E. NOISE

This section describes existing noise conditions, criteria for determining the significance of noise impacts, and estimates the likely noise that would result from the project including construction activities, vehicular traffic, and noise from events at the proposed baseball stadium. Where appropriate, mitigation measures are recommended to reduce project-related noise impacts to a less-than-significant level.

Existing setting information is drawn from several sources. Noise measurements taken at similar baseball stadiums and field measurements taken at the project site by LSA staff were also used. This noise assessment follows the City of San Jose's guidelines for the preparation of noise studies, outlined in the City's Noise Element and Municipal Code Noise Control Ordinance.

1. Setting

This section describes the characteristics of sound, the federal, State and City regulations related to noise, and the existing noise sources in and adjacent to the project area.

a. Characteristics of Sound. To the human ear, sound has two significant characteristics: pitch and loudness. A specific pitch can be an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments.

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation or sleep.

Several noise measurement scales exist which are used to describe noise in a particular location. A *decibel* (dB) is a unit of measurement which indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness. Sound intensity is normally measured through the *A-weighted sound level* (dBA). This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Table IV.E-1 shows representative outdoor and indoor noise levels in units of dBA.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6-dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise sensitive receptor of concern.

Table V.E-1: Typical A-Weighted Sound Levels

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Moderate	1/2 as loud
Suburban Street	55	Moderate	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	1/4 as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	1/8 as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing

Source: Compiled by LSA Associates, Inc., 2004.

b. Fundamentals of Noise. Based on the adverse effects of noise, the federal government, the State of California, and many local governments have established maximum allowed noise levels to protect public health and safety and to prevent disruption of certain activities.

Various noise measurements are used to assess the level and the annoyance potential of community noise such as that generated by aircraft activity and arterial traffic. They include:

(1) A-Weighted Sound Level (dBA). The A-weighted sound pressure level is commonly abbreviated dBA. The dB refers to a measurement in decibels. The "A" identifies a particular setting of the measurement instrument, the sound level meter. The A-weighted sound level provides a scale with the range and characteristics most consistent with human hearing ability. The dBA measures sound over a period of time, typically 1 hour, to identify the minimum and maximum levels and the statistical variation of fluctuating sounds.

(2) Continuous Equivalent (Average) Noise Level (L_{eq}). The continuous equivalent (average) noise level is an energy equivalent level of fluctuating noise for a measured time period. Data from this measurement are applied to the 24-hour measurement of noise.

(3) Community Noise Equivalent Noise Level (CNEL) or Day-Night Sound Level (L_{dn}). A given level of noise may be more or less tolerable depending on the time of day and duration of exposure experienced by an individual. The U.S. Department of Housing and Urban Development

(HUD) and the Environmental Protection Agency (EPA) have adopted the L_{dn} as their standard unit of measurement for noise levels. This measure increases the average noise level (L_{eq}) for late evening and early morning hours (10:00 p.m. to 7:00 a.m.) by 10 dBA. The daytime noise levels (7:01 a.m. to 9:59 p.m.) are then combined with these weighted levels and are averaged to obtain a 24-hour averaged noise level. A similar noise scale, the CNEL, which weights noise events in the late evening through early morning (as done for the L_{dn}), as well as noise events occurring between 7:00 p.m. and 10:00 p.m. (increasing them by 5 dBA), is also widely used by jurisdictions concerned with noise. These two noise scales are considered interchangeable in general (if not mathematically).

Noise levels that are less than 40 dBA CNEL/L_{dn} are not considered significant. This threshold is commonly used to assess noise impacts in environmental impact documents. In addition, generally established regulatory standards throughout California do not typically address noise levels that are less than 40 dBA. However, even low levels of noise can be annoying to people when concurrent background noise is very low.

b. Noise Regulatory Framework. The following section provides brief discussions of the federal, State and City regulatory framework related to noise.

(1) U.S. Environmental Protection Agency (EPA). In 1972 Congress enacted the Noise Control Act. This act authorized the EPA to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels) as shown in Table V.E-2. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels. For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to a $L_{eq}(24)$ of 70 dBA. The "(24)" signifies a L_{eq} duration of 24 hours. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels do not exceed 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dBA are summarized in Table V.E-3. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 3.5 meters, and no community reaction would result. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

For the purposes of this EIR, the EPA findings provide a more complete understanding of the issue of noise as well as a context in which to evaluate the proposed project.

(2) State of California. The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the

Table V.E-2: Summary of EPA Noise Levels for Protection of Public Health and Welfare with an Adequate Margin of Safety

Effect	Level	Area
Hearing loss	70 dBA L_{eq}(24)	All areas
Outdoor activity interference and annoyance	55 dBA L_{dn}.	Outdoors in residential areas and farms and other outdoor areas where people spend wildly varying amounts of time and other places in which quiet is a basis for use.
	55 dBA L_{eq}(24)	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoy-ance	45 dBA L_{eq}	Indoor residential areas.
	45 dBA L_{eq}(24)	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," March 1974.

Table V.E-3: Summary of Human Effects in Areas Exposed to 55 dBA Ldn

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dBA margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meters. 99 percent sentence intelligibility (average) at 1.0 meters. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dBA below level of significant complaints and threats of legal action and at least 16 dBA below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

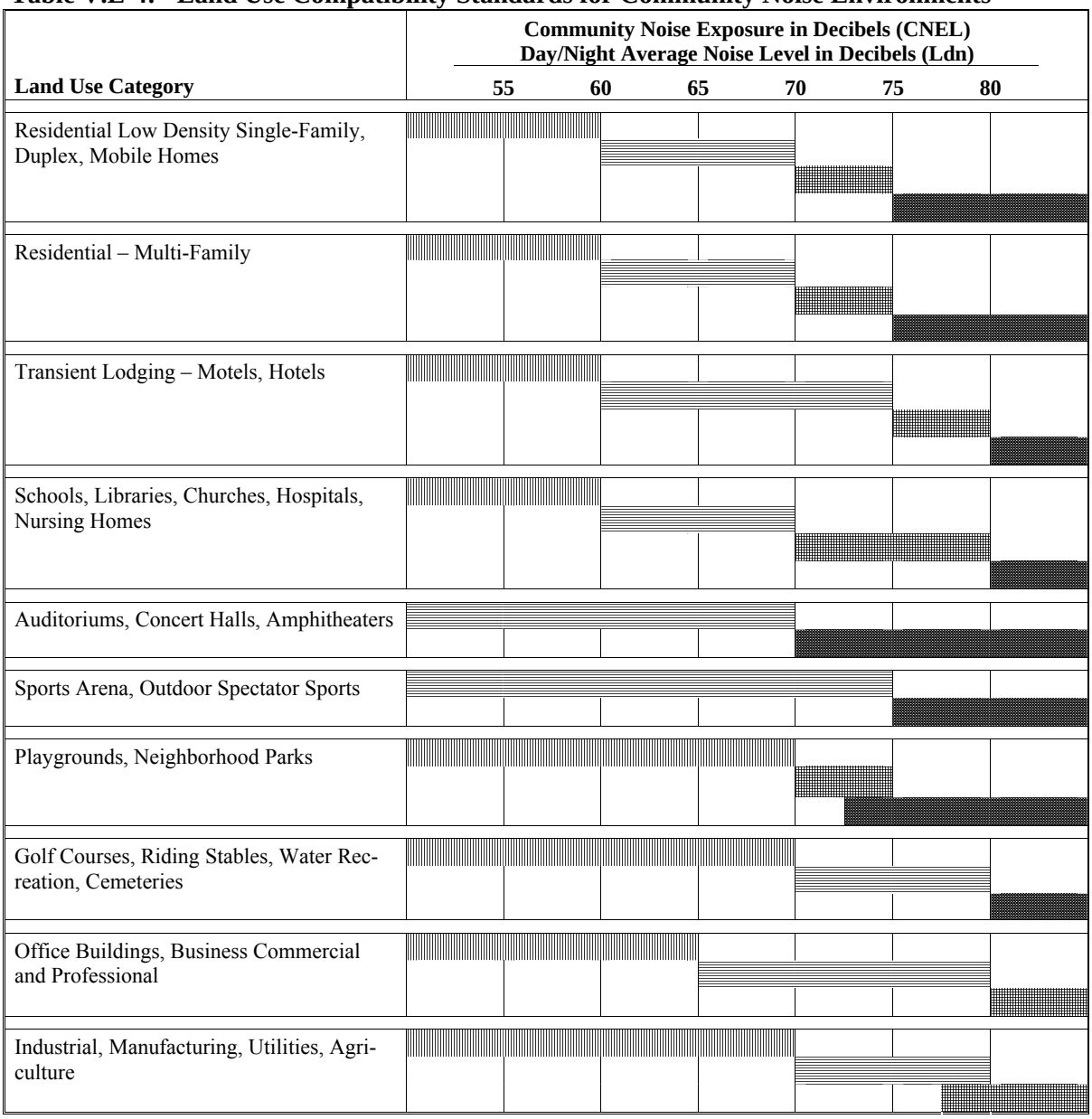
Source: U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," March 1974.

noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in area with exterior noise levels greater than 60 dBA CNEL.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses, as shown in Table V.E-4 below.1 This bar chart also recommends steps to be taken if one of the specified land uses (e.g., a school or church) is proposed for an area exposed

[1] State of California, Governor's Office of Planning and Research, *General Plan Guidelines, 1998* (Appendix A, Figure 2).

Table V.E-4: Land Use Compatibility Standards for Community Noise Environments



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

NORMALLY UNACCEPTABLE
New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development clearly should not be undertaken.

Source: Modified from State of California General Plan Guidelines, June 1987.

to a high noise level (e.g., >85 dBA): "Clearly unacceptable. New construction or development should generally not be undertaken."

(3) City of San Jose. The standards within the San Jose 2020 General Plan Noise Element determine the acceptable noise environment for each land use. For commercial or business office buildings, noise levels up to 60 dBA L_{dn} are acceptable. In areas with noise levels from 60 dBA to 76 dBA L_{dn}, construction of commercial buildings would require acoustic analysis to determine the insulation needed to maintain an indoor level of 45 dBA L_{dn}. A maximum exterior noise level of 76 dBA L_{dn} has been established as the maximum exterior noise level necessary to avoid significant adverse health effects. An interior noise level of 45 dBA L_{dn} has been established for all uses. The Noise Element recognizes that full attainment of noise standards may not be achievable in the environs of the San Jose International Airport, the Downtown Core Area and along major roadways.

c. Sensitive Land Uses in the Project Vicinity. Land uses surrounding the project site consist of residences, commercial buildings/light industrial buildings and railroad lines. The closest sensitive receptors are residential uses located approximately 200 feet to the east of the project boundary. Other residential uses are located west of the project. The construction and operation of the proposed project could significantly affect these surrounding land uses.

d. Existing Noise Environment. The project is located in an urban area and is, therefore influenced by several surrounding noise sources. Primary noise sources that affect the baseline noise level of the area include the following:

- Aircraft noise from the San Jose International Airport located approximately 2.5 miles northeast of the project site.
- Railroad noise from railroad tracks adjacent to the western boundary of the project site as well as the light rail line.
- Vehicle traffic on State Route 87 (SR 87), State Route 280 (SR 280), W. San Carlos Street, Park Avenue and W. San Fernando Street.

(1) Existing Ambient Noise. To document the existing noise environment in the project area and in the vicinity, noise measurements were taken at representative locations. The measurement locations are shown in Figure V.E-1. The measurement data are presented in Table V.E-5.

Table V.E-5: Ambient Noise Monitoring Results Weekday/Weekend

Receptor Location	L_{eq}		L_{min}		L_{max}		Location
1	67.4	60.6	53.7	53.7	81.9	68.9	Four-plex located on Montgomery St.
2	65.7	63.5	50.8	47.6	79.4	81.7	490 Park Avenue
3	67.5	62.9	59.0	51.2	79.4	72.1	193 Laurel Grove Lane
4	70.1	63.7	57.1	49.1	83.2	77.4	691 W. San Carlos St.

Source: LSA Associates, Inc., 2005.

Short term monitoring was used for the analysis of the project to allow for the most accurate comparison of potential stadium events. Monitoring experience has shown that evening short-term L_{eq} measurements are approximately 2-3 dB less than weighted 24-hour L_{dn} measurements. The noise measurements were taken on Monday, December 19th between 2:00-6:00 p.m. and Saturday, January 7, 2006 from 7:00-10:00 p.m. and were made for a period of 15 continuous minutes at each location. The descriptors shown in the tables are maximum (L_{max}) and minimum (L_{min}) levels and the continuous equivalent noise level (L_{eq}).

Figure V.E-1: Noise Monitoring Locations

8x11 B&W

Results of the monitoring indicate noise levels at the project site fall within the acceptable range of up to 75 dBA L_{dn} for outdoor spectator sports as established by the City of San Jose. The residential areas surrounding the project area are generally above normally acceptable noise levels for residential uses established in the General Plan. All monitor sites currently have a L_{max} level that exceed 55 dB due to existing noise sources observed to be airplane flyovers; bus, truck and vehicle traffic on surrounding roadways; and trains on the railroad tracks west of the project site. Additional sources of noise observed during the evening measurements include dogs barking in the residential neighborhoods. Live music from the bar located adjacent to the four-plex located on Montgomery Street affected the results on noise monitoring at that location.

(2) Existing Aircraft Noise Levels. San Jose International Airport is located approximately 2.5-miles northwest of the project site. Noise exposure information in the community is developed for airport operations by the City of San Jose on a quarterly basis, based on current airport operations data and continuously measured noise levels. The project site is located ¼ mile outside of the 65 CNEL contour line from the latest noise monitoring report.[2]

(3) Existing Rail Noise Levels. The rail line used for commuter trains and trolleys borders the project site to the west. Existing noise level from train operations on the project site nearby residential units west of the rail line reach 79 L_{max} based on measurements taken by LSA. Average noise levels measured near rail noise sources were 67.5 L_{eq} dBA.

(4) Existing Traffic Noise Levels. Existing traffic noise levels were calculated using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model. Traffic data used in the model were obtained from the traffic impact analysis prepared by Hexagon Transportation Consultants, Inc. (December 2005). Table V.E-6 lists the calculated traffic noise levels in the project study area under the existing (2005) baseline conditions. Traffic noise in the project vicinity is generally moderate. Peak traffic noise occurs on W. Santa Clara Street between White Street and Delmas Avenue and also Bird Street between W. San Carlos Street and Auzerais Street where traffic noise exceeds 65 dBA L_{dn} at 50 feet from the centerline of the outermost lane. The traffic noise model printouts are included in Appendix E.

2. Impacts and Mitigation Measures

a. Criteria of Significance. A project would normally have a significant effect on the environment related to noise if it would substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project area are the criteria in the City's Noise Element of the General Plan. For the purposes of this project, a noise impact is considered significant if the project results in:

- Exposure of persons to or generation of noise levels in excess of standards established in the San Jose Zoning Ordinance Performance Standards for Noise, San Jose General Plan, or applicable standards of other agencies;

[2] The most recent measurements posted on the Airport Department website are excerpted from the First Quarter Noise Monitoring Report, ending March 31, 2005.

Table V.E-6: Existing Year (2005) Baseline No Project Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 L_{dn} (feet)	Center-line to 65 L_{dn} (feet)	Center-line to 60 L_{dn} (feet)	L_{dn} (dBA) 50 Feet From Outermost Lane
W. Santa Clara St. between White St. and Autumn St.	16,400	<50[a]	87	184	66.7
W. Santa Clara St. between Autumn St. and Delmas Ave.	15,200	<50	83	175	66.4
Autumn St. between W. San Fernando St. and W. Santa Clara St.	2,400	<50	<50	52	58.8
W. San Fernando St. between Autumn St. and Delmas Ave.	2,800	<50	<50	<50	57.1
Park Ave. between Autumn St. and Sunol St.	6,900	<50	<50	67	59.9
Park Ave. between Autumn St. and Delmas Ave.	7,000	<50	<50	68	60.0
Montgomery St./Bird Ave. btwn. Park Ave. and W. San Carlos St.	16,700	<50	65	122	62.6
Bird Avenue between W. San Carlos St. and Auzerais Ave.	21,800	<50	109	224	66.8
Auzerais Ave. between Bird Ave. and Sunol St.	6,400	<50	<50	62	60.6
Auzerais Ave, between Bird Ave. and Josefa St.	4,500	<50	<50	<50	59.1
W. San Carlos St., between Dupont St. and Bird Ave.	16,000	<50	55	114	63.6
W. San Carlos St. Between Bird Avenue and Josefa St.	14,700	<50	<50	108	63.2
Delmas Ave. between Park and Auzerias Avenue	11,300	<50	<50	90	63.1
Delmas Ave. between Park and W. San Carlos St.	6,500	<50	<50	63	60.1

[a] Traffic noise within 50 feet of roadway centerline requires site specific analysis.

Source: LSA Associates, Inc., December 2005.

- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial temporary, periodic, or permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

b. Less-Than-Significant Noise Impacts. Less-than-significant impacts of the proposed project are discussed below.

(1) Aircraft Noise. The project is located approximately 2.5 miles south of the Norman Y. Mineta San Jose International Airport. The Airport Master Plan 2010 Noise Contour Map indicates the project site is located approximately ¼ -mile outside the 65 dBA CNEL contour line. Aircraft noise levels of less than 65 dBA are not considered excessive noise, therefore, the exposure impact to persons on the project site from aircraft noise would be less than significant.

c. Significant Noise Impacts. Significant noise impacts from the proposed project are discussed below.

<u>Impact NOISE-1</u>: Increases in traffic noise to surrounding roadways would be significant. (S)

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions in the vicinity of the project area. Traffic data with the proposed project were obtained from the traffic impact analysis prepared by Hexagon Transportation Consultants, Inc. (December 2005) and used in the noise prediction model. The resultant noise levels were weighted and summed over a 24-hour period in order to determine the L_{dn} values. L_{dn} contours are derived through a series of computerized iterations to isolate the 60, 65, and 70 dBA L_{dn} contour for traffic noise levels in the project area. The traffic noise levels with the project are show in Table V.E-7.

Table V.E-7 shows that all areas of the project area will be exposed to traffic noise levels exceeding the City's normally acceptable range. Results of noise modeling indicate that traffic associated with the project will increase noise on the surrounding roadways from 0.2 dBA to 5.3 dBA. Roadway segments that exceed the 3 dBA threshold (detectable by the human ear) include W. San Fernando Street from Autumn Street to Delmas Avenue and Autumn Street from W. San Fernando Street to W. Santa Clara Street. The traffic noise increases on W. San Fernando Street and Autumn Street represent a significant increase in noise levels.

Mitigation measures typically used to address increases in noise caused by traffic including berms and soundwalls. However, exterior noise mitigation measures would not be feasible along these roadways due to driveway openings and safety concerns. Impacts to exterior areas of residential units along W. San Fernando Street from Autumn Street to Delmas Avenue and Autumn Street from W. San Fernando Street to W. Santa Clara Street would be significant. Implementation of Impact NOISE-1 would reduce the interior noise impacts for residences located along W. San Fernando Street and Autumn Street.

> Mitigation Measure NOISE-1: With affected property owner's consent, prior to opening day of the stadium, the City shall implement measures to reduce significant noise impacts associated with increased traffic for residences located along W. San Fernando Street from Autumn Street to Delmas Avenue or Autumn Street from W. San Fernando Street to W. Santa Clara Street which may include, but are not limited to installation of dual-pane windows, mechanical air conditioning and improved ceiling and wall insulation. (SU)

Impact NOISE-2: Baseball game events could result in noise impacts on adjacent residential uses. (S)

During the baseball game events at the proposed stadium, potential noise impacts would be created. Sources of noise would include the sounds of the crowd cheering, the public address systems, music and firework displays. These are considered isolated peak noises and are not an averaged calculation, such as CNEL measurements. Rather, these types of noise impacts would be most appropriately measured and reported in terms of dBA L_{max} or L_{eq}.

The potential noise impacts from baseball game events would be primarily from the crowd noise from within the proposed stadium. Such noise was evaluated by referencing previous noise analyses that were performed for similar projects. Baseball stadium event noise has been monitored for a number

Table V.E-7: Existing Year (2005) Plus Project Traffic Noise Levels

Roadway Segment	ADT With Project	Change in ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 Feet From Outermost Lane	Increase From Baseline Conditions
W. Santa Clara St. between White St. and Autumn St.	22,100	4,600	<50[a]	105	224	68.0	1.3
W. Santa Clara St. between Autumn St. and Delmas Ave.	21,300	6,100	<50	103	219	67.8	1.4
Autumn St. between W. San Fernando St. and W. Santa Clara St.	8,000	5,600	<50	54	114	64.1	5.3
W. San Fernando St. between Autumn St. and Delmas Ave.	6,100	3,300	<50	<50	60	60.4	3.3
Park Ave. between Autumn St. and Sunol St.	7,800	900	<50	<50	72	60.4	0.5
Park Ave. between Autumn St. and Delmas Ave.	8,200	1,200	<50	<50	75	60.6	0.6
Montgomery St./Bird Ave. between Park Ave. and W. San Carlos St.	21,800	5,100	<50	74	143	63.7	1.1
Bird Ave. between W. San Carlos St. and Auzerais Ave.	25,200	3,400	64	118	246	67.4	0.6
Auzerais Ave. between Bird Ave. and Sunol St.	7,300	900	<50	<50	67	61.2	0.6
Auzerais Ave. between Bird Ave. and Josefa St.	5,600	1,100	<50	<50	57	60.1	1.0
W. San Carlos St., between Dupont St. and Bird Ave.	17,100	1,100	<50	58	120	63.8	.2
W. San Carlos St. Between Bird Avenue and Josefa St.	16,400	1,700	<50	56	116	63.7	.5
Delmas Ave. between Park and Auzerias Avenue	13,700	2,400	<50	<50	102	64.0	.9
Delmas Ave. between Park and W. San Carlos St.	8,100	1,600	<50	<50	73	61.1	1.0

[a] Traffic noise within 50 feet of roadway centerline requires site specific analysis.

Source: LSA Associates, Inc., December 2005.

of facilities that are similar to the proposed project. Specific noise estimates for the new ballpark are based on measurements taken at Qualcomm Stadium[3] at a baseball game with an attendance of approximately 40,000 (slightly less than the design capacity of the propose project at 45,000). Base-ball event noise would general both peak noise and ambient noise.

Peak Baseball Game Noise Analysis (L_{max}). Crowd noise from the project was analyzed using a L_{max}, rather than the 24-hour L_{dn}, because baseball games last approximately three hours and would not occur on a daily basis. Monitoring at Qualcomm was performed during a baseball game in the parking

[3] San Diego, California

lot opposite a break in the outfield barrier that maximized event noise. Results of monitoring are shown in Table V.E-8. Discounting the noise reading that was distorted by a car horn honking, maximum noise from crowd cheering and public address (P.A.) announcements ranged from 71-77 dB L_{max} at approximately 400 feet from the center of the baseball diamond. The average noise or L_{eq} for the game was 64.4 dB. These results also indicate that the ballpark has peak noise events 10 percent of the time, with the remaining 90 percent of the event generating substantially less noise.

Table V.E-8: Summary of Noise Monitoring for Baseball Game, Qualcomm Stadium

Descriptor	dB
Leq	64.4
Lmax	77.0*
Lmin	54.9
L10	64.5
L33	60.8
L50	58.4
L90	56.0

*Maximum noise source due to crowd cheering and PA system.
Source: Giroux & Associates.

The proposed stadium would be relatively open in the outfield portion of the site. To account for the additional 5,000 seat capacity and increased openness which provides direct line of site over the sample data, the peak noise from baseball events at the proposed project is estimated to be approximately 5 dB higher, or 82 dB, 400 feet from the center of the baseball diamond.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound level to attenuate, resulting in a six-decibel reduction in the noise level for each doubling of distance from a single point source of noise to the noise receptor. Other factors influence sound attenuation with distance from a source including atmospheric conditions, background noise levels and buildings located within the line-of-sight from the source.

The closest sensitive receptors are located at a distance of approximately 200 feet from the boundary of the project site, or 750 feet from the center of the baseball diamond. Assuming direct line-of-sight conditions for this receptor and a distance divergence factor (i.e., the diminution of noise resulting from the distance between the source and the receptor) of 5.5 dB, maximum noise levels at this residence would be 76.5 dBA.

For residential receptors located west of the stadium, direct line-of-sight to the stadium will be blocked due to the stadium seating and spectator noise would be projected away from the residential uses to the west. For receptors located west of the stadium, L_{max} would be 68.5 dBA.

P.A. system noise is included in the peak noise estimates. Previous noise analysis for 3Com Park[4] and PETCO Stadium,[5] indicate that P.A. system noise is less than the crowd noise. The P.A. system for the downtown stadium is proposed to be a distributed speaker system, which would utilize speakers located around each section of the park to minimize the need for extra-loud and high-mounted units. Therefore, crowd noise is determined to be the peak noise source from baseball events.

An increase in peak noise sources of 3 dBA or more would be considered a significant impact. As shown in monitoring results from the surrounding residential uses, existing noise at residential uses adjacent to the property currently range from 79.4 dBA to 83.2 dBA due to existing noise sources

[4] San Francisco, California

[5] San Diego, California

such as planes, trains and automobiles. The proposed project would generate peak noises during baseball game events that are lower than existing peak noises from other sources.

Ambient Baseball Game Noise Analysis (L_{eq}). A significant impact would occur if a substantial temporary, periodic, or permanent increase in ambient noise levels in the project vicinity were to be created above levels existing without the project. Existing ambient noise measurements, in terms of L_{eq} were measured for both weekday late afternoon conditions and weekend evening conditions. A comparison of existing and project conditions shown in Table IV.E-9. Results indicate that predicted L_{eq} will be considered significantly higher than the prevailing ambient noise during the weekend evening baseball game events at Receptors 1 and 2. As shown in Figure V.E-1, Receptor 1 represents a multi-family housing unit located north of the project site, while Receptor 2 represents housing units located along S. Park Avenue.

Referencing Table V-E-2, the interior noise level established by the EPA required to protect public health is 45 dBA L_{eq} for residential uses. Standard residential structures in northern California provide an exterior-to-interior noise reduction of 25 dBA with windows closed and 15 dBA with windows open. Based on the analysis, several residential sites in the project area would be exposed to noise levels that would exceed the criteria with windows open. Therefore, in order for residential uses located within the 60 dBA L_{eq} contour line shown in Figure V.E-2, windows and doors would need to remain closed to meet the interior noise standard.

The project shall implement the following mitigation measure to reduce the impact of ambient noise sources from stadium events.

> Mitigation Measure NOISE-2a: The stadium public address system shall be comprised of a distributed speaker system on-site, which would locate speakers around each section of the park to minimize the need for extra-loud and high-mounted units.
>
> Mitigation Measure NOISE-2b: Prior to the first ballpark event, a detailed acoustic study shall be conducted by the City of San Jose to confirm the predictions of the long-term noise levels at noise sensitive uses within the 60 dBA L_{eq} contour line shown in Figure V.E-2 of the ballpark, which have been made in this EIR. The study shall be used to determine noise attenuation measures to achieve a 45 dBA L_{eq} interior noise level at nearby residences. Attenuation measures at the stadium shall include, but not be limited to, distributed speakers for the public address system and limitations placed on sound levels associated with various activities. Measures taken with affected property owner's consent, at receptor locations may include, but are not limited to installation of dual-pane windows, mechanical air conditioning, sound walls and improved ceiling and wall insulation.
>
> Necessary remedial measures shall be implemented, or otherwise assured to be implemented within one year to the satisfaction of the City Manager. Implementation of mitigation measures NOISE-1a and NOISE-1b would reduce impacts associated with baseball games. However, impacts would remain significant and unavoidable. (SU)

Impact NOISE-3: Proposed on-site concert events could result in noise impacts on adjacent residential uses. (S)

Table V.E-9: Existing and With Project Ballgame Event Noise Levels

Receptor	Location	Existing L_{eq}	Existing L_{max}	Project Noise Level (dBA)		Project & Existing Noise Level (dBA)	
				Hourly L_{eq}	Maximum Level	Hourly L_{eq}	Change From Existing Hourly L_{eq}
1	Four-plex located on Montgomery St.	60.6	68.9	64.4	76.5	65.4	4.8
2	490 Park Avenue	63.5	81.7	64.4	76.5	67.4	3.9
3	193 Laurel Grove Lane	62.9	72.1	56.4	68.5	63.9	1.0
4	691 W. San Carlos Street	63.7	77.4	40.4	58.5	63.7	0.0

Source: LSA Associates, Inc., 2005.

The proposed stadium is expected to have two event seating configurations. One configuration would be for ballgames the other would be for concerts. Concert configuration would not necessarily increase the number of seats as seating in the grandstands would be eliminated due to the limited views of the stage. The stage would potentially be located in the outfield and speakers would be oriented towards the southwest. It is anticipated that twelve concert events would occur at the stadium each year. Anticipated crowd levels would vary with event. Some concerts would be held using less than the stadium's full seating capacity, while others could potentially use the maximum seating capacity. The noise effects of amplified music would be noticeably different from baseball game event noise.

Peak Noise During Concert Events. For outdoor concerts for which the attraction is rock or other popular music, typical noise levels for a mixing board located approximately 100 feet from the stage is 95 dB. Amplifiers for concerts would be located at field level. Concerts at the proposed downtown stadium would be unique for outdoor music in that the stadium would provide a barrier behind the audience that would reduce the speaker volume needed to achieve the same sound effect in a completely open outdoor environment and would reduce off-site sound migration. Under this concert configuration the stadium stands and the people in them would absorb a substantial amount of the acoustic energy. However, noise would spill over to the surrounding areas.

Using a 10 dBA reduction to account for attenuation from the ballpark structure and other noise absorption and a distance divergence factor (the reduction in noise due loss of energy from the source with distance) of 12 dB, music noise and the nearest residence with a direct line-of-sight (Receptor 2) would be 73 dB L_{max}, which is less than the maximum noise level for a baseball game.

Ambient Noise During Concert Events. Based on monitoring results from baseball games (and reiterating that baseball games are quiet 90 percent of the time) noise peaks are caused by public address system announcements or crowd cheering. Unlike baseball events, concert noise typically has a higher hourly L_{eq} because music from the speaker system is louder and more continuous than crowd cheers. Based on results of the Environmental Noise Model (ENM) for the San Francisco Giants Ballpark which proposed open air concerts with similar crowd capacity, the hourly L_{eq} would be 6 dB less than the L_{max} for concert noise.[6]

[6] San Francisco Giants Ballpark at China Basin, Draft Environmental Impact Report. City of San Francisco. 1997.

Figure V.E-2 shows the distribution of average concert noise into the surrounding area. The figure illustrates how noise from events at the downtown stadium would be a function of the intensity of the noise and the design factors, such as attenuation from the stadium itself. The nearest residence (Receptor 2) located east of the project site would experience an hourly L_{eq} from concert noise of 67 dBA. This represents a 3.5 dBA increase over existing L_{eq} conditions measured between the hours of 7:00 p.m. to 10:00 p.m.

One criterion of significance for the proposed stadium would define a significant impact to exist if the project would increase the ambient noise levels in the project vicinity more than 3 dBA over levels existing without the project. Existing noise during evening hours in the project area as documented by field surveys ranges from 60.6 to 63.7 dBA L_{eq}. Baseball games at the proposed stadium significantly increase the L_{eq} in the surrounding neighborhoods located directly north and east of the project site. Potential noise from concerts at the stadium could also significantly increase the noise levels in the area particularly during the hours of 7:00 p.m. to midnight which are considered noise sensitive hours.

> Mitigation Measure NOISE-3: A maximum sound level of 95 dB L_{eq} shall be maintained at the sound board for concerts.
>
> Implementation of the multipart mitigation measures NOISE-1 and NOISE-2 would reduce impacts from concert noise. However, noise impacts would be significant and unavoidable. (SU)

Impact NOISE-4: Explosions associated with fireworks displays at the proposed project would create significant peak noise impacts. (S)

Fireworks require a City permit and are exempt from noise ordinance standards (as they are such short term events). General Plan Noise Standards are based on 24-hour averages and therefore fireworks are exempt from noise element standards. However, explosive noise sources such as fireworks can be disturbing to residents. Because the explosions associated with firework displays occur in high in the air, explosions can be heard from five to ten miles from the source, depending on the type of fireworks. In general, explosions from fireworks would be very short in duration, however they would be louder than other sources of noise from the stadium such as concert noise or crowd noise.

The proposed stadium currently does not have a proposed schedule for firework displays. However, ballparks typically have a three minute mini-display at the end of each ballgame, several longer shows for special nights that do not exceed ten minutes, and an occasional major show that may last for up to 30 minutes, such as might occur on the 4th of July. Fireworks display *time of occurrence* is generally more intrusive than the *magnitude of the noise*. Typically, the larger shows would be conducted in conjunction with earlier ballgame starting times and noise events after 10:00 p.m. would be infrequent and of reasonably short duration. However, because firework displays are often shown at the end of a ballgame or events, it is not possible to determine the exact timing of the displays due to the possibility of extra inning games. Isolated explosive noise associated with fireworks displays could occur and would constitute a significant noise impact.

Implementation Mitigation Measure NOISE-2b would reduce impacts from firework displays for residences located adjacent to the proposed stadium. Implementation of the Mitigation Measure NOISE-2b would help to minimize this impact but not reduce it to a less-than-significant level. (SU)

(1) Short-Term Construction Noise. Noise levels from construction activities such as grading and building erection for the proposed project may range up to 91 dBA L_{max} at 50 feet from the active construction area for a limited time period.

The transport of workers and construction equipment and materials to the project area would incrementally increase noise levels on existing access roads leading to the area. Noise from passing trucks (87 dBA L_{max} at 50 feet) would be similar to existing truck-generated noise. Short-term intermittent noise from trucks would be minor and less than significant when averaged over a longer time period. In addition, noise associated with on-road vehicles is regulated by the federal and State governments and is exempt from local government regulations.

Noise generated during excavation, grading, and building erection on the project area would result in potential noise impacts to off-site uses and to on-site uses if they were to occupy a site while later phases of construction were continuing. Existing tenants in the project vicinity may also experience short-term noise generated by construction equipment and activities in the project area when construction occurs near the project boundary.

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table V.E-8 lists typical construction equipment noise levels recommended for use in noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. Typical construction noise levels vary up to a maximum of 91 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of a site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backhoes, bulldozers, draglines, and front loaders and earthmoving and compacting equipment, which includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by 3 to 4 minutes at lower power settings.

Table V.E-10: Typical Construction Equipment Noise Level

Type of Equipment	Range of Sound Levels Measured (dBA at 50 feet)	Suggested Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	68 to 80	77
Dozers	85 to 90	88
Tractors	77 to 82	80
Front-End Loaders	86 to 90	88
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 86	86
Trucks	81 to 87	86

Source: Bolt, Beranek & Newman 1987. Noise Control for Buildings and Manufacturing Plants.

Construction of the proposed project is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, and pickup trucks. As shown in Table V.E-10, the typical maximum noise level

Figure V.E-2: Event Noise Contour

8x11 color

back of Figure V.E-2

generated by each earthmover on a proposed project site is assumed to be 88 dBA L_{max} at 50 feet from the operating earthmover. The maximum noise level generated by water and pickup trucks is approximately 86 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength would increase the noise level by 3 dBA. Assuming each piece of construction equipment operates at some distance apart from the other equipment, the worst-case combined noise level at the nearest residences during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area.

Pile driving may be required, which could generate noise levels above 90 dBA L_{max} and ground vibration. Noise associated with pile driving is a very loud and impulsive sound, resulting from a large hammer that drops on steel or reinforced concrete piles. Individual noise impacts are of short duration (under one second), but the noise is repetitive, occurring about once every two seconds. Pile driving also generates vibration that is perceptible at a distance of 100 feet but would not generally be expected to cause damage to other properties. (The potential exception to this rule would be historic structures, as discussed in this chapter, in Section J, Cultural Resources.)

Impact NOISE-5: Construction period activities could create significant short-term noise impacts. (S)

Implementation of the following mitigation measures would reduce the impact to a less-than-significant level.

Mitigation Measure NOISE-5a: The following measures shall be implemented during construction of the proposed project:

- All construction vehicles or equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers.
- City will develop a Construction Impact Mitigation Plan with input from neighbors to determine a construction activity schedule including construction days and hours of construction.
- Unnecessary idling of internal combustion engines will be prohibited.
- All stationary noise generating construction equipment, such as air compressors and portable power generators, will be located as far as practical from existing residences.

Mitigation Measure NOISE-5b: In the event that pile-driving and/or other extreme noise generating construction vehicles or equipment are required, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. These attenuation measures shall include as many of the following control strategies as feasible and shall be implemented prior to any pile-driving or extreme noise generating activities:

- Implement "quiet" pile-driving technology, where feasible, in consideration of geotechnical and structural requirements and conditions;
- Utilize noise control blankets on the building structure as it is erected to reduce noise emission from the site;
- Evaluate the feasibility of noise control at the receptor(s) by temporarily improving the noise reduction capability of those buildings; and

- Monitor the effectiveness of noise attenuation measures by taking noise measurements once the measures are in place.
- Residents within 1,000 feet of the pile-driving activity will be notified of the schedule for their use while they are in use. Portable acoustical barriers will be installed around pile driving equipment.
- A name, address, and phone number of a contact person will be posted on the site to handle noise complaints.

Implementing the basic measures required by Mitigation Measure NOISE-5a would reduce potential impacts from construction activities. In addition, Mitigation Measure NOISE-5b will further reduce the potential impacts from pile driving activities and other extreme noise generating construction activities in the vicinity of the construction site. However, even with the implementation of these mitigation measures, noise associated with the construction of the proposed project would be considered significant and unavoidable. (SU)