1	0.0		0.0	32.9	0.0	32.9
Pickleball Court	Lmax	Area			94.1	0	228.2	-58.2	1.4	-0.8	-4.1	0.0		0.2	32.6	0.0	32.6
Pickleball Court	Lmax	Area			94.1	0	222.1	-57.9	1.4	-0.8	-4.1	0.0		0.0	32.6	0.0	32.6
Receiver R2			FI	G	Lmax,lim	dB(A)	Lmax 39.2 dB(A)										
Basket Ball Court	Lmax	Area			101.5	0	245.7	-58.8	1.4	-0.8	-4.1	0.0		0.1	39.2	0.0	39.2
Pickleball Court	Lmax	Area			94.1	0	252.9	-59.1	1.4	-2.2	-5.3	0.0		0.0	28.9	0.0	28.9
Pickleball Court	Lmax	Area			94.1	0	255.0	-59.1	1.4	-2.0	-5.2	0.0		0.5	29.8	0.0	29.8
Pickleball Court	Lmax	Area			94.1	0	247.3	-58.9	1.4	-2.1	-5.1	0.0		0.0	29.4	0.0	29.4
Pickleball Court	Lmax	Area			94.1	0	260.4	-59.3	1.4	-2.2	-5.3	0.0		0.6	29.3	0.0	29.3
Pickleball Court	Lmax	Area			94.1	0	274.8	-59.8	1.4	-2.4	-5.4	0.0		0.2	28.2	0.0	28.2
Pickleball Court	Lmax	Area			94.1	0	267.8	-59.5	1.4	-2.4	-5.3	0.0		0.0	28.2	0.0	28.2
Pickleball Court	Lmax	Area			94.1	0	267.3	-59.5	1.4	-2.3	-5.3	0.0		0.4	28.8	0.0	28.8
Pickleball Court	Lmax	Area			94.1	0	260.0	-59.3	1.4	-2.3	-5.3	0.0		0.0	28.6	0.0	28.6
Receiver R3			FI	G	Lmax,lim	dB(A)	Lmax 39.8 dB(A)										
Basket Ball Court	Lmax	Area			101.5	0	188.8	-56.5	1.2	-1.7	-4.6	0.0		0.0	39.8	0.0	39.8
Pickleball Court	Lmax	Area			94.1	0	233.4	-58.4	1.4	-1.8	-5.0	0.0		0.0	30.3	0.0	30.3
Pickleball Court	Lmax	Area			94.1	0	214.3	-57.6	1.3	-1.8	-4.8	0.0		0.0	31.3	0.0	31.3
Pickleball Court	Lmax	Area			94.1	0	215.2	-57.7	1.3	-1.8	-4.8	0.0		0.0	31.1	0.0	31.1
Pickleball Court	Lmax	Area			94.1	0	232.7	-58.3	1.4	-2.0	-4.8	0.0		0.0	30.4	0.0	30.4
Pickleball Court	Lmax	Area			94.1	0	268.6	-59.6	1.4	-3.5	-4.2	0.0		0.0	28.3	0.0	28.3

Pickleball Courts
Mean propagation Lmax - 002 - Pickleball Courts - LMAX: Outdoor SP

Source	Time slice	Source type	Xmax m	Ymax m	Lw dB(A)	Ko dB	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	ADI dB	Amisc dB	dLrefl dB(A)	Ls dB(A)	Cmet dB	Lr dB(A)
Pickleball Court	Lmax	Area			94.1	0	269.6	-59.6	1.4	-1.8	-5.2	0.0		0.0	28.9	0.0	28.9
Pickleball Court	Lmax	Area			94.1	0	250.6	-59.0	1.4	-2.8	-4.5	0.0		0.0	29.3	0.0	29.3
Pickleball Court	Lmax	Area			94.1	0	251.3	-59.0	1.4	-1.8	-5.1	0.0		0.0	29.6	0.0	29.6

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