

I. NOISE

This section describes existing noise conditions in the vicinity of the site, describes criteria for determining the significance of noise impacts, and estimates the likely noise that would result from the proposed project. Where appropriate, mitigation measures are recommended to reduce project-related noise impacts to a less-than-significant level.

1. Setting

The setting section begins with an introduction to several key concepts and terms that are used in evaluating noise. It then explains the various agencies that regulate the noise environment in the City of Benicia and summarizes key standards that are applied to proposed development. This setting section concludes with a description of current noise sources that affect the project site and the noise conditions that are experienced at the project site vicinity.

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 that are used to describe noise in a particular location. A *decibel* (dB) is a unit of measurement that 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 3.0 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3.0 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, and 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.I-1 shows representative outdoor and indoor noise levels in units of dBA.

Noise impacts can be described in three categories. The first is audible impacts, which refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater, since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Table IV.I-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	Reference Level
Near Freeway Auto Traffic	70	Moderately Loud	
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., 2005.

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 is. 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. There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

Another noise scale often used together with the L_{max} in noise ordinances for enforcement purposes is noise standards in terms of percentile noise levels. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level: half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

b. Noise Regulatory Framework. The following section summarizes the regulatory framework related to noise, including federal, State and City of Benicia plans, policies and standards.

(1) U.S. Environmental Protection Agency (EPA). In 1972 Congress enacted the Noise Control Act, authorizing 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 IV.I-2. The EPA cautions that these identified levels are not standards because they do not take into account cost or feasibility.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dB. The “(24)” signifies an 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 are below 55 dBA and 45 dBA, respectively.

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

(2) State of California. The State of California has established regulations that help

Table IV.I-2: Summary of EPA Noise Levels

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

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

Table IV.I-3: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB 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 dB below level of significant complaints and threats of legal action and at least 16 dB 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, 1974. “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March.

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 and/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 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 an 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. However, the City has adopted and modified the State’s land use compatibility guidelines, as discussed below.

(3) City of Benicia General Plan. The City of Benicia addresses noise in both the Noise Element of the General Plan¹ and in Chapter 8.20 and 15.28 of the Municipal Code². The following are the City of Benicia’s Goals, Policies and Programs from the Noise Element of the General Plan that relate to the proposed project. The Noise Element of the General Plan adopts the “Maximum Allowable Noise Exposure for New Noise Sensitive Uses From Transportation Noise Sources” chart which is shown in Table IV.I-4 and the “Maximum Allowable Noise Exposure for New Noise-Sensitive Uses From Stationary Noise Sources” chart, which is shown in Table IV.I-5.

Transportation Noise Sources

- *Table 4-3 (see Table IV.I-4)* provides specific standards for determining the compatibility of proposed noise-sensitive land uses with transportation noise sources. Where noise-sensitive projects are proposed within areas which exceed the standards contained in Table 4-3 [reference Table IV.I-4], it is necessary to prepare a report that (a) performs an analysis of noise impacts, and (b) recommends mitigation measures to reduce noise levels on the site to comply with the standards in Table 4-3 [reference Table IV.I-4]. This table is only to be used with proposed projects; the City’s noise ordinance governs noise associated with existing uses.

Stationary Noise Sources

- *Table 4-4 (see Table IV.I-5)* provides specific performance standards for determining the compatibility of proposed noise-sensitive land uses with stationary noise sources. The performance standards are for new noise-sensitive developments which may be affected by an existing stationary noise source. The performance standards also apply to new developments that include a stationary noise source which may affect an existing noise sensitive development.

¹ City of Benicia General Plan, 1999. Chapter 4. Community Health and Safety, D. Noise

² Benicia Municipal Code, 2006, Chapter 8.20 and 15.28. August 1.

- The intent of these performance standards is both to prevent new noise sources from encroaching on existing noise-sensitive developments and to prevent new noise sensitive developments from encroaching on existing uses. Noise sources evaluated relative to the performance standards in Table 4-4 [reference Table IV.I-5] should be considered with respect to their standard daily or weekly operating conditions. Noise sources may produce unusual noise levels due to temporary equipment malfunction, or unusual atmospheric conditions. Noise levels associated with these infrequent conditions are exempt from the performance standards contained in Table 4-4 (see Table IV.I-5). In addition, the performance standards are not to be applied to safety signals or warning devices. In the event an acoustical study is required of a sponsor, refer to Appendix I: “Requirements for an Acoustical Analysis.”

Table IV.I-4: Maximum Allowable Noise Exposure for New Noise Sensitive Uses From Transportation Noise Sources

Land Use	Outdoor Activity Areas ^a	Interior Spaces	
	L _{dn} /CNEL, dB	L _{dn} /dB	L _{eq} /dB ^b
Residential	60 ^c	45	—
Transient Lodging	65 ^d	45	—
Hospitals, Nursing Homes	60 ^c	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls	60 ^c	—	40
Office Buildings, Commercial Uses, Industrial, Manufacturing, Utilities ^e	—	—	45
Schools, Libraries, Museums	60 ^c	—	45
Playgrounds, Neighborhood Parks	65	—	—

- ^a Where the location of outdoor activity areas is unknown, or does not exist, the exterior noise level standard will be applied to the property line of the receiving land use. Refer to glossary for definition of outdoor activity area.
- ^b As determined for a typical worst-case hour during periods of use.
- ^c Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. If these noise levels cannot be complied with, this will constitute a significant environmental impact.
- ^d In the case of hotel/motel facilities or other transient lodging, with no proposed outdoor activity areas such as pool areas, only the interior noise level criterion will apply.
- ^e Standards would only apply to areas requiring good speech intelligibility such as offices, conference rooms, etc.
- Source: City of Benicia General Plan, 1999. Chapter 4: Community Health and Safety, D. Noise

Table IV.I-5: Noise Level Performance Standards for Noise-Sensitive Land Uses Which May Be Affected by Stationary Noise Sources

Land Use	Exterior Hourly L _{eq} , dB		Interior Hourly L _{eq} , dB	
	Daytime	Nighttime	Daytime	Nighttime
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Residential	55	50	40	35
Transient Lodging	55	50	40	35
Hospitals	—	—	40	35
Nursing Homes	55	50	40	35
Theaters, Auditoriums	—	—	35	35
Churches	55	50	40	40
Schools	55	50	45	45
Libraries	55	50	45	45

Source: City of Benicia General Plan, 1999. Chapter 4: Community Health and Safety, D. Noise

The City of Benicia's General Plan includes the following policy applicable to the proposed project.

Noise

- *Community Noise Policy 4.23.5:* Accommodate roadway improvement projects for build-out of the General Plan by recognizing that existing noise-sensitive uses may be exposed to increased noise levels from roadway repairs, increased traffic, and increased travel speeds. When it is not practical to reduce traffic noise levels to those in Table 4-4 [reference Table IV.I-5], the following criteria will be used as a test of significance for the environmental review of roadway improvement projects:
 - (a) Where existing noise levels are less than 60 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant;
 - (b) Where existing noise levels range between 60 and 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 3 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant; and
 - (c) Where existing noise levels are greater than 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 1.5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant.

The City of Benicia's Municipal Code³ further defines the guidelines for control of noise sources within the city limits of Benicia. The codes that are of particular significance as they relate to this project are outlined as follows.

- *8.20.120 Schools, hospitals and churches.* It is unlawful for any person to create any noise on any street, sidewalk or public place adjacent to any school, institution of learning or church while the same is in use, or adjacent to any acute hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such street, sidewalk or public place indicating the presence of a school, church or hospital. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-204).
- *8.20.140 Machinery, equipment, fans and air conditioning.* It is unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-206).
- *8.20.150 Construction of buildings and projects.* It is unlawful for any person within a residential zone, or within a radius of 500 feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of any one day and 7:00 a.m. of the next day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless beforehand a permit therefore has been duly obtained from the city manager or his designee. No permit shall be required to perform emergency work as defined in BMC 8.20.020. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-301).

³ Benicia Municipal Code Chapter 8.20 noise Regulations

- *8.20.190 Ambient base noise level.* Where the ambient noise level is less than designated in this section the respective noise level in this section shall govern.

- *8.20.200 Excessive noise prohibited.*
 - A. Notwithstanding any other provision of this chapter, and in addition thereto, it shall be unlawful for any person to willfully make or continue, or cause to be made or continued, any loud, unnecessary, or unusual noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.
 - B. The standards which shall be considered in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:
 - 1. The level of the noise;
 - 2. The intensity of the noise;
 - 3. Whether the nature of the noise is usual or unusual;
 - 4. Whether the origin of the noise is natural or unnatural;
 - 5. The level and intensity of the background noise, if any;
 - 6. The proximity of the noise to residential sleeping facilities;
 - 7. The nature and zoning of the area within which the noise emanates;
 - 8. The density of the inhabitation of the area within which the noise emanates;
 - 9. The time of day or night the noise occurs;
 - 10. The duration of the noise;
 - 11. Whether the noise is recurrent, intermittent, or constant; and
 - 12. Whether the noise is produced by a commercial or noncommercial activity. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-601).

- *Excavating, grading and filling – Regulations.* The following regulations shall apply to all excavating, grading and filling: All grading and noise there from, including, but not limited to, warming of equipment motors, shall be limited to the hours between 7:00 a.m. and 6:00 p.m., Monday through Saturday, unless other times are specifically authorized in writing by the city engineer for special circumstances

- c. Existing Noise.** Primary noise sources in the City of Benicia and the effects of resulting noise levels are described below.

(1) Existing Vehicular Traffic Noise Levels. Vehicular traffic is a major source of ambient noise levels in urban settings. The major sources of noise affecting the project site include Lake Herman Road, East 2nd Street, and Reservoir Road. The traffic noise levels for roadway segments around the project site are listed in Table IV.I-6 below. This table was generated from data including roadway traffic volumes, vehicle speeds, and roadway geometry, using the Federal Highways Administration (FHWA) Highway Traffic Noise Prediction Model. Existing noise levels along select roadway segments in the vicinity of the project site (at 50 feet outward from the roadway center line) range from 52.3 dBA CNEL to 66.3 dBA CNEL. According to noise exposure contours in the City's General Plan⁴, traffic noise levels from I-680 reach 60 dBA L_{dn} for only a small portion of the extreme northeast section of the project site. Because noise associated with vehicles on I-680 does not significantly contribute to high noise levels on the project site, noise from this roadway is not further analyzed in this section.

⁴ City of Benicia General Plan, 1999.

(2) **Existing Railroad Noise Levels.** The Southern Pacific Railroad line passes approximately ½-mile to the east of the proposed project site. The railroad line is located on the south-eastern side of Interstate 680 (I-680), the opposite side of the freeway from the project site. Due to the distance and location of the railroad line from the site, ambient noise levels at the project site are not significantly affected by railroad operations.

(3) **Existing Aircraft Noise Levels.** Oakland International Airport is located approximately 27 miles south of the project site. Buchanan Field Airport is located approximately 6 miles south of the project site. Napa County Airport is located approximately 6 miles to the northwest of the project site. Travis Air Force Base is located approximately 10 miles northeast of the project site. According to the Travis Air Force Base Land Use Compatibility Plan (June 2002)⁵, the project site is located outside of the 60 dBA noise contours associated with airport flight paths. Due to the project site’s distance and flight path orientation from these airports, the noise effect from aircraft noise sources is less than significant for the project site in terms of 24 hour averaged noise levels such as CNEL or L_{dn}.

(4) **Other Ambient Noise Sources.** Other ambient noise sources in the vicinity of the project site include the City’s firing range located approximately ¾-mile to the west of the site. Noise from the firing range may be audible on the project site; however due to the distance from the site and intermittent nature of the firing range noise sources, noise effects from the firing range on the project site are not significant.

Table IV.I-6: Existing (2006) Baseline Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
East 2nd St. - Lake Herman Rd. to Park Rd.	5,400	< 50 ^a	< 50	107	63.9
East 2nd St. - Park Rd. to Industrial Way	6,100	< 50	54	115	64.4
East 2nd St. - Industrial Way to Rose Dr.	7,400	< 50	63	132	64.5
East 2nd St. - Rose Dr. to I-780 WB On Ramp	11,100	< 50	82	172	66.3
East 2nd St. - I-780 EB On Ramp to Military St.	13,300	< 50	60	128	65.1
Lake Herman Rd. - East 2nd St. to Reservoir Rd.	1,300	< 50	< 50	< 50	57.7
Lake Herman Rd. - Reservoir Rd. to Sky Valley Rd.	3,000	< 50	< 50	72	61.4
Lake Herman Rd. - Sky Valley Rd. to Columbus Pkwy	3,200	< 50	< 50	75	61.6
Reservoir Rd. - Lake Herman Rd. & East 2nd St.	1,900	< 50	< 50	54	59.4
Industrial Way - East 2nd St. to Park Rd.	3,200	< 50	< 50	< 50	58.9
Park Rd. - East 2nd St. to Industrial Way	700	< 50	< 50	< 50	52.3
Park Rd. - Industrial Way to Bayshore Rd.	7,400	< 50	< 50	87	62.6

^a Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Source: LSA Associates Inc., September 2006

⁵ Travis Air Force Base, 2002. Travis Air Force Base Land Use Compatibility Plan. Figure 2B Noise Contours. June 13.

2. Impacts and Mitigation Measures

a. Criteria of Significance. A project would have a significant noise effect 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 site are the State's noise criteria, the City of Benicia's Noise Element of the General Plan, and applicable sections of the City's Municipal Code. For the purposes of this project, a noise impact is considered significant if the project would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance (see Tables IV.I-4 and IV.I-5), or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above the levels existing without the project;

b. Less-Than-Significant Noise Impacts. The following noise types/sources would produce less-than-significant noise effects at or near the project site.

(1) **Vibration Impacts.** Specific tenants for proposed industrial and commercial uses have not yet been identified as part of the project. However, based on proposed land uses, the project would not contain perceptible sources of long-term ground borne vibration. Therefore ground borne vibration impacts from the project would be less than significant for people working or residing within or near the project site.

(2) **Railroad Noise.** The project site is located approximately ½-mile northwest of the Southern Pacific Railroad line. The rail line runs along the eastern side of I-680, while the proposed project is located on the western side of I-680. Due to the distance of the proposed project from the rail line, significant impacts from railroad noise sources would not affect the project site. Noise level impacts from railroad sources for people working within the project site would be less than significant.

c. Significant Noise Impacts. The following noise sources would produce significant noise levels at or near the project site.

(1) **Construction Period Impacts.** The project site is currently surrounded by open space, commercial buildings and industrial land uses. Project construction would result in short-term noise impacts on these adjacent land uses. The level and types of noise impacts that would occur during construction are described below.

Impact NOI-1: Construction period activities could create significant short-term noise impacts on adjacent industrial/commercial properties and on buildings that would become occupied within the project site before completion of the entire project. (S)

Noise levels from construction activities such as finished 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 site would incrementally increase noise levels on access roads leading to the site. Noise impacts from trucks would occur on the site for the duration of the construction period. Workers and construction equipment would use existing access routes. Noise from passing trucks (87 dBA L_{max} at 50 feet) would be similar to existing truck-generated noise.

Table IV.I-7: 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.*

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

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. Grading on the site would be substantial (involving 9,000,000 cubic yards of soil). Pile drivers and rock drills are not expected to be used on a regular basis during construction. As shown in Table IV.I-7, the typical maximum noise level generated by each earthmover at the 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 commercial and industrial uses to the site during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area. The closest residences are located on a hill more than 1,000 feet east of the proposed Industrial Way extension and more than 1,000 feet north of East 2nd Street. Another close sensitive receptor is the Northgate Christian Fellowship church, located at 2201 Lake Herman Road. The church is located more than 1,000 feet from the nearest construction area within the project site. The City's standards do not permit construction on Sundays or evenings, when the church facility would typically be in use; therefore, construction of the proposed project would have a less-than-significant noise impact on the church. Other receptors of construction related noise would be the industrial properties located along East 2nd Street and Industrial Drive, and properties that would be occupied on the site before construction is complete.

Implementation of the following four-part mitigation measure for project construction within 500 feet of existing buildings in the vicinity of the project site or buildings at the project site that are occupied

before the completion of total project construction would reduce potential construction period noise impacts to less-than-significant levels:

Mitigation Measure NOI-1a: During all project site excavation and on-site grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

Mitigation Measure NOI-1b: The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

Mitigation Measure NOI-1c: The construction contractor shall locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

Mitigation Measure NOI-1d: The construction contractor shall ensure that all general construction related activities are restricted to the hours of 7:00 a.m. and 10:00 p.m.; with the exception of all excavating, grading, and filling activity, which shall be restricted to the hours of 7:00 a.m. and 6:00 p.m. Monday through Saturday. (LTS)

(2) **Operational Period Impacts.** Significant long-term noise impacts that could be experienced as a result of the project include increased traffic noise levels along Lake Herman Road, East 2nd Street, Reservoir Road, and Park Road. Depending on where buildings are situated and how they are constructed, the interior of some buildings and associated outdoor spaces may experience noise levels that exceed appropriate noise standards.

Impact NOI-2: Implementation of the proposed project would increase traffic noise levels at the project site and surrounding areas. (S)

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the project site. The resultant noise levels were weighed and summed over a 24-hour period in order to determine the CNEL values. The existing and future traffic volumes for roadway segments in the project vicinity were used in the traffic noise impact analysis. Table IV.I-8 shows the Existing (2006) Plus Project Traffic Noise Levels adjacent to the roadway segments at the project site vicinity. Tables IV.I-9 and IV.I-10 show the predicted Cumulative and the Cumulative Plus Project Traffic Noise Levels.

Modeling results indicate that some roadway segments would experience a significant increase in traffic noise levels for both the Existing Plus Project scenario and the Cumulative Plus Project scenario.

Off-Site Traffic Noise Impacts. Noise traffic levels greater than 65 dBA CNEL are in excess of the City's General Plan policies for the following land uses: residential, transient lodging, hospitals, nursing homes, churches, meeting halls, schools, libraries, museums, playgrounds, and neighborhood parks. There are not currently any of these land use types within the impacted range of the traffic noise contours of the described roadway segments. The closest residences are located on a hill more than 1,000 feet east of the proposed Industrial Way extension and more than 1,000 feet north of East 2nd Street. Another close sensitive receptor is the Northgate Christian Fellowship church, located at 2201 Lake Herman Road. The church is located approximately ¼ mile north

Table IV.I-8: Existing Plus Project Traffic Noise Levels

Roadway Segment	ADT	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Baseline Conditions
East 2nd St. - Lake Herman Rd. to Park Rd.	19,300	54 <u>56</u>	116	248	69.4 <u>68.7</u>	5.5 <u>4.8</u>
East 2nd St. - Park Rd. to Industrial Way	11,700	< 50 ^a	83 <u>84</u>	178	67.3 <u>66.5</u>	2.9 <u>2.1</u>
East 2nd St. - Industrial Way to Rose Dr.	31,700	77	161	345	70.8	6.3
East 2nd St. - Rose Dr. to I-780 WB On Ramp	25,000	66	138	295	69.8	3.5
East 2nd St. - I-780 EB On Ramp to Military St.	13,300	< 50	60 <u>62</u>	128 <u>129</u>	65.1 <u>64.4</u>	0.0 <u>-0.7</u>
Lake Herman Rd. - East 2nd St. to Reservoir Rd.	13,800	< 50	93 <u>94</u>	199	68.0 <u>67.2</u>	10.3 <u>9.5</u>
Lake Herman Rd. - Reservoir Rd. to Sky Valley Rd.	15,900	< 50	102	218	68.6	7.2
Lake Herman Rd. - Sky Valley Rd. to Columbus Pkwy	16,000	< 50	102	219	68.6	7.0
Reservoir Rd. - Lake Herman Rd. & East 2nd St.	11,200	< 50	81	173	67.1	7.7
Industrial Way - East 2nd St. to Park Rd.	7,400	< 50	< 50	87 <u>88</u>	62.6 <u>61.8</u>	3.7 <u>2.9</u>
Park Rd. - East 2nd St. to Industrial Way	2,400	< 50	< 50	< 50	57.7	5.4
Park Rd. - Industrial Way to Bayshore Rd.	13,300	< 50	60	128	65.1	2.5

^a Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.

Source: LSA Associates Inc., September 2006

Table IV.I-9: Cumulative Without Project Traffic Noise Levels

Roadway Segment	ADT	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
East 2nd St. - Lake Herman Rd. to Park Rd.	7,800	< 50 ^a	64	136	67.7 <u>65.5</u>
East 2nd St. - Park Rd. to Industrial Way	8,300	< 50	66	142	67.7 <u>65.8</u>
East 2nd St. - Industrial Way to Rose Dr.	10,100	< 50	77	162	67.8 <u>65.9</u>
East 2nd St. - Rose Dr. to I-780 WB On Ramp	15,000	< 50	99	210	69.5 <u>67.6</u>
East 2nd St. - I-780 EB On Ramp to Military St.	18,000	< 50	73	157	68.4 <u>66.4</u>
Lake Herman Rd. - East 2nd St. to Reservoir Rd.	1,800	< 50	< 50	52	61.4 <u>59.1</u>
Lake Herman Rd. - Reservoir Rd. to Sky Valley Rd.	4,300	< 50	< 50	92	65.2 <u>62.9</u>
Lake Herman Rd. - Sky Valley Rd. to Columbus Pkwy	4,500	< 50	< 50	94	65.3 <u>63.1</u>
Reservoir Rd. - Lake Herman Rd. & East 2nd St.	2,700	< 50	< 50	67	63.0 <u>60.9</u>
Industrial Way - East 2nd St. to Park Rd.	4,500	< 50	< 50	63	62.4 <u>60.4</u>
Park Rd. - East 2nd St. to Industrial Way	900	< 50	< 50	< 50	55.4 <u>53.4</u>
Park Rd. - Industrial Way to Bayshore Rd.	10,500	< 50	52	41 <u>110</u>	66.1 <u>64.1</u>

^a Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.

Source: LSA Associates Inc., September 2006

Table IV.I-10: Cumulative Plus Project Traffic Noise Levels

Roadway Segment	ADT	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Cumulative Conditions
East 2nd St. - Lake Herman Rd. to Park Rd.	21,000	59	123	263	69.8 <u>69.0</u>	.5 <u>3.5</u>
East 2nd St. - Park Rd. to Industrial Way	8,500 <u>16,500</u>	< 50 ^a	105	224	68.8 <u>68.0</u>	2.2
East 2nd St. - Industrial Way to Rose Dr.	36,100	83	176	377	71.4	5.5
East 2nd St. - Rose Dr. to I-780 WB On Ramp	7,3 <u>37,900</u>	86	181	389	71.6	4.0
East 2nd St. - I-780 EB On Ramp to Military St.	18,000	< 50	75	158	65.7	0 <u>-0.7</u>
Lake Herman Rd. - East 2nd St. to Reservoir Rd.	13,800	< 50	94	199	67.2	8.9 <u>8.1</u>
Lake Herman Rd. - Reservoir Rd. to Sky Valley Rd.	17,100	< 50	107	229	68.9	6.0
Lake Herman Rd. - Sky Valley Rd. to Columbus Pkwy	15,000	< 50	98	210	68.3	5.2
Reservoir Rd. - Lake Herman Rd. & East 2nd St.	12,000	< 50	84	181	67.4	6.5
Industrial Way - East 2nd St. to Park Rd.	8,700	< 50	< 50	98	62.5	2.9 <u>2.1</u>
Park Rd. - East 2nd St. to Industrial Way	100 <u>2,100</u>	< 50	< 50	< 50	57.1	3.7
Park Rd. - Industrial Way to Bayshore Rd.	13,800	< 50	62	132	65.3	1.2

^a Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Source: LSA Associates Inc., September 2006

of Lake Herman Road. At these distances, the increase in traffic noise level along these roadway segments would be less than significant.

A significant impact would occur if the project would expose sensitive receptors to a 3 dBA increase in ambient noise levels. The roadway segment of Lake Herman Road between East 2nd Street and Reservoir Road would experience the greatest increase in traffic noise levels, at ~~40.3~~ 9.5 dBA over existing conditions. The existing noise level of 57.7 dBA CNEL would increase to ~~68.0~~ 67.2 dBA CNEL within 50 feet of the centerline of the outermost travel lane. The other segments of Lake Herman Road would also experience a significant increase in traffic noise levels with an increase of up to 6.0 dBA for the Cumulative Plus Project scenario. The only sensitive receptor on this roadway segment is the Northgate Christian Fellowship church located at 2201 Lake Herman Road. The church is located approximately 1,000 feet from the centerline of the outermost travel lane. At this distance, the modeled future-plus-project traffic noise level would only be 42 dBA. Therefore, noise impacts associated with project-related traffic on the church would be less than significant.

Road segments of East 2nd Street could also experience a significant increase in traffic noise levels. The cumulative noise model with the project shows the traffic noise levels along East 2nd Street between Lake Herman Road and Park Road could increase to ~~69.8~~ 69.0 dBA CNEL, a ~~4.3~~ 3.5 dBA increase over Cumulative Without the Project scenario. The segment from Industrial Way to Rose Drive would experience a 5.5 dBA increase to 71.4 dBA CNEL for Cumulative Plus Project traffic

noise levels. However, land uses along these segments are industrial and commercial land uses and are not considered sensitive receptors.

The segment of Park Road from East 2nd Street to Industrial Way would also be exposed to an increase in traffic noise levels of up to 3.7 dBA for Cumulative Plus the Project traffic predictions. This would expose buildings within 50 feet of the centerline of the outermost travel lane to noise levels up to 57.1 dBA CNEL. However, the only land uses along these segments are industrial and commercial land uses, which are not considered sensitive receptors.

~~In summary, because there are no noise sensitive receptors within the noise contour areas for these roadway segments, the increased traffic noise levels would result in a less than significant impact for off site receptors.~~

The segment of East 2nd Street from I-780 to Rose Drive could also experience a significant increase in traffic noise levels. The cumulative noise model for the project shows that traffic noise levels along East 2nd Street could increase to 71.6 dBA CNEL at 50 feet from the centerline of the outermost travel lane, a 4.0 dBA increase over the Cumulative Without Project scenario. Construction of a sound barrier at least 8 feet high along the property/right-of-way line would reduce the traffic noise impacts to sensitive receptors along this roadway segment to a less-than-significant level. The use of rubberized asphalt along the roadway segment, as an alternate mitigation measure, would also be effective in reducing traffic noise levels to a less-than-significant level. Rubberized asphalt reduces traffic noise through its porous and ductile qualities (refer to the following study for more information: Bollard and Brennan, Inc., 1999. *Report on the Status of Rubberized Asphalt., Traffic Noise Reduction in Sacramento County*. Prepared for Sacramento County Public Works Department.).

Mitigation Measure NOI-2a: For existing unprotected residential and school land uses along East 2nd Street from I-780 to Rose Drive, **one** (or more) of the following measures shall be implemented:

- A sound barrier at least 8 feet high shall be constructed along the property/right-of-way line of sensitive receptors along this roadway segment; or
- Rubberized asphalt shall be used to resurface the entire identified roadway segment.

On-Site Traffic Noise Impacts. Noise traffic levels greater than 65 dBA CNEL are in excess of the City's General Plan regulations for the following land uses: residential, transient lodging, hospitals, nursing homes, churches, meeting halls, schools, libraries, museums, playgrounds and neighborhood parks. Hotels are planned for the eastern section of the project site near the intersection of Lake Herman Road and East 2nd Street. The hotels would be required to meet the interior noise level of 45 dBA CNEL (see Table IV.I-4 sub-note 4). If the hotel construction includes outdoor activity areas, measures would need to be implemented to ensure these areas meet the 65 dBA CNEL exterior noise level requirement for outdoor activity areas. This could be achieved through various options. All outdoor activity areas could be located so that the hotel building prevents direct exposure to both Lake Herman Road and East 2nd Street. Placement of buildings to shelter outdoor activity areas could result in as much as a 15 dBA reduction, which would reduce the exterior noise level in the associated activity areas to below 65 dBA CNEL.

A second option would be to locate the outdoor activity areas of the hotels at the project site so that they are at a distance greater than 93 feet from the centerline of the outermost travel lane of Lake Herman Road and a distance greater than 122 feet from the centerline of the outermost travel lane of East 2nd Street. At these distances the traffic noise levels would be below 65 dBA CNEL and would meet the City's noise standards.

A third option would be to construct a noise barrier, a sound wall or sound wall/berm combination, around all outdoor activity areas. For all outdoor activity areas located within 57 feet of the centerline of the outermost travel lane of East 2nd Street, the construction of a 8-foot-high sound wall or sound wall/berm combination would provide at least a 5 dBA noise reduction for ground-floor level areas facing the road when the direct line of sight to the traffic is blocked. For outdoor activity areas located between 57 and 122 feet of the centerline of the outermost travel lane of East 2nd Street, the construction of a 6-foot-high sound barrier would reduce the noise impact to be less than significant.

Based on City standards, planned hotel buildings as well as office/industrial facilities with areas that require good speech intelligibility, such as offices or conference rooms, must be constructed to maintain an interior noise level of 45 dBA CNEL. Using the EPA's Protective Noise Levels (EPA 550/9-79-100, November 1978), with a combination of walls, doors, and windows, standard construction for northern California buildings would provide more than 25 dBA in exterior to interior noise reduction with windows closed and 15 dBA or more with windows open. For all buildings constructed within 199 feet of the centerline of the outermost travel lane of Lake Herman Road and within 263 feet of the centerline of the outermost travel lane of East 2nd Street, rooms with direct exposure to these roadway segments would not meet the interior noise standard with windows open. Therefore, a form of noise-attenuated ventilation systems, such as air conditioning systems, would be required to ensure that windows can remain closed for a prolonged period of time.

Implementation of the following multi-part mitigation measure would reduce noise levels to below the exterior noise threshold of 65 dBA CNEL and the interior noise threshold of 45 dBA CNEL:

Mitigation Measure NOI-2b: For all hotels built at the project site that include outdoor activity areas, **one** (or more) of the following measures shall be implemented:

- All hotel outdoor activity areas shall be located so that they are completely sheltered by the hotel building from direct exposure to both Lake Herman Road and East 2nd Street; or
- All hotel outdoor activity areas shall be located at a distance greater than 93 feet from the centerline of the outermost travel lane of Lake Herman Road and also at a distance greater than 122 feet from the centerline of the outermost travel lane of East 2nd Street; or
- A sound barrier at least 8-feet-high shall be constructed around all outdoor hotel activity areas that are located within 57 feet of the centerline of the outermost travel lane of the East 2nd Street roadway segment; a 6-foot-high sound barrier shall be constructed around all outdoor activity areas located between 57 feet and 122 feet from the centerline of the outermost travel lane of the East 2nd Street roadway segment.

Mitigation Measure NOI-2c: If a sound study confirms that the interior noise level without sound-attenuated ventilation systems would exceed the City's standards, sound-attenuated ventilation systems, such as air conditioning, shall be installed in all buildings that require good speech intelligibility (as outlined in sub-note 5 of Table IV.I-4) for buildings located as follows:

- Within 199 feet from the centerline of the outermost travel lane of Lake Herman Road;
- Within 263 feet from the centerline of the outermost travel lane of East 2nd Street.

Implementation of these mitigation measures would sufficiently mitigate traffic noise levels to comply with the City's General Plan requirements and thus reduce the traffic noise impact of the project to a less- than-significant level. (LTS)