

# Environmental Noise Assessment

## Derby Skateboard Park Improvements

Santa Cruz, California

BAC Job # 2023-061

Prepared For:

### **Santa Cruz Parks & Recreation**

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## Introduction

The Derby Skateboard Park Improvements project (project), is located in the City of Santa Cruz, California. The project proposes the expansion of an existing skateboard park within Sergeant Derby Park. The project area and conceptual 3D rendering of the skate park expansion are provided as Figures 1 and 2, respectively.

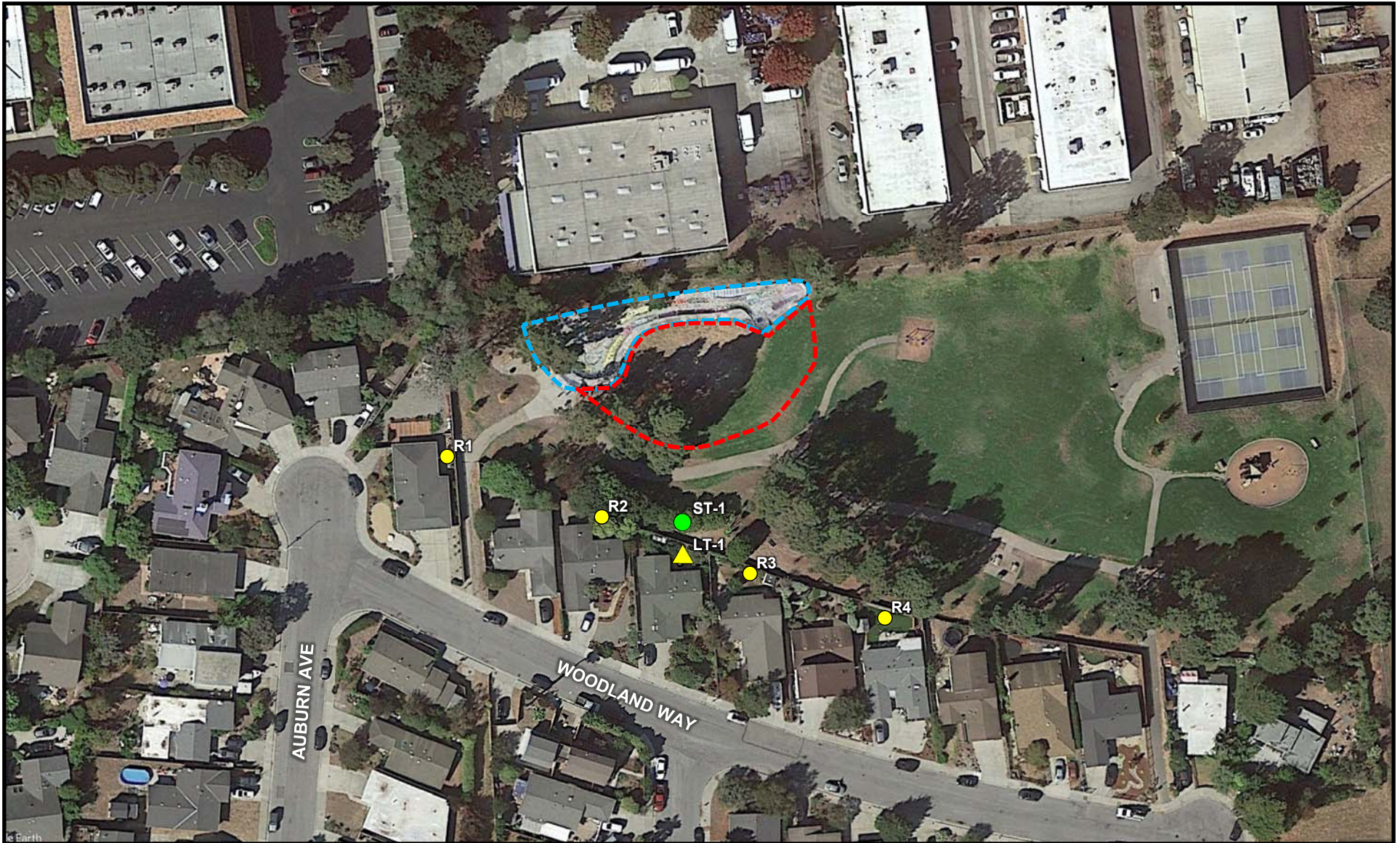
Due to the proximity of the project site to existing residences on Woodland Way and Auburn Avenue, Bollard Acoustical Consultants, Inc. (BAC) was retained by the City of Santa Cruz Parks & Recreation department to prepare this noise assessment for the project. Specifically, the purposes of this assessment are to quantify existing skate park noise levels at the nearest residences, to predict future skateboard park noise levels at those residences, to compare those predicted levels against the applicable City of Santa Cruz noise standards for acceptable noise exposure, and to recommend noise mitigation measures where appropriate. This report contains BAC's evaluation.

## Noise Fundamentals and Terminology

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard, and thus are called sound. Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness. Appendix A contains definitions of Acoustical Terminology. Figure 3 shows common noise levels associated with various sources.

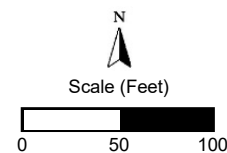
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels in decibels.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level ( $L_{eq}$ ) over a given time period (usually one hour). The  $L_{eq}$  is the foundation of the Day-Night Average Level noise descriptor,  $L_{dn}$  or DNL, and shows very good correlation with community response to noise.



### Legend

- Existing Skate Park Boundary (Approximate)
- Proposed Skate Park Addition (Approximate)
- ▲ Long-Term Noise Survey Location
- Short-Term Noise Survey Location
- Noise-Sensitive Receiver



Project Area  
Derby Skateboard Park  
Improvements  
Santa Cruz, California

Figure 1



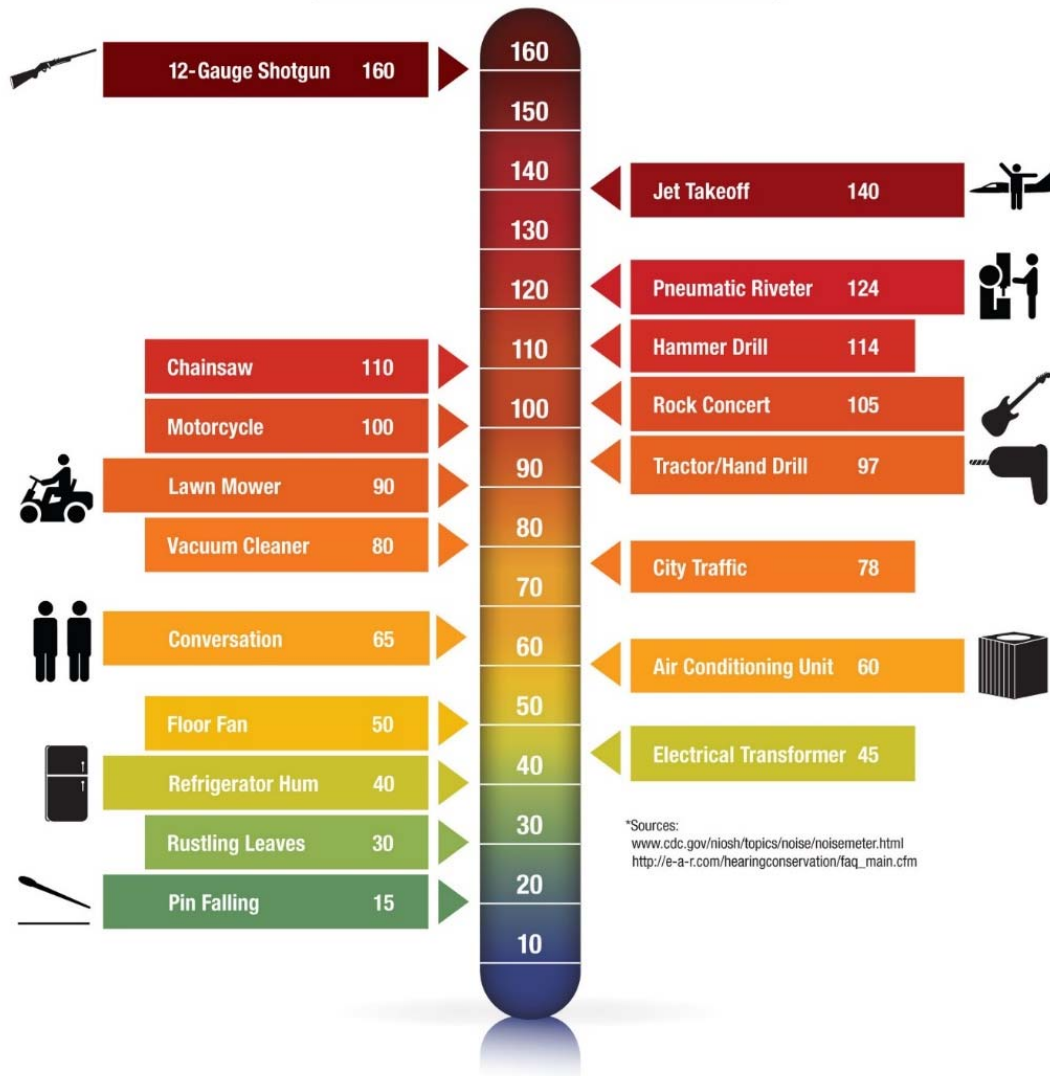


Conceptual 3D Render  
Derby Skateboard Park  
Improvements  
Santa Cruz, California

Figure 2



**Figure 3**  
**Typical A-Weighted Sound Levels of Common Noise Sources**  
**Decibel Scale (dBA)\***



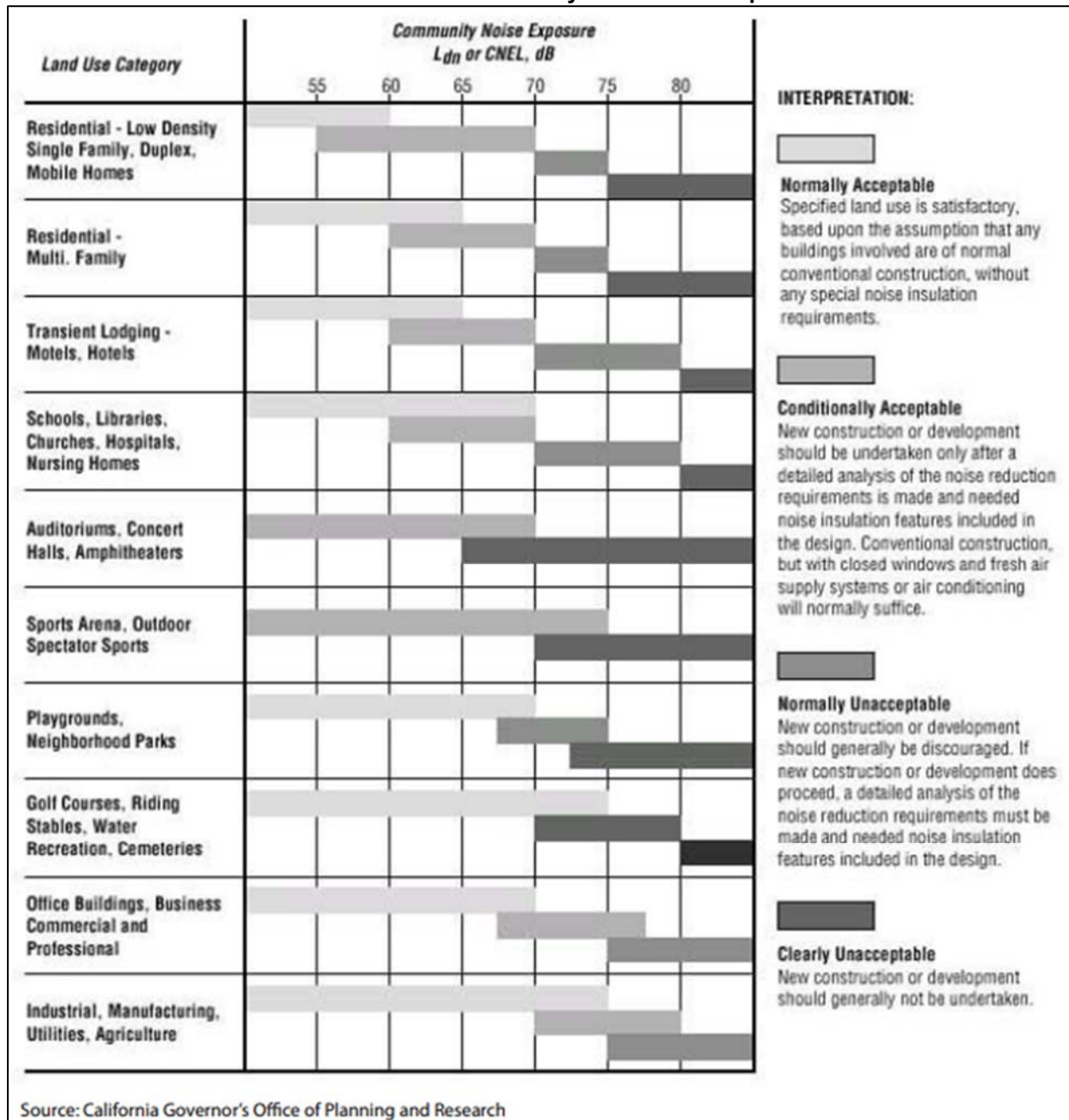
The Day-Night Average Level (DNL) is based upon the average noise level over a 24-hour day, with a +10-decibel weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because DNL represents a 24-hour average, it tends to disguise short-term variations in the noise environment. DNL-based noise standards are commonly used to assess noise impacts associated with traffic, railroad, and aircraft noise sources.

## Criteria for Acceptable Noise Exposure

### Santa Cruz General Plan 2030

Chapter 8 of the Santa Cruz General Plan 2030 (Hazards, Safety, and Noise) contains numeric thresholds for acceptable community noise level exposure for various land categories, which are included in Figure 4.

**Figure 4**  
**Santa Cruz General Plan Community Noise Level Exposure Limits**



According to Figure 4, playgrounds and neighborhood parks are considered acceptable provided the noise environment at the park site does not exceed 70 dB DNL. In addition, Figure 4 indicates that, provided the proposed skatepark expansion project does not result in noise levels exceeding the normally acceptable level of 60 dB DNL at the existing adjacent residential uses, the project's noise generation would be satisfactory relative to the Santa Cruz General Plan noise standards.

### **Santa Cruz Municipal Code**

The Santa Cruz Municipal Code provides noise level criteria pertaining to noise generated on residential property, commercial and industrial property in Section 24.14.260. This section does not, however, contain noise level criteria for activities occurring within park uses. Although the General Plan standard of 70 dB DNL for new park uses would apply to this project, for the assessment of the noise impacts of the skatepark upon the existing residential uses, the portions of the Municipal Code reproduced below would be applicable:

#### **24.14.260 Noise**

At the points of measurement specified in this part, the maximum sound level shall not exceed the following limits:

1. **Noise Limits, Residential Property.** No person shall produce, suffer, or allow to be produced by any machine or device, or any combination of the same, on nonresidential property, a noise level more than five dBA above the local ambient at the points of measurement established in this part. The local ambient shall establish the maximum noise limit. More stringent noise limits may be established for specific uses through the conditions of a use permit.
2. **Noise Limits, Commercial and Industrial Property.** No person shall produce, suffer, or allow to be produced by any machine or device, or any combination of the same, on nonresidential property, a noise level more than six dBA above the local ambient at the points of measurement established in this part. The local ambient shall establish the maximum noise limit. More stringent noise limits may be established for specific uses through the conditions of a use permit.

### **Noise Level Criteria Applied to this Project**

Although no noise criteria are established for noise generated within park sites, such as the proposed project, it is reasonable to conclude based on the standards applicable to residential uses that an increase of 5 dBA above the local ambient would be deemed as significant. Therefore, for this assessment noise impacts of the project would be considered significant if the project raises the ambient noise level by more than 5 dBA or increases the ambient noise level past the 60 dBA DNL noise level criteria at the nearby residential uses (see Figure 4).

## Existing Ambient Noise Environment within the Project Vicinity

The existing ambient noise environment within the outdoor activity areas (backyards) of the residences which abut Sergeant Derby Park is defined primarily by activities at the park. Slow moving traffic on Woodland Way does not appreciably affect ambient noise levels in the rear yard areas of the nearest residences to the project site. To quantify the existing ambient noise environment at the nearest backyard areas to the project site, BAC conducted a long-term (96-hour) noise level survey from July 2<sup>nd</sup> through July 5<sup>th</sup>, 2023, at the location shown in Figure 1. Photographs of the noise survey location is provided in Appendix B.

A Larson-Davis Laboratories (LDL) Model 831 precision integrating sound level meter was used to complete the ambient noise level survey. The meter was calibrated immediately before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

The long-term ambient noise level survey results are summarized in Table 1. The detailed results of the ambient noise survey are contained in tabular and graphical formats in Appendices C and D, respectively.

**Table 1**  
**Summary of Long-Term Noise Survey Measurement Results<sup>1</sup>**

				Average Hourly Noise Levels [dBA]			
Site <sup>2</sup>	Description	Date	DNL [dBA]	Daytime <sup>3</sup>		Nighttime <sup>4</sup>	
				Leq	Lmax	Leq	Lmax
LT-1	Backyard with 426 Woodland Way	7/2/2023	45	45	65	34	55
		7/3/2023	46	45	66	38	52
		7/4/2023 <sup>5</sup>	57	55	70	48	60
		7/5/2023	43	38	60	37	58
		Average <sup>6</sup>	45	43	63	36	55
Notes							
1. Detailed summaries of the noise monitoring results are provided in Appendices C and D.							
2. Long-term noise survey location is identified on Figure 1.							
3. Daytime hours: 7:00 a.m. to 10:00 p.m.							
4. Nighttime hours: 10:00 p.m. to 7:00 a.m.							
5. Noise levels were elevated due to fireworks activities occurring in the project vicinity on the evening of July 4 <sup>th</sup> .							
6. The average does not take into account the noise level measured on Fourth of July.							
Source: Bollard Acoustical Consultants, Inc. (2023)							

Table 1 indicates that the maximum noise levels measured at the nearest residence to the skatepark ranged from 60 – 65 dBA Lmax during daytime hours, not including the elevated levels generated by fireworks on the 4<sup>th</sup> of July. The measured day-night average noise levels (DNL) at site LT-1 ranged from 43 – 46 dBA DNL, also excluding July 4<sup>th</sup>. Because the measured DNL values were all well below 70 dB, the noise environment within the park site is considered acceptable for the proposed project.

## Evaluation of Skateboard Park Generated Noise

The skateboard expansion area is shown on Figure 1. For the assessment of skateboard park noise impacts, a combination of data collected during the long-term noise survey and the results of a short-term noise survey were utilized. Specifically, the long-term noise level data shown in Table 1 was used with short-term noise data collected at site ST-1 (see Figure 1) between 3-4 pm on the afternoon of July 2<sup>nd</sup>, when several skateboarders were observed by BAC staff to be using the skatepark. Photographs of the short-term noise survey location and persons using the skatepark during the short-term survey are provided in Appendix B.

Site LT-1 represents the nearest property line of the residences to the west and south of the project site, and was located approximately 145 feet from the center of the skateboard area. As indicated in Appendix C-1, the measured average hourly noise levels during the 3-4 pm hour of July 2<sup>nd</sup>, 2023 was 44 dBA Leq. At the short-term monitoring site, average noise levels measured during this same hour were 49 dBA Leq. The 5 dBA difference in measured sound levels is due primarily to the noise attenuation provided by the rear-yard fencing.

According to persons familiar with the proposed skatepark expansion, the project could potentially double the number of skaters using the facilities at any given time, although actual usage would vary. During periods when skatepark usage following the expansion would be approximately double that of existing skatepark usage, the ambient noise environment at the nearest residences would be expected to increase by approximately 3 dBA. In addition, because the proposed improvements would position skaters closer to the nearest residences to the south, the increase in noise levels resulting from the closer proximity was computed to be approximately 0.3 to 1.1 dBA.

Conservatively assuming a 3 dBA increase in hourly average noise levels during daytime hours for doubled skate park usage, and adjusting for the closer position of some skaters to residences following the skate park expansion, the increase in DNL noise exposure at the nearest residences to the project site was calculated. Table 2 shows the predicted skateboard park noise exposure at each of the nearest receivers identified on Figure 1.

**Table 2**  
**Predicted Skateboard Park Noise Levels at the Nearest Receivers**

Receiver <sup>1</sup>	Noise Level, DNL [dBA]		
	Existing Ambient	Existing Ambient + Project <sup>2</sup>	Increase in Ambient
R1	43	46	3.3
R2	45	49	3.9
R3	43	47	4.1
R4	40	44	4.1
Notes 1. Receiver locations are shown on Figure 1. 2. A +3 dB offset was applied to the existing ambient to account for doubling the number of skaters. 3. Existing ambient was computed from the Table 1 data, excluding the 4 <sup>th</sup> of July, and adjusted for distance to the skatepark. Source: Bollard Acoustical Consultants, Inc (2023)			

The data in Table 2 indicate that skateboard park noise levels are calculated to range from 44 – 49 dBA DNL at the backyards of the nearest residences to the project site. These noise levels are well below the General Plan 60 dBA DNL exterior noise standard applied to residential uses and below the 5 dBA increase considered significant. In addition, because skatepark activities would not occur during nighttime hours, the actual increase in DNL is predicted to be closer to 2 dBA at the nearest residences, rather than the more conservative range of increases shown in Table 2.

Because noise exposure from future skateboard park activities is predicted to be satisfactory relative to Santa Cruz General Plan noise standards, and because usage occurring under the proposed project would not result in a substantial increase in noise levels at the nearest residences to the project site, ***noise impacts related to the skatepark expansion are considered to be less than significant.***

## Conclusions

Future skateboard park noise levels are predicted to be in compliance with the Santa Cruz General Plan 60 dB DNL exterior noise level standard for residential uses and are expected to result in an increase in ambient noise exposure below the 5 dB threshold considered significant by the City. As a result, noise impacts related to the skatepark expansion are considered to be less than significant and no mitigation measures would be required for this project.

These conclusions are based on the BAC noise level data described herein and on the skateboard park expansion area shown on Figure 1. Deviations from the above-mentioned resources could cause future noise levels to differ from those predicted in this assessment.

This concludes BAC's noise evaluation for the Derby Skateboard Park Improvements project in Santa Cruz, California. Please contact BAC at (530) 537-2328 or paulb@bacnoise.com with any questions regarding this assessment.

## Appendix A

### Acoustical Terminology

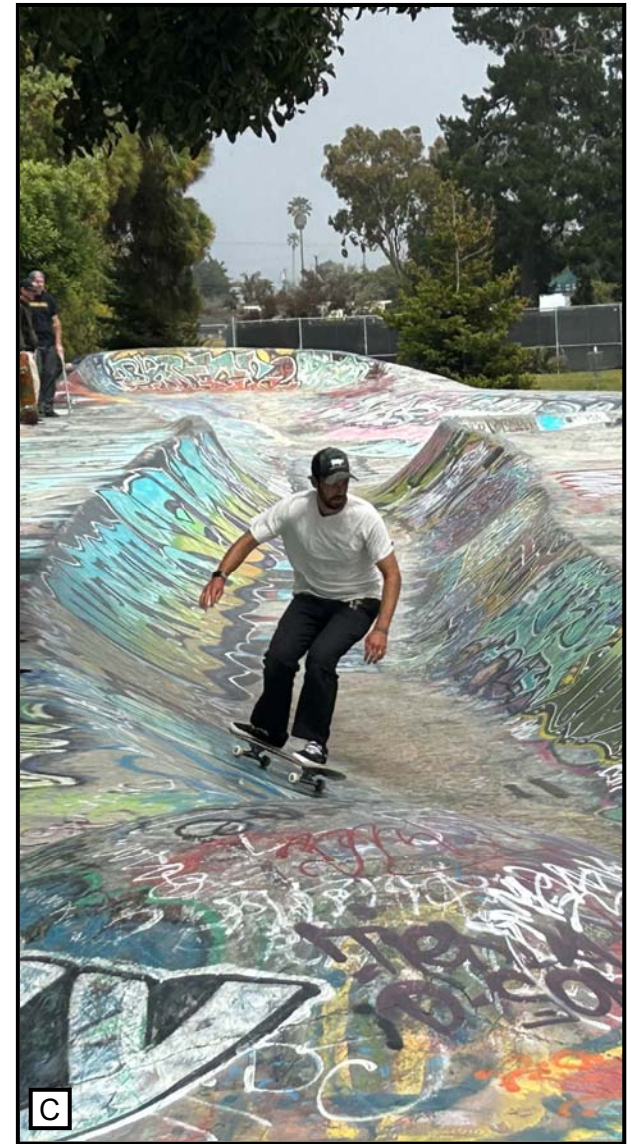
<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
<b>CNEL</b>	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
<b>IIC</b>	Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.
<b>Ldn</b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>Leq</b>	Equivalent or energy-averaged sound level.
<b>Lmax</b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Masking</b>	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
<b>Noise</b>	Unwanted sound.
<b>Peak Noise</b>	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
<b>RT<sub>60</sub></b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>STC</b>	Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.



A



B



C

### Legend

- A LT-1 Noise Measurement Location at 426 Woodland Way
- B ST-1 Noise Measurement Location
- C Skater Using Existing Facilities

Noise Survey Photographs  
Derby Skateboard Park  
Improvements  
Santa Cruz, California

Appendix B



**Appendix C-1**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Sunday, July 2, 2023**

Hour	Leq	Lmax	L50	L90
12:00 AM				
1:00 AM				
2:00 AM				
3:00 AM				
4:00 AM				
5:00 AM				
6:00 AM				
7:00 AM				
8:00 AM				
9:00 AM				
10:00 AM				
11:00 AM				
12:00 PM				
1:00 PM				
2:00 PM				
3:00 PM	44	59	42	40
4:00 PM	46	71	42	40
5:00 PM	49	68	44	40
6:00 PM	46	64	41	38
7:00 PM	48	77	41	37
8:00 PM	39	64	36	35
9:00 PM	36	51	35	34
10:00 PM	34	57	33	33
11:00 PM	34	52	33	33

Statistical Summary					
Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
High	Low	Average	High	Low	Average
49	36	45	34	34	34
77	51	65	57	52	55
44	35	40	33	33	33
40	34	38	33	33	33

Computed DNL, dB	45
% Daytime Energy	96%
% Nighttime Energy	4%

GPS Coordinates
36°57'12.65"N
122° 3'8.01"W

**Appendix C-2**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Monday, July 3, 2023**

Hour	Leq	Lmax	L50	L90
12:00 AM	34	50	34	34
1:00 AM	34	51	33	33
2:00 AM	34	42	34	33
3:00 AM	34	43	33	33
4:00 AM	34	41	34	33
5:00 AM	39	52	36	34
6:00 AM	44	65	36	34
7:00 AM	37	58	35	33
8:00 AM	38	57	35	34
9:00 AM	43	73	36	35
10:00 AM	43	68	39	37
11:00 AM	45	65	41	38
12:00 PM	45	61	43	39
1:00 PM	48	70	44	41
2:00 PM	46	67	43	40
3:00 PM	48	63	46	42
4:00 PM	46	62	44	41
5:00 PM	43	67	40	38
6:00 PM	43	70	39	37
7:00 PM	45	63	42	37
8:00 PM	42	62	38	36
9:00 PM	48	78	33	31
10:00 PM	32	56	32	31
11:00 PM	37	66	32	31

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	48	37	45	44	32	38
Lmax (Maximum)	78	57	66	66	41	52
L50 (Median)	46	33	40	36	32	34
L90 (Background)	42	31	37	34	31	33

Computed DNL, dB	46
% Daytime Energy	90%
% Nighttime Energy	10%

GPS Coordinates
36°57'12.65"N
122° 3'8.01"W

**Appendix C-3**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Tuesday, July 4, 2023**

Hour	Leq	Lmax	L50	L90
12:00 AM	39	65	33	32
1:00 AM	32	39	32	31
2:00 AM	32	51	32	31
3:00 AM	33	48	32	31
4:00 AM	31	44	31	30
5:00 AM	38	58	33	32
6:00 AM	41	66	38	33
7:00 AM	41	65	34	32
8:00 AM	36	54	33	32
9:00 AM	38	60	34	32
10:00 AM	44	66	37	34
11:00 AM	45	62	43	40
12:00 PM	45	63	43	41
1:00 PM	46	61	45	42
2:00 PM	48	67	46	43
3:00 PM	48	70	46	43
4:00 PM	49	66	47	45
5:00 PM	48	64	46	43
6:00 PM	48	76	44	41
7:00 PM	63	98	42	39
8:00 PM	53	87	37	36
9:00 PM	64	89	37	33
10:00 PM	52	83	33	31
11:00 PM	56	87	32	31

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	36	55	56	31	48
Lmax (Maximum)	98	54	70	87	39	60
L50 (Median)	47	33	41	38	31	33
L90 (Background)	45	32	38	33	30	31

Computed DNL, dB	57
% Daytime Energy	88%
% Nighttime Energy	12%

GPS Coordinates
36°57'12.65"N
122° 3'8.01"W

**Appendix C-4**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Wednesday, July 5, 2023**

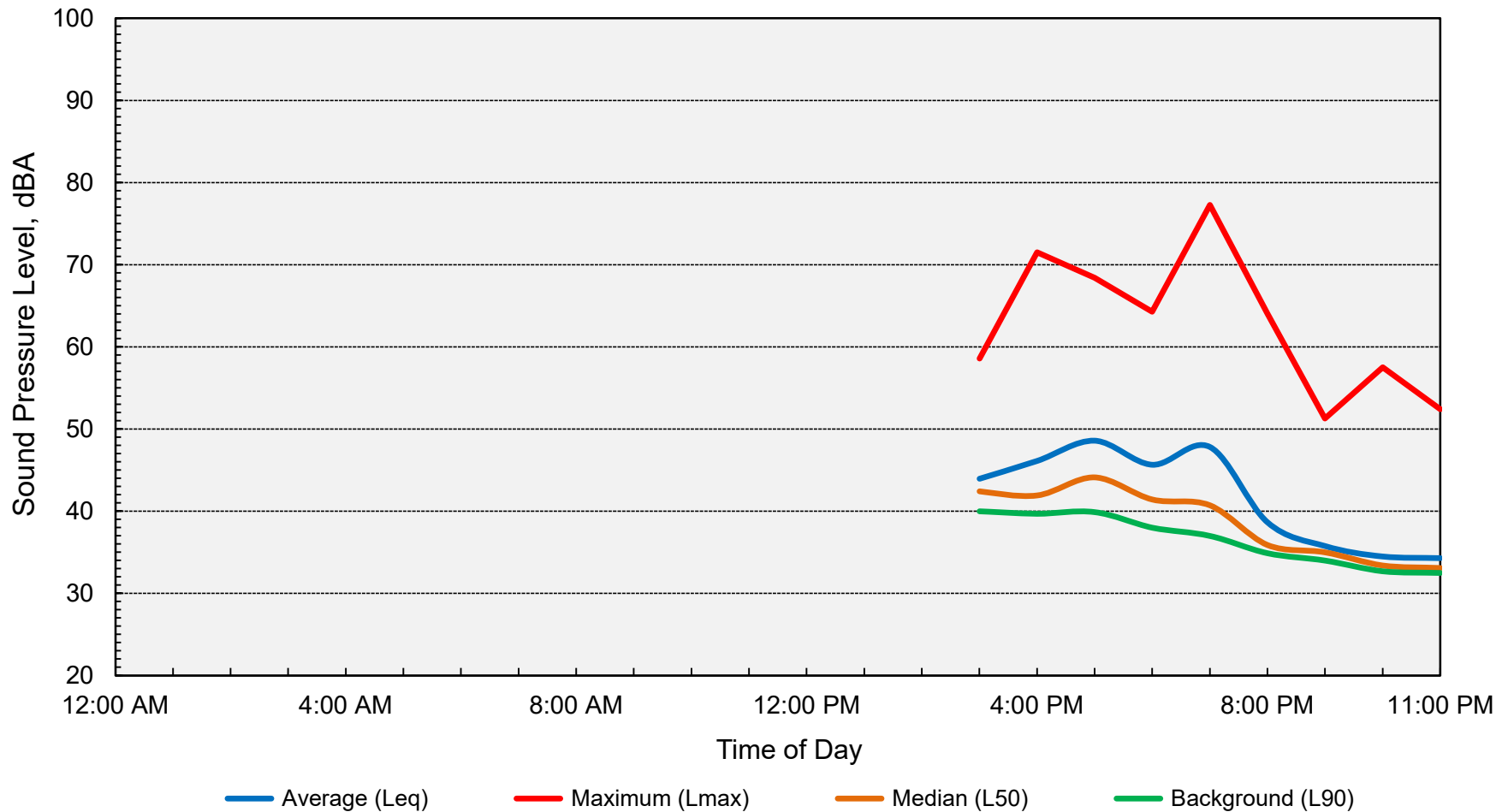
Hour	Leq	Lmax	L50	L90
12:00 AM	34	58	32	31
1:00 AM	34	63	31	30
2:00 AM	33	54	32	31
3:00 AM	32	56	32	31
4:00 AM	32	44	32	31
5:00 AM	38	54	34	31
6:00 AM	42	74	34	32
7:00 AM	38	60	34	32
8:00 AM				
9:00 AM				
10:00 AM				
11:00 AM				
12:00 PM				
1:00 PM				
2:00 PM				
3:00 PM				
4:00 PM				
5:00 PM				
6:00 PM				
7:00 PM				
8:00 PM				
9:00 PM				
10:00 PM				
11:00 PM				

Statistical Summary					
Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
High	Low	Average	High	Low	Average
38	38	38	42	32	37
60	60	60	74	44	58
34	34	34	34	31	32
32	32	32	32	30	31

Computed DNL, dB	43
% Daytime Energy	71%
% Nighttime Energy	29%

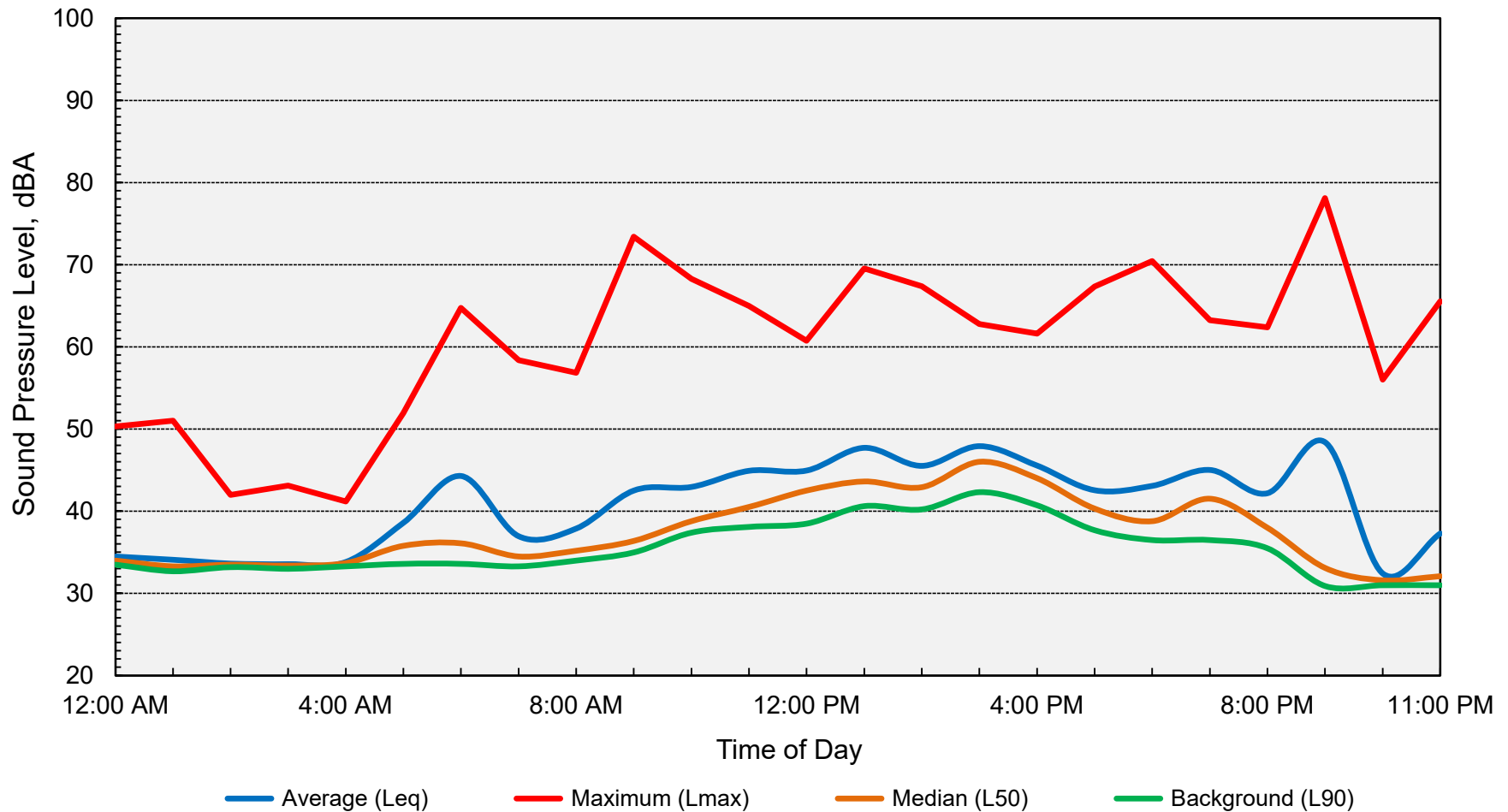
GPS Coordinates
36°57'12.65"N
122° 3'8.01"W

**Appendix D-1**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Sunday, July 2, 2023**



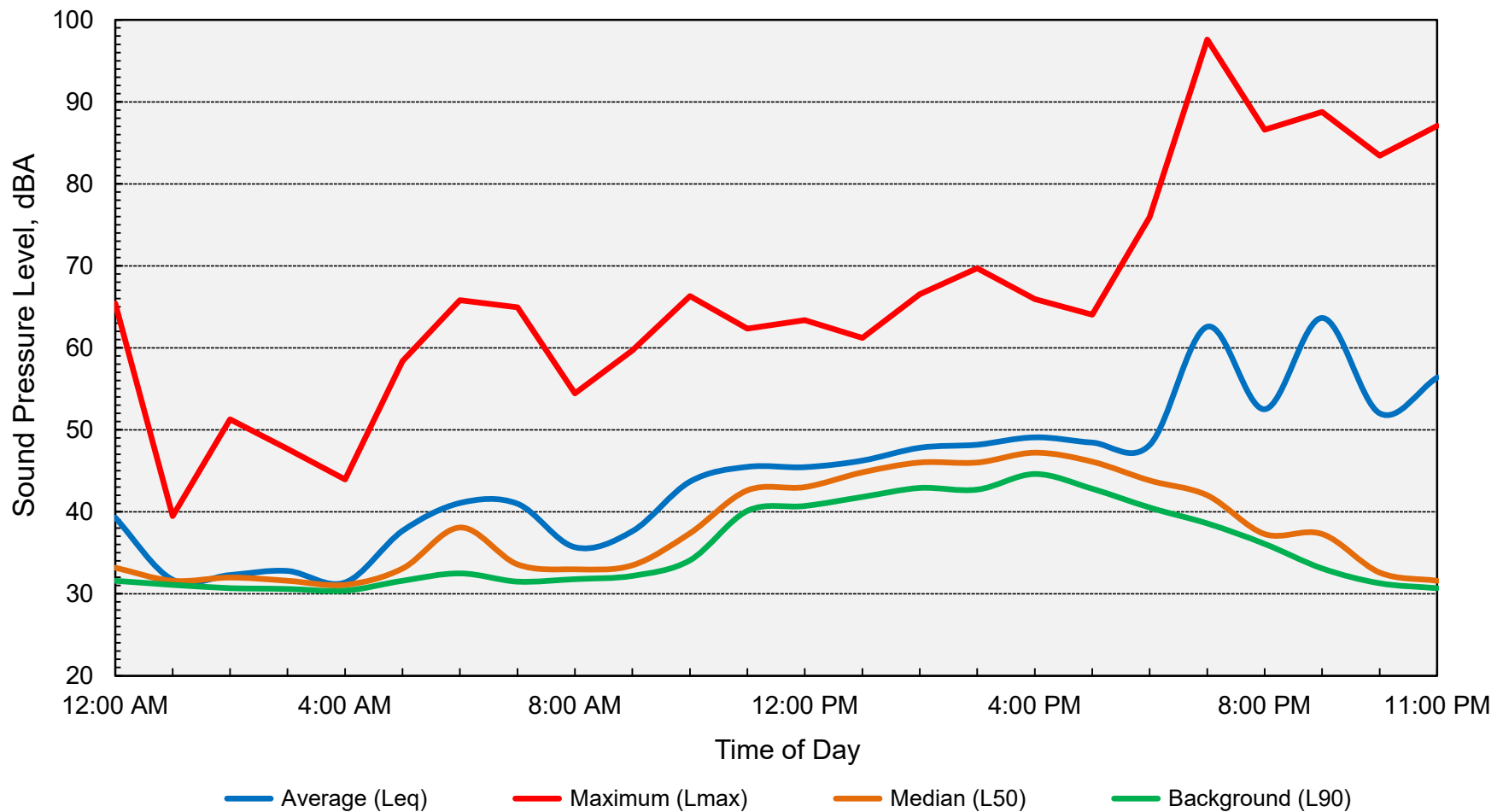
**Computed DNL = 45 dB**

**Appendix D-2**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Monday, July 3, 2023**



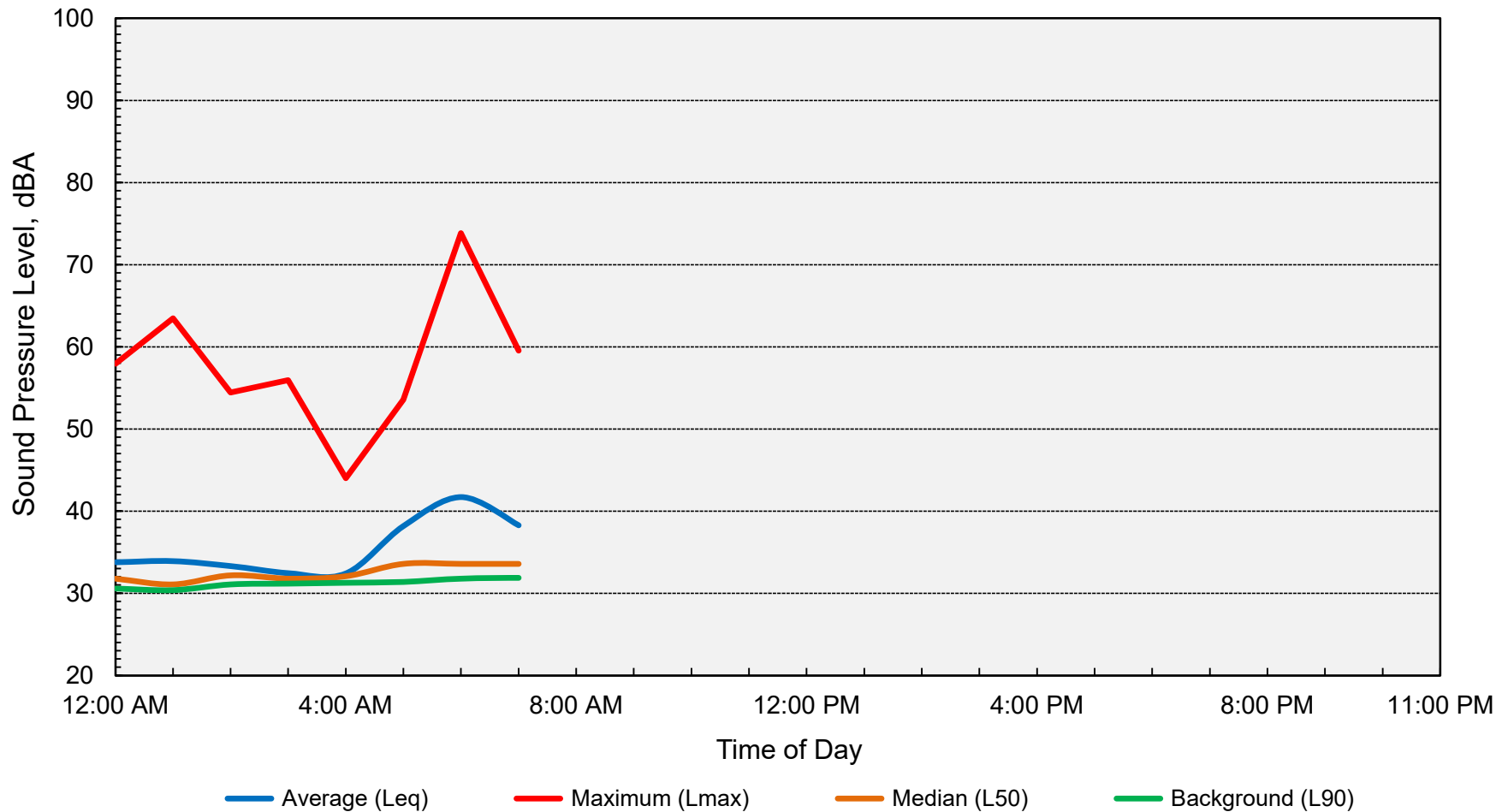
**Computed DNL = 46 dB**

**Appendix D-3**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Tuesday, July 4, 2023**



**Computed DNL = 57 dB**

**Appendix D-4**  
**Long-Term Ambient Noise Monitoring Results**  
**Derby Skateboard Park Improvements - Santa Cruz, California**  
**Wednesday, July 5, 2023**



**Computed DNL = 43 dB**