Noise Monitoring Services
Sound and Vibration Measurement, Testing & Consulting

Noise Analysis Report

for the

Coachella Valley Events Center

May 1, 2024

Prepared for:

Coachella Valley Events Center
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Introduction

This report details the noise analysis performed for the Coachella Valley Events Center at 46600 Tyler Street in Coachella. The events center is an existing facility that is undergoing remodeling. The facility currently includes various guest congregation areas, a covered deck, patio, a lake, a stage an onsite building and offices. The remodeled facility will include the addition of parking areas, a loading zone and bathrooms. It is proposed that amplified music will be played at the stage and a distributed speaker system will be installed around the lake, which will play ambient music during events. The maximum capacity of the facility will be 750 people and the proposed operating hours are 11 am to 2 am. The noise study was performed to estimate noise levels of events and to determine the noise control measures required for compliance with the City's noise ordinance. This report provides the City of Coachella Municipal Code noise standards, the existing noise levels at the site, estimated noise levels during an event, an assessment of impact, and recommendations to ensure compliance with the noise standards. The location of the project site is shown in Figure 1.

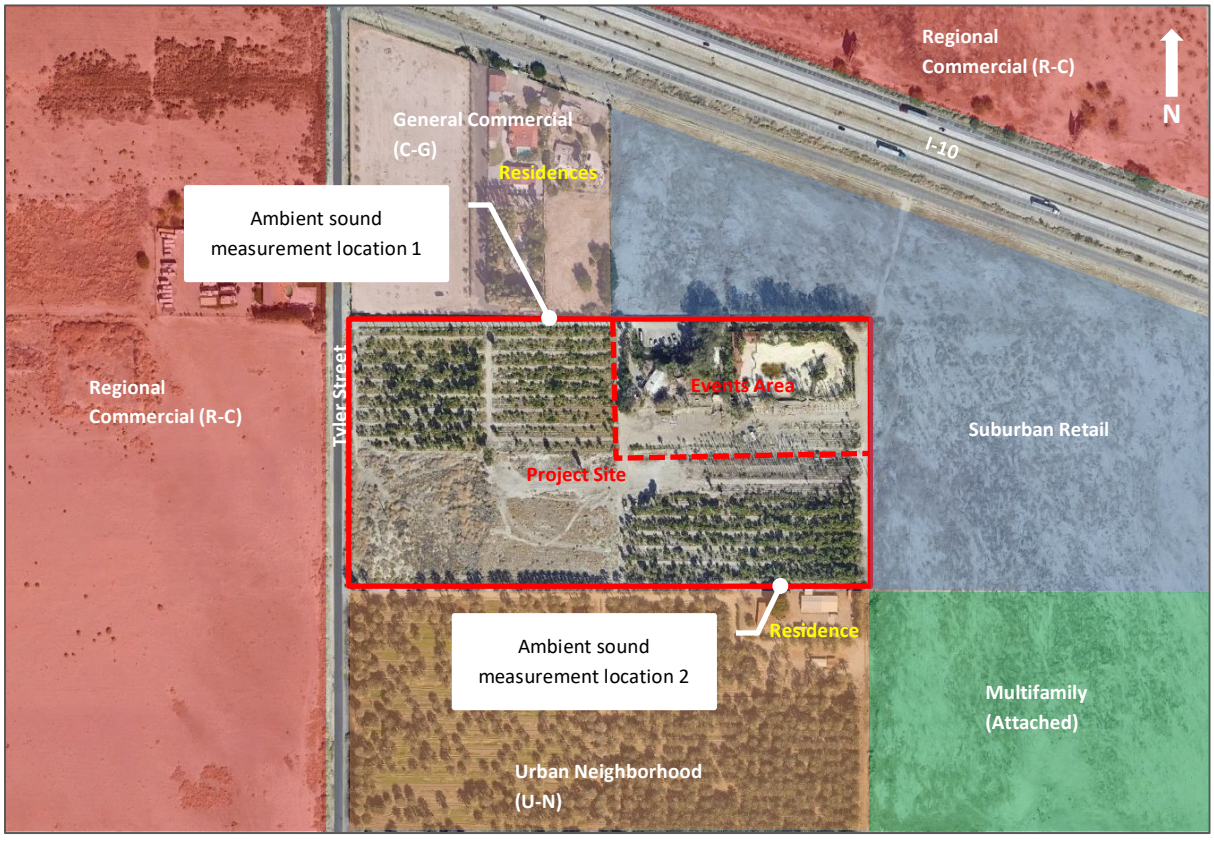

Figure 1 Project location and ambient noise measurement, and nearest residence locations

The project site is bounded on the north by properties zoned as General Commercial and Suburban Retail; on the east by a property zoned as Suburban Retail; on the southeast by a property zoned as Multifamily Residential; on the south by a property zoned as Urban Neighborhood; and on the west by Tyler Street, beyond which a Regional Commercial zone is located. It is noted that residences are located with the General Commercial zone to the north and the Urban Neighborhood zone to the south. The locations of these residences are shown in Figure 1. The events area is located in the northeast quadrant of the project site. A site plan showing the proposed layout is provided in Figure 2.

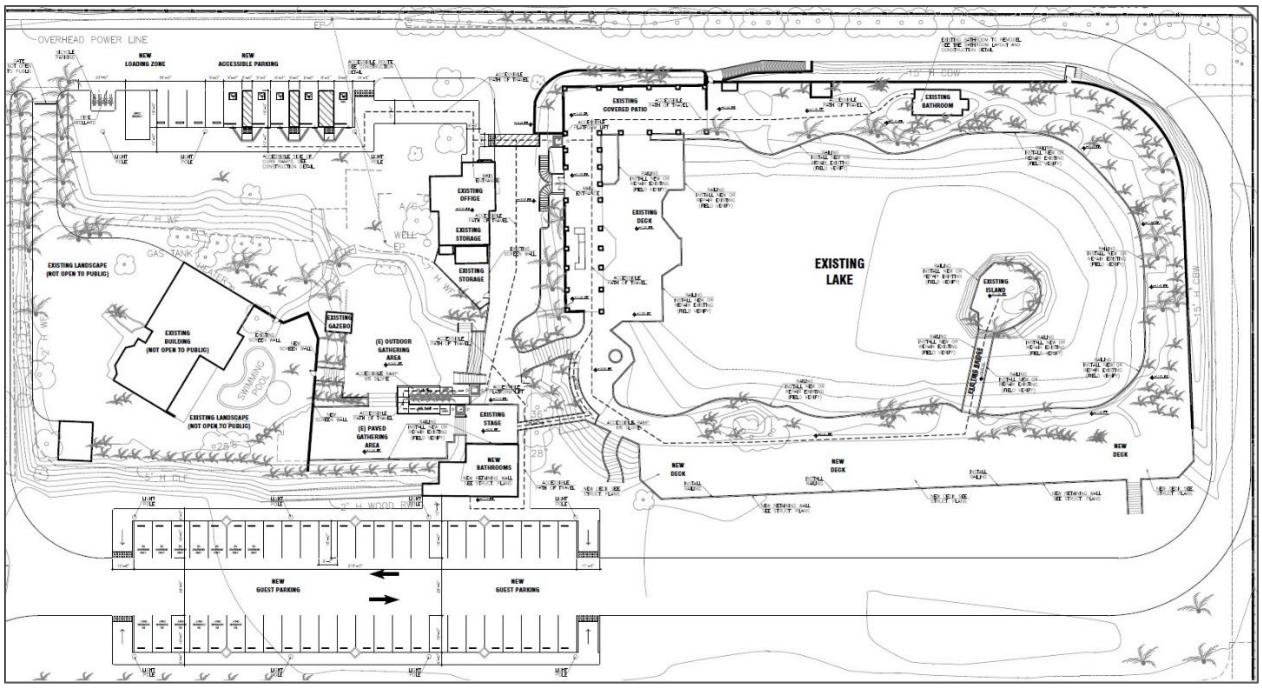

Figure 2 Proposed Coachella Valley Events Center layout

City of Coachella Noise Standards

Chapter 7.04 of the City of Coachella Municipal Code contains exterior sound limits that apply to the project. These limits are provided below:

7.04.030 - Sound level limits as related to fixed noise sources.

A. Regardless of whether an objective measurement by sound level meter is involved, it shall be unlawful for any person to make, continue, or cause to be made or continued, within the city limits any disturbing excessive or offensive noise or vibration which causes discomfort or annoyance to any reasonable person of normal sensitivity residing in the area or that is plainly audible at a distance greater than fifty (50) feet from the sources point for any purpose. The following ten-minute average sound level limits, unless otherwise specifically indicated, shall apply as indicated in the following table as it relates to a fixed noise source or leaf blowers pursuant to Section 7.04.075.

Zone	Time	Applicable Ten-Minute Average Decibel Limit (A-weighted)
Residential—All zones	6:00 a.m. to 10:00 p.m. 10:00 p.m. to 6:00 a.m.	55 45
Commercial—All zones	6:00 a.m. to 10:00 p.m. 10:00 p.m. to 6:00 a.m.	65 55

B. If the measured ambient noise level exceeds the applicable limit as noted in the table in subsection (A) of this section, the allowable average sound level shall be the ambient noise level. The ambient noise level shall be measured when the alleged noise violation sources are not operating.

C. The sound level limit between two zoning districts shall be measured at the higher allowable district.

7.05.020 - Loud or unruly gatherings—Public nuisance.

It shall be unlawful and a public nuisance to conduct a gathering of ten (10) or more persons on any private property in a manner which constitutes a substantial disturbance of the quiet enjoyment of private or public property in a significant segment of a neighborhood, as a result of conduct constituting a violation of law. Illustrative of such unlawful conduct is excessive noise or traffic, obstruction of public streets by crowds or vehicles, public drunkenness, the service of alcohol to minors, fights, disturbances of the peace, litter. A gathering constituting a public nuisance may be abated by the city by all reasonable means including, but not limited to, an order requiring the

gathering to be disbanded and citation and/or arrest of any law violators under any applicable local laws and state statutes.

Noise measurements conducted to determine compliance with the above noise limits are performed at the property line of the property affected by the noise.

In addition to the objective noise limits above, the Municipal Code provides the following subjective noise regulations:

7.04.040 - Prohibited noise generally.

A. It is unlawful for any person or property owner within the city of Coachella to make, cause, or continue to make or cause, loud, excessive, impulsive or intrusive sound or noise that annoys or disturbs persons of ordinary sensibilities.

B. The factors, standards, and conditions that may be considered in determining whether a violation of the provisions of this section has been committed, include, but are not limited to, the following:

1. The level of the noise;
2. The level and intensity of the background (ambient) noise, if any;
3. The proximity of the noise to residential or commercial sleeping areas;
4. The nature, density and zoning of the area within which the noise emanates;
5. The density of inhabitation of the area within which the noise emanates;
6. The time of day and night the noise occurs;
7. The duration of the noise;
8. Whether the nature of the noise is natural or unnatural;
9. Whether the noise is constant, recurrent or intermittent; and
10. Whether the noise is produced by a commercial or noncommercial activity.

The City provides an exemption for outdoor gatherings, public dances, shows and sporting and entertainment events; provided the events are authorized by the city.

To ensure a conservative analysis, and to reduce the possibility of noise disturbances at nearby residences, our analysis assumes that the events center must comply with the residential noise limits at all nearby residences even though the residential properties to the north are within a commercial zone.

It should be noted that this study considers only whether the project complies with the objective noise limits provided in the code.

Existing Noise Environment

Ambient noise in the area is primarily due to traffic on I-10 and nearby surface streets, aircraft and wildlife. Two 24-hour ambient noise measurements were obtained at the north and south property boundaries of the site, at locations representative of the nearest residences.

The measurements were obtained with model SVAN 971 type 1 precision sound level meters manufactured by Svantek, which were calibrated before the measurements. The locations of the measurement are provided in Figure 1. The measurements were obtained from 3:00 pm on April 13, 2024 for a period of 24-hours. Figure 3 provide the 10 minute average noise levels measured at each location for the entire measurement period. Table 3 provides a summary of the results. This table provides the range of measured sound levels for the daytime and nighttime operational hours.

Table 1 Summary of ambient noise measurement results

Location	Time period	Range of 10-minute A-weighted average sound levels (dBA)
Location 1	Daytime operation (11 am to 10 pm)	46.3 to 59.9
	Nighttime operation (10 pm to 2 am)	47.3 to 59.6
Location 2	Daytime operation (11 am to 10 pm)	43.6 to 59.5
	Nighttime operation (10 pm to 2 am)	46.3 to 58.7

Based on the sound measurement data presented in Table 1, an increase to the nighttime noise limits at the nearby residences is permitted. The revised nighttime noise limits are 47.3 dBA at the residences to the north of the site, and 46.3 dBA at the residences to the south of the site. The daytime noise limit remains at 55 dBA.

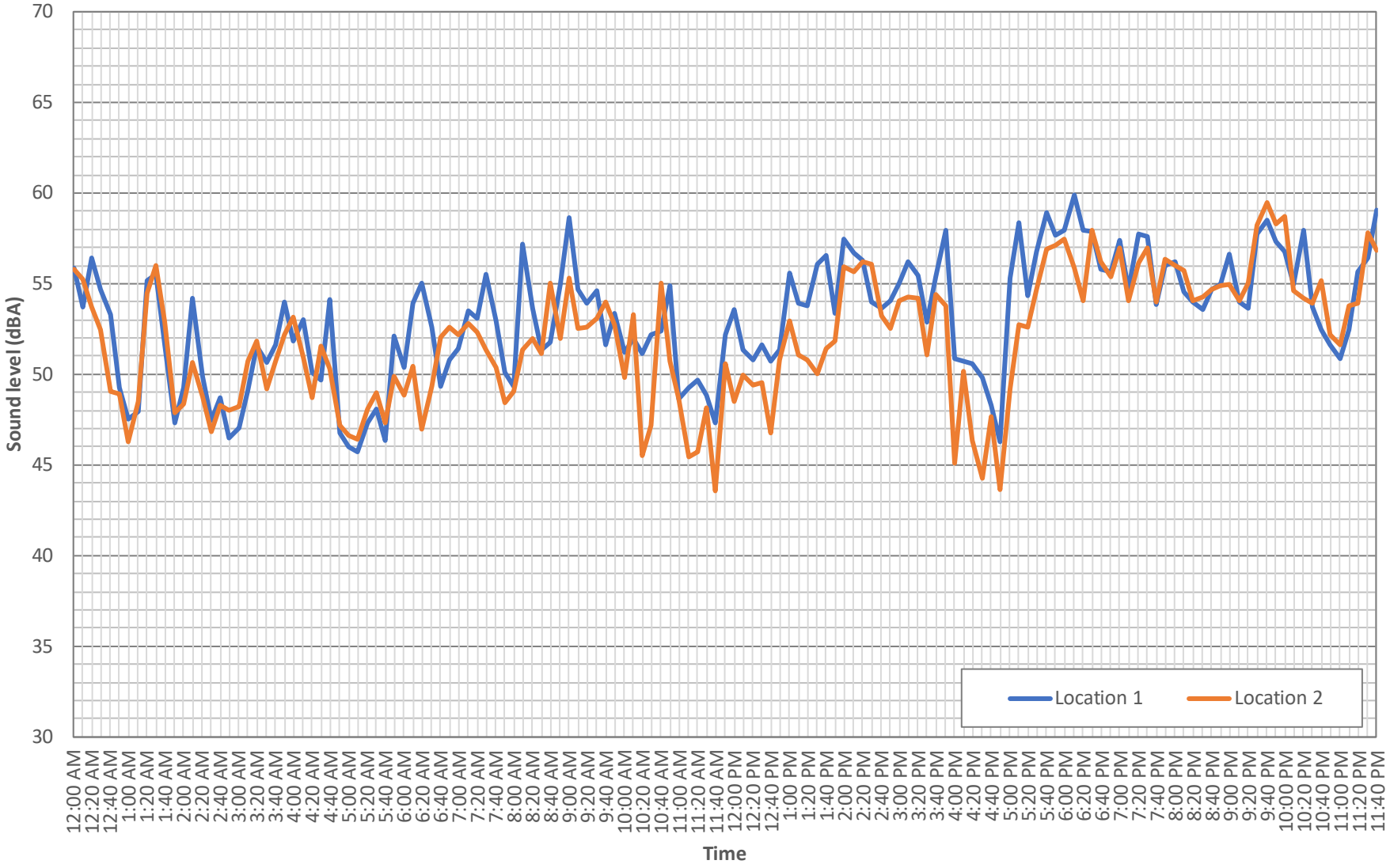

Figure 3 Measured ambient noise levels at project site

Events Center Noise Analysis

The sound sources associated with the project include guests talking at the various onsite congregation areas, amplified music at the stage, and music played though the distributed speaker system around the lake. A computer noise model of the events center was generated to estimate the worst-case noise levels produced by the facility. The worst-case noise levels would occur during a full-capacity event, with guests generating noise through talking and shouting, amplified music at the stage and ambient music played though the speaker system around the lake. It was assumed there will be a maximum of 25 loudspeakers distributed around the edge of the lake (each directed towards the center of the lake) and two loudspeakers at the stage (directed west).

The noise model was constructed using SoundPlan three-dimensional noise modeling software, which takes into account the locations, levels and frequency spectra of the noise sources, and the terrain, buildings and barriers at the site. The model utilized reference sound measurements conducted at similar facilities.

Based on our analysis it was determined that the loudspeakers at the stage will be the greatest contributor of offsite noise. While the noise from guests and distributed speaker system will contribute to overall noise levels, compliance with the City's noise limits can be achieved by controlling noise from the stage alone. Our analysis involved determining maximum sound levels of loudspeakers to ensure compliance with the City's noise limits. The loudspeakers at the stage must produce a sound level no higher than 76 dBA before 10 pm, and no higher than 66 dBA after 10 pm, when measured 25 ft in front of the loudspeakers.

A summary of the results of exterior noise level analysis is provided in Table 2. The data provided in the table demonstrates compliance with the noise limits at all nearby properties during a worst-case event. A noise map showing the worst-case noise levels of an event during the daytime hours (before 10 pm), with implementation of the 76 dBA daytime stage loudspeaker sound level limit, is provided in Figure 4. A noise map showing the worst-case noise levels of an event during the nighttime hours (after 10 pm), with implementation of the 66 dBA nighttime stage loudspeaker sound level limit, is provided in Figure 5.

Table 2 Results of exterior noise level analysis

Location	Daytime Noise Limit (dBA)	Worst-case daytime event noise level (dBA)	Nighttime Noise Limit (dBA)	Worst-case nighttime event noise level (dBA)	City Noise Ordinance Compliance
General commercial zone to north (contains residences)	55	54	47.3	46	Yes
Suburban retail zone to north	65	56	55	51	Yes
Suburban retail zone to east	65	49	55	46	Yes
Multifamily zone to southeast	55	46	46.3	42	Yes
Urban neighborhood zone to south (contains residence)	55	48	46.3	44	Yes
Regional commercial zone to west	65	47	55	38	Yes

Assessment of Impact

With implementation of the noise control measures determined as part of our analysis, the worst-case project operational noise levels will comply with the City's the daytime and nighttime noise limits at all nearby properties.

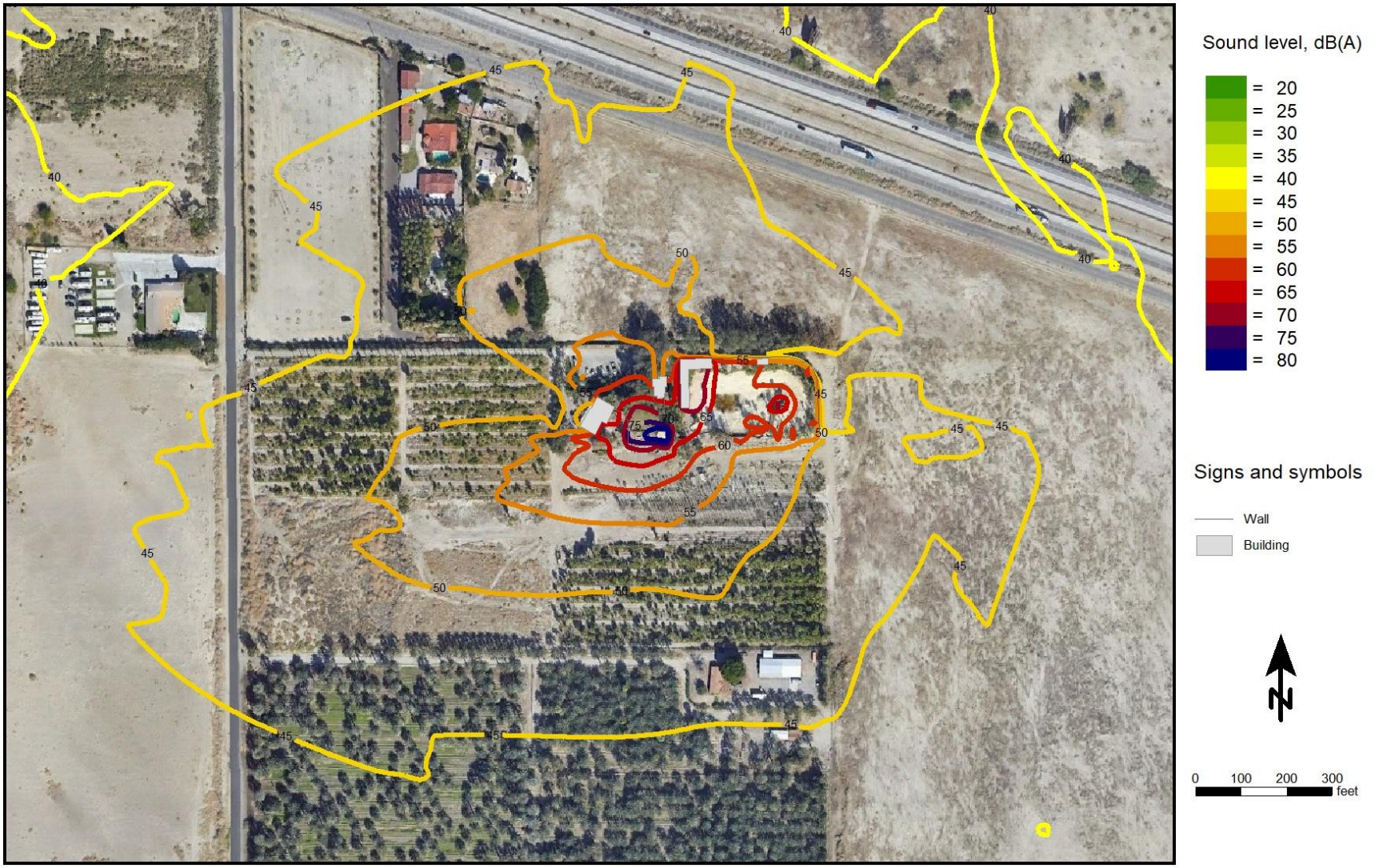

Figure 4 Coachella Valley Events Center daytime worst-case event noise level contour map

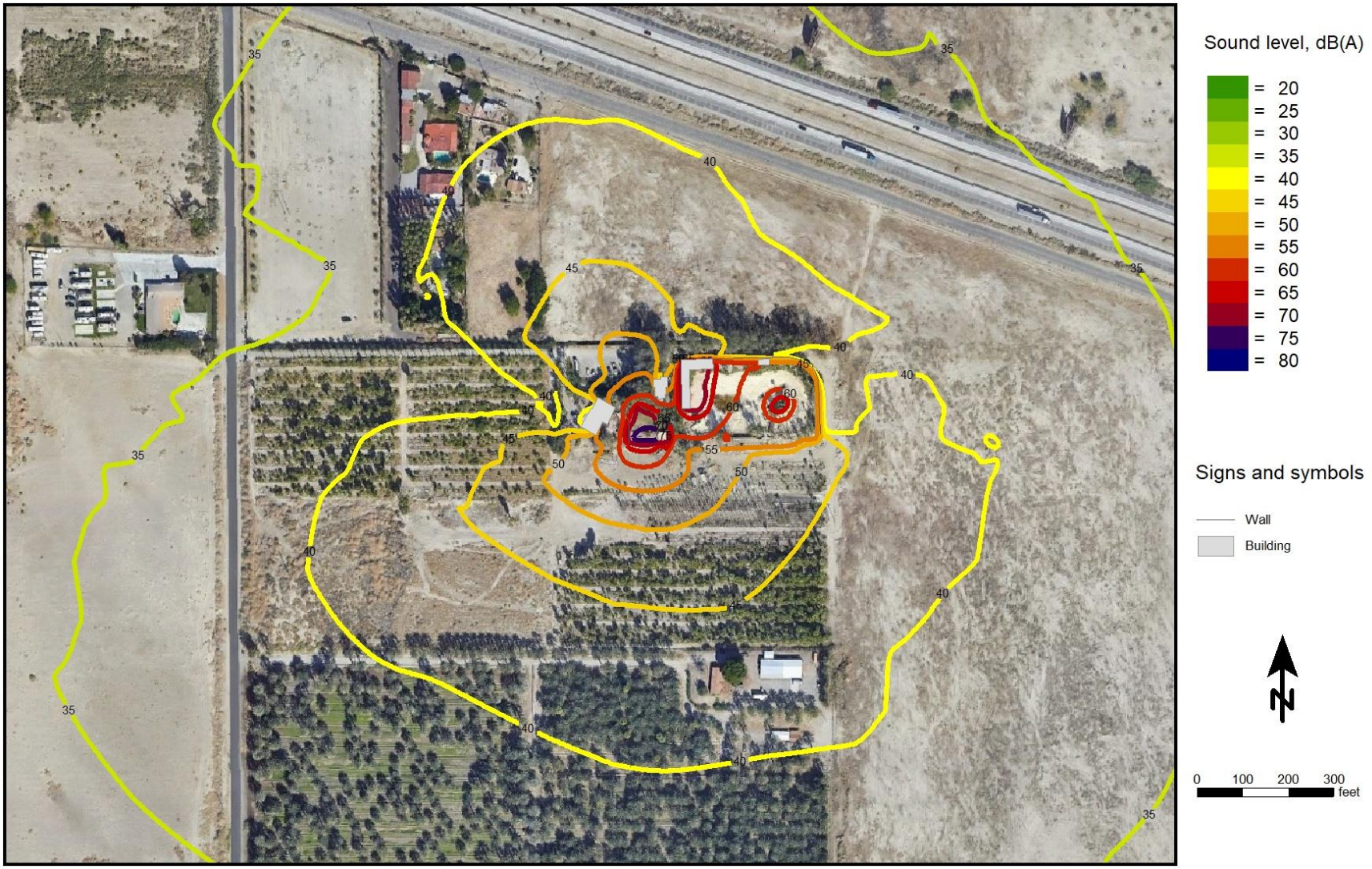

Figure 5 Coachella Valley Events Center nighttime worst-case event noise level contour map

Recommendations

The following noise control recommendations are provided to ensure compliance with the City of Coachella exterior noise limits:

1. The sound level of the music sound system at the stage should be adjusted so that the sound level is no higher than 76 dBA before 10 pm and no higher than 66 dBA after 10 pm when measured at a distance of 25 feet in front of the speakers. The sound system level control should be set so that the speaker sound level cannot exceed this requirement.

2. The sound level of the distributed ambient music sound system around the lake should be adjusted so that the sound level is no higher than 65 dBA at a distance of 5 feet in front of any single loudspeaker. The sound system level control should be set so that the loudspeaker sound level cannot exceed this requirement. The loudspeakers should be oriented so that they are directed towards the center of the lake.

3. Sound levels should be measured during an event to verify that the City's noise limits are not exceeded. At a minimum, sound levels should be measured at the two measurement locations identified in Figure 1. If the event extends beyond 10 pm, measurements should be obtained after this time. If an exceedance of the noise limit is measured, the loudspeaker level limiters should be adjusted down to ensure that the noise limit is achieved. The measurements should be made in accordance with the requirements of the City of Coachella Municipal Code.

Conclusion

This report provides an analysis of the noise levels associated with the proposed Coachella Valley Events Center. Our analysis indicates that, with the implementation of the recommendations included in this report, the operational noise levels will comply with the City's daytime and nighttime Municipal Code noise limits at all nearby properties. Furthermore, the noise levels will be lower than the existing ambient background noise levels in the area.

References

1. Coachella Valley Events Center Architectural Plans, AMC Architectural Studio. April 29, 2024.

Appendix I

Glossary of Acoustical Terms

Glossary of Terms

The following is a list of definitions of terms commonly used in the field of acoustics. Some, or all, of these terms may have been used in the preceding report:

Ambient Noise: The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources both near and far.

Average Sound Level: See Equivalent-Continuous Sound Level.

A-Weighted Sound Level, dB(A): The sound level obtained by use of A-weighting. Weighting systems were developed to measure sound in a way that more closely mimics the ear's natural sensitivity. The A- weighting system is incorporated into the sound level meter to alter its sensitivity relative to frequency so that the instrument is less sensitive to noise at frequencies where the human ear is less sensitive and more sensitive at frequencies where the human ear is more sensitive. (Refer to Figure l-l for typical noise source levels.)

Community Noise Equivalent Level (CNEL): A 24-hour A-weighted average sound level which takes into account the fact that a given level of noise may be more or less tolerable depending on when it occurs. The CNEL measure of noise exposure weights average hourly noise levels by 5 dB for the evening hours (between 7:00 p.m. and 10:00 p.m.), and 10 dB between 10:00 p.m. and 7:00 a.m., then combines the results with the daytime levels to produce the final CNEL value. It is measured in decibels, dB. (Refer to Figure l-2 for typical noise exposure levels.)

CNEL: See Community Noise Equivalent Level.

Day-Night Average Sound Level (DNL or Ldn): A measure of noise exposure level that is similar to CNEL except that there is no weighting applied to the evening hours of 7:00 p.m. to 10:00 p.m. It is measured in decibels, dB. (Refer to Figure I-2 for typical noise exposure levels.)

Daytime Average Sound Level (Leq(12)): The time-averaged A-weighted sound level measured between the hours of 7:00 am to 7:00 pm. It is measured in decibels, dB.

Decay Rate: The time taken for the sound pressure level at a given frequency to decrease in a room. It is measured in decibels per second, dB/s.

Decibel (dB): The basic unit of measure for sound level.

Direct Sound: Sound that reaches a given location in a direct line from the source without any reflections.

Divergence: The spreading of sound waves from a source in a free field, resulting in a reduction in sound pressure level with increasing distance from the source.

Energy Basis: This refers to the procedure of summing or averaging sound pressure levels on the basis of their squared pressures. This method involves the conversion of decibels to pressures, then performing the necessary arithmetic calculations, and finally changing the pressures back to decibels.

Equivalent-Continuous Sound Level (Leq): The average sound level measured over a specified time period. It is a single-number measure of time-varying noise over a specified time period. It is the level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.

For example, a person who experiences an Leq of 60 dB(A) for a period of 10 minutes standing next to a busy street is exposed to the same amount of sound energy as if he had experienced a constant noise level of 60 dB(A) for 10 minutes rather than the time varying traffic noise level. It is measured in decibels, dB.

Fast Response: A setting on the sound level meter that determines how sound levels are averaged over time. A first sound level is always more strongly influenced by recent sounds, and less influenced by sounds occurring in the distant past, than the corresponding slow sound level. For the same non-steady sound, the maximum first sound level is generally greater than the corresponding maximum slow sound level. Fast response is typically used to measure impact sound levels.

Field Impact Insulation Class (IIC): A single number rating similar to the impact insulation class except that the impact sound pressure levels are measured in the field.

Field Sound Transmission Class (FSTC): A single number rating similar to sound transmission class except that the transmission loss values used to derive this class are measured in the field.

FIIC: See Field Impact Insulation Class.

Flanking Sound Transmission: The transmission of sound from a room in which a source is located to an adjacent receiving room by paths other than through the common partition. Also, the diffraction of noise around the ends of a barrier.

Frequency: The number of oscillations per second of a sound wave (i.e., the number of cycles per second). It is measured in hertz. Hz.

FSTC: See Field Sound Transmission Class.

Hertz (Hz): See Frequency.

Hourly Average Sound Level (HNL): The equivalent-continuous sound level, Leq, over a 1-hour time period. It is measured in decibels.

Impact Insulation Class (IIC): A single number rating used to compare the effectiveness of floor/ceiling assemblies in providing reduction of impact-generated sounds such as the sound of a person walking across the upstairs floor.

Impact Noise: The noise that results when two objects collide.

Impulse Noise: Noise of a transient nature due to a sudden impulse of pressure like that created by a gunshot or a balloon bursting.

Insertion Loss: The decrease in sound power level measured at the location of the receiver when an element (e.g., a noise barrier) is inserted in the transmission path between the sound source and the receiver. It is measured in decibels.

Inverse Square Law: A rule by which the sound intensity varies inversely with the square of the distance from the source. This results in a 6 dB decrease in sound pressure level for each doubling of distance from the source.

L_2, L_8, L_{25}, L_{50}: See X-Percentile-Exceeded Sound Level.

Ldn: See Day-Night Average Sound Level.

Leq: See Equivalent-Continuous Sound Level.

Leq(12): See Daytime Average Sound Level.

Lmax: See Maximum Sound Level.

Ln: See X-Percentile-Exceeded Sound Level.

Lpk: See Peak Sound Level.

Masking: The process by which the threshold of hearing for one sound is raised by the presence of another sound.

Maximum Sound Level (Lmax): The greatest sound level measured on a sound level meter during a designated time interval or event. It is measured in decibels.

NC Curves (Noise Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-band spectrum is compared with a set of standard NC curves to determine the NC level of the space.

NIC: See Noise Isolation Class.

NNIC: See Normalized Noise Isolation Class.

Noise: Any unwanted or disagreeable sound.

Noise Criterion Curves: See NC Curves.

Noise Isolation Class (NIC): A single number rating derived from measured values of noise reduction between two enclosed spaces that are connected by one or more partitions. Unlike STC or NNIC, this rating is not adjusted or normalized to a measured or standard reverberation time.

Noise Reduction: The difference in sound pressure level between any two points.

Noise Reduction Coefficient (NRC): A single number rating of the sound absorption properties of a material. It is the average of the sound absorption coefficients at 250, 500, 1000, and 2000 Hz, rounded to the nearest multiple of 0.05.

Normalized Noise Isolation Class (NNIC): A single number rating similar to the noise isolation class except that the measured noise reduction values are normalized to a reverberation time of 0.5 seconds.

NRC: See Noise Reduction Coefficient.

Octave: The frequency interval between two sounds whose frequency ratio is 2. For example, the frequency interval between 500 Hz and 1,000 Hz is one octave.

Octave-Band Sound Level (Octave-Band Level): For an octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

One-Third Octave: The frequency interval between two sounds whose frequency ratio is $2^{1/3}$ (1.26). For example, the frequency interval between 200 Hz and 250 Hz is one-third octave.

One-Third-Octave-Band Sound Level (One-Third-Octave-Band Level): For a one-third-octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

Outdoor-Indoor Transmission Class (OITC): A single number rating used to compare the sound insulation properties of building facade elements. This rating is designed to correlate with subjective impressions of the ability of facade elements to reduce the overall loudness of ground and air transportation noise.

Peak Sound Level (Lpk): The maximum instantaneous sound level during a stated time period or event. It is measured in decibels.

Pink Noise: Noise that has approximately equal intensities at each octave or one-third-octave band.

Point Source: A source that radiates sound as if from a single point.

RC Curves (Room Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-bond spectrum is compared with a set of standard RC curves to determine the RC level of the space.

Real-Time Analyzer (RTA): An instrument for the determination of a sound spectrum.

Receiver: A person (or persons) or equipment which is affected by noise.

Reflected Sound: Sound that persists in an enclosed space as a result of repeated reflections or scattering. It does not include sound that travels directly from the source without reflections.

Reverberation: The persistence of a sound in an enclosed or partially enclosed space after the source of the sound has stopped, due to the repeated reflection of the sound waves.

Reverberation Time (T_{60}): The time required for the sound pressure level of a given frequency in an enclosed or partially enclosed space to decrease by 60 dB after the source of the sound has stopped. It is measured in seconds.

Room Absorption: The total absorption within a room due to all objects, surfaces and air absorption within the room. It is measured in Sabins or metric Sabins.

Room Criterion Curves: See RC Curves.

RTA: See Real-Time Analyzer.

SLM: See Sound Level Meter.

Slow Response: A setting on the sound level meter that determines how measured sound levels are averaged over time. A slow sound level is more influenced by sounds occurring in the distant past that the corresponding fast sound level.

Sound: A physical disturbance in a medium (e.g.. air) that is capable of being detected by the human ear.

Sound Absorption: The process of dissipation of sound energy, and the property of materials and structures to dissipate sound energy.

Sound Absorption Coefficient (α): A measure of the sound-absorptive property of a material.

Sound Insulation: The capacity of a structure or element to prevent sound from reaching a receiver room either by absorption or reflection.

Sound Level: See Sound Pressure Level.

Sound Level Meter (SLM): An instrument used for the measurement of sound level, with a standard frequency-weighting and standard exponentially weighted time averaging.

Sound Power Level: A physical measure of the amount of power a sound source radiates into the surrounding air. It is measured in decibels.

Sound Pressure Level: A physical measure of the magnitude of a sound. It is related to the sound's energy. The terms sound pressure level and sound level are often used interchangeably. It is measured in decibels.

Sound Transmission Class (STC): A single number rating used to compare the sauna' insulation properties of walls, floors, ceilings, windows, or doors. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of speech, radio, television, and similar noise sources in offices and buildings.

Source Room: A room that contains a noise source or sources.

Spectrum: The spectrum of a sound wave is a description of its resolution into components, each of different frequency and usually different amplitude (level).

STC: See Sound Transmission Class.

T_{60}: See Reverberation Time.

Tapping Machine: A device used in rating different floor constructions against impacts. It produces a series of impacts on the floor under test, 10 times per second.

Tone: A sound with a distinct pitch (i.e., a dominant frequency).

Transmission Loss (TL): A property of a material or structure describing its ability to reduce the transmission of sound at a particular frequency from one space to another. The higher the TL value the more effective the material or structure is in reducing sound between two spaces. It is measured in decibels.

White Noise: Noise that has approximately equal intensities at all frequencies. (White noise need not be random noise.)

Windscreen: A porous covering for a microphone, designed to reduce the noise generated by the passage of wind over the microphone.

X-Percentile-Exceeded Sound Level (L_n): The A-weighted sound level equaled or exceeded by a fluctuating sound level x percent of a stated time period. E.g., the letter symbol L_{10}, represents the sound level which is exceeded 10 percent of the stated time period. For a 1-hour measurement, L_{50}, is the sound level exceeded for more than 30 minutes in an hour, L_{25} is the sound level exceeded for more than 15 minutes in an hour. L_8 is the sound level exceeded for more than 5 minutes in an hour, and L_2 is the sound level exceeded for more than 1 minute in an hour.