4.11 NOISE

This section discusses the fundamentals of sound; examines the pertinent federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; evaluates potential noise impacts associated with the Project, and provides feasible mitigation measures to reduce noise impacts at noise-sensitive locations.

A. Background

This section begins with a discussion of the fundamental concepts of environmental acoustics.

1. Noise Descriptors

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as “noisiness” or “loudness.”

The following are brief definitions of terminology used in this section:

- Sound. A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- Noise. Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- Decibel (dB). A unitless measure of sound on a logarithmic scale.
- A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- Equivalent Continuous Noise Level (L_{eq}). The mean of the noise level, energy averaged over the measurement period.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L50 level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L10 level, likewise, is the value that is exceeded 10 percent of the time (i.e. near the maximum) and this is often known as the "intrusive sound level." The L90 is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

2. Characteristics of Sounds

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate the human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The normal range of human hearing extends from approximately 0 dBA (the threshold of detection) to 140 dBA (the threshold of pain).

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale to better account for the large variations in pressure amplitude (the above range of human hearing, 0 to 140 dBA, represents a ratio in pressures of one hundred trillion to one). All noise levels in this study are relative to the industry-standard pressure reference value of 20 micropascals. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 4.11-1 presents the subjective effect of changes in sound pressure levels.

Sound is generated from a source and the decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as spreading loss or distance attenuation.

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. For example, L_{50} is the noise level that is exceeded 50 percent of the time. Similarly, the L_{02}, L_{08}, and L_{25} values are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with community noise measurements. The L_{eq} metric is a single-number noise descriptor of the energy-average sound level over a given period of time. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values are the minimum and maximum root-mean-square (RMS) noise levels obtained over the stated measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and nighttime hours, state law requires that, for planning purposes and to account for this increased receptiveness of noise, an artificial decibel increment is to be added to quiet-time noise levels to calculate the 24-hour CNEL noise metric.

3. Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire

TABLE 4.11-1 **CHANGE IN APPARENT LOUDNESS**

± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen 2009.

system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g. speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Table 4.11-2 shows typical noise levels from noise sources.

4. Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is the velocity, and the rate of change of the speed is

TABLE 4.11-2 **TYPICAL NOISE LEVELS**

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: CalTrans, 2009. *Loudness Comparison Chart (dBA)*. http://www.dot.ca.gov/dist2/projects/sixer/loud.pdf, accessed on March 1, 2013.

the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels.

During project construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. These types of vibration are best measured and described in terms of velocity and acceleration.

- The three main types of waves associated with groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.
- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation.
- Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.
- Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the RMS velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. In this study, all PPV and RMS velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second (abbreviated as VdB). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Man-made vibration problems are, therefore, usually confined to relatively short distances (500 to 600 feet or less) from the source.[1]

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, and differential settlement of pavement all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, heavy loads, and wheel-rail interactions.

5. Noise- and Vibration-Sensitive Receptors

Sensitive receptors include land uses which customarily host activities that may be particularly impacted by noise and vibration, and where a quiet environment is therefore necessary for enjoyment, public health, and/or safety. These land uses include: residential development, day care centers, schools, hospitals, senior care facilities, and some parks and recreational areas. Sensitive land uses within the City boundaries includes residences, schools,

[1] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.*

churches, and certain recreational areas. Commercial and industrial uses are not considered noise- and vibration-sensitive.[2]

B. Regulatory Framework

To limit exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and the City of Tracy have established standards and ordinances to regulate the noise environment.

1. State of California Noise Standards

a. State of California Building Code

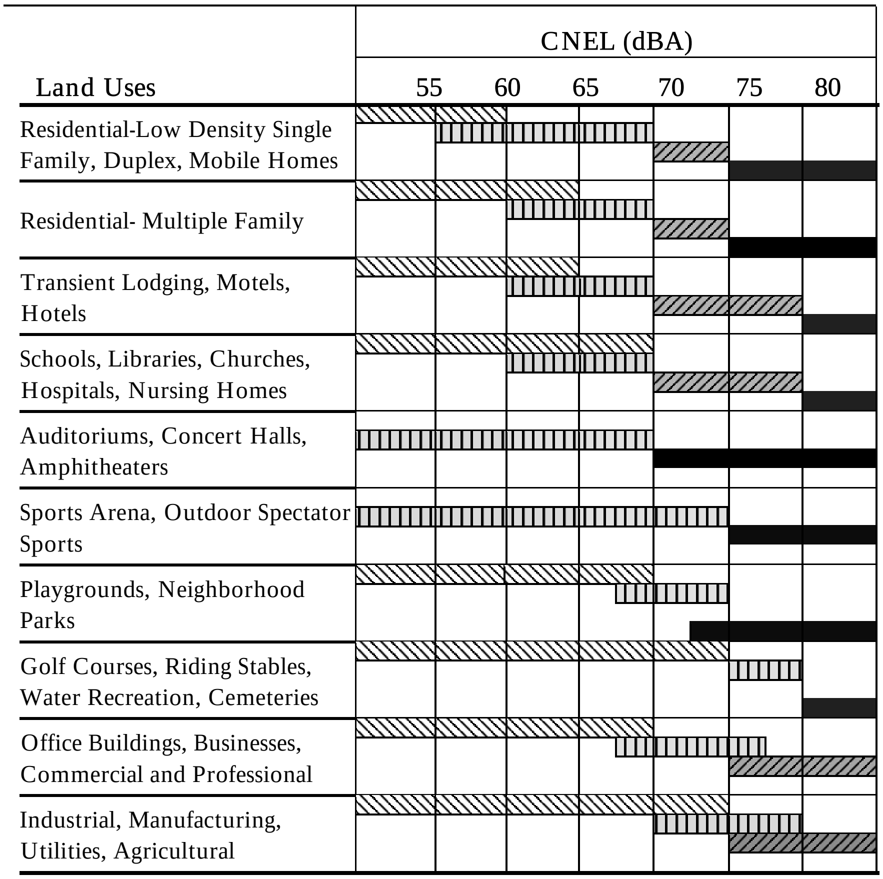
The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, *Building Standards Administrative Code*, Part 2, *California Building Code*. These noise standards are applied to new construction in California for the purpose of interior noise compatibility from exterior noise sources. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL. During the plan review stage of projects in areas subject to high noise levels, acoustic studies are required demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For the purpose of the Building Code, high noise environments are those in which the ambient noise level would result in the proposed land use falling into any compatibility category other than "normally acceptable," as discussed below.

b. State of California Land Use Compatibility Criteria

Table 4.11-3 presents a land use compatibility chart for community noise adopted by the State of California as part of its General Plan Guidelines. This table provides urban planners with a tool to gauge the compatibility of new land uses relative to existing and future noise levels. This table identifies

[2] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.*

TABLE 4.11-3 **CALIFORNIA LAND USE COMPATIBILITY 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 generally be discouraged. If new construction 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 the needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Clearly Unacceptable:
New construction or development generally should not be undertaken.

Source: California Office of Noise Control. Guidelines for the Preparation and Content of Noise Elements of the General Plan. February 1976. Adapted from the US EPA Office of Noise Abatement Control, Washington D.C. Community Noise. Prepared by Wyle Laboratories. December 1971.

normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed acoustic analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

2. City of Tracy Noise Element

The Noise Element in the Tracy General Plan discusses how ambient noise should influence land use and development decisions and includes a chart of 'normally acceptable', 'conditionally acceptable', and 'unacceptable' uses at different noise levels expressed in L_{dn}. The relevant policies of the Noise Element are presented below (Table 4.11-4). A complete listing of General Plan policies is provided in Appendix C.

3. City of Tracy Municipal Code

In addition to the standards set forth within the General Plan, the City's Municipal Code establishes sound level limits, as discussed below. The City of Tracy Municipal Code – Title 4.12, Article 9, Noise Control Ordinance – establishes the following:

a. General Sound Level Limits (Section 4.12.750):

Except for exempted activities/sounds,[3] it shall be unlawful for any person to cause or allow the creation of any noise (from each Base District Zone on which the sound is produced) to exceed the following sound level limits:

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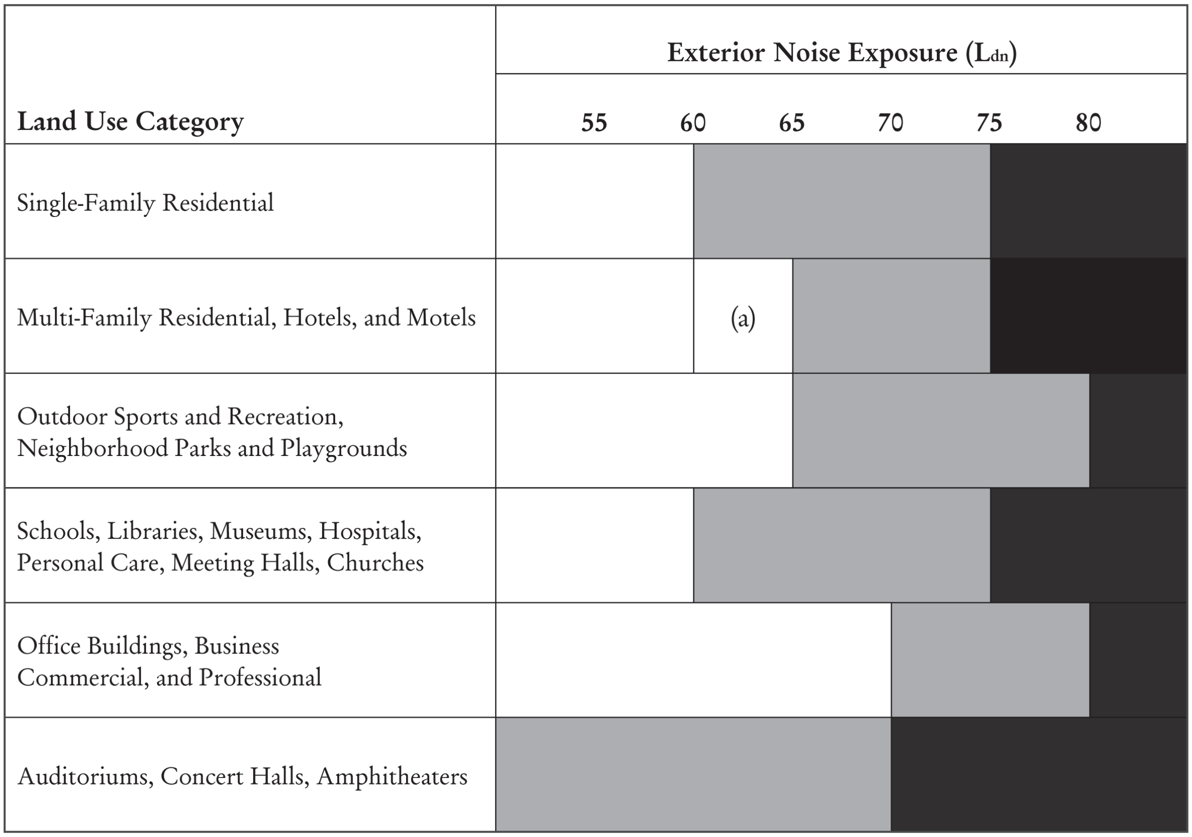
[3] Notwithstanding the general sound level limits provided in Section 4.12.740, an owner or operator of commercial or industrial properties may apply for an exemption from these limits and substitution of alternative sound level limits for the property. The application and approval of alternative sound level limits are controlled by Article 11 of this chapter. Any alternative sound level limit duly approved by the City shall be enforceable in the same manner as the general sound level limits provided in Section 4.12.750.



(a) Residential development sites exposed to noise levels exceeding 60 Ldn shall be analyzed following protocols in Appendix Chapter 12, Section 1208A, Sound Transmission Control, California Building Code.

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

Conditionally Acceptable
Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable
New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Source: Tracy General Plan Noise Element, Figure 9-3. (http://www.ci.tracy.ca.us/documents/2011_General_Plan.pdf)

FIGURE 4.11-1

CITY OF TRACY NOISE AND LAND USE COMPATIBILITY STANDARDS

TABLE 4.11-4 **GENERAL PLAN POLICIES RELEVANT TO NOISE**

Goal/ Policy No.	Goal/Policy Content
Noise Element	
Objective N-1.1	*Ensure appropriate exterior and interior noise levels for new land uses.*
Policy P1	Noise sensitive land uses shall not be located in areas with noise levels that exceed those considered normally acceptable for each land use unless measures can be implemented to reduce noise to acceptable levels.
Policy P2	Less noise sensitive uses shall require appropriate interior noise environments when located in areas adjacent to major noise generators.
Policy P8	Measures to attenuate exterior and/or interior noise levels to acceptable levels shall be incorporated into all development projects. Acceptable, conditionally acceptable, and unacceptable noise levels are presented in Figure 4.11-1.
Objective N-1.2	*Control sources of excessive noise.*
Policy P1	The City shall reduce traffic noise levels in existing residential areas through enforcement and structural improvements, to the extent feasible.
Policy P2	Mitigation measures shall be required for new development projects that exceed the following criteria: ¨ Cause the L_{dn} at noise-sensitive uses to increase by 3 dB or more and exceed the “normally acceptable” level. ¨ Cause the L_{dn} at noise-sensitive uses to increase 5 dB or more and remain “normally acceptable.” ¨ Cause new noise levels to exceed the City of Tracy Noise Ordinance limits.
Policy P3	Pavement surfaces that reduce noise from roadways should be considered as paving or re-pavement opportunities arise.
Policy P4	All construction in the vicinity of noise sensitive land uses, such as residences, hospitals, or convalescent homes, shall be limited to daylight hours or 7:00 a.m. to 7:00 p.m. In addition, the following construction noise control measures shall be included as requirements at construction sites to minimize construction noise impacts: ¨ Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and

Goal/ Policy No.	Goal/Policy Content
	appropriate for the equipment. ¨ Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction area. ¨ Utilize "quiet" air compressors and other stationary noise sources where technology exists.
Objective N-1.3	*Consider noise issues in the Development Review process.*
Policy P1	Development projects shall be evaluated for potential noise impacts and conflicts as part of the Development Review process.
Policy P2	The City shall ensure that significant noise impacts are mitigated as a condition of project approval.
Policy P3	New development projects shall have an acoustical specialist prepare a noise analysis with recommendations for design mitigation if a noise-producing project is proposed near existing or planned noise-sensitive uses.
Policy P4	Proposed noise sensitive projects within noise-impacted areas shall submit acoustical studies and provide necessary mitigation from noise.
Policy P5	Site design techniques shall be considered as the primary means to minimize noise impacts as long as they do not conflict with the goals of the Community Character Element. Techniques include: ¨ Designing landscaped building setbacks to serve as a buffer between the noise source and receptor. ¨ Placing noise-tolerant land uses, such as parking lots, maintenance facilities, and utility areas between the noise source(s), such as highways and railroad tracks, and receptor. ¨ Orienting buildings to shield noise sensitive outdoor spaces from a noise source. ¨ Locating bedrooms or balconies on the sides of buildings facing away from noise sources. ¨ Utilizing noise barriers (e.g. fences, walls, or landscaped berms) to reduce adverse noise levels in noise sensitive outdoor activity areas.

- Residential Districts have a noise limit of 55 dBA
- Commercial Districts have a noise limit of 65 dBA
- Industrial Districts have a noise limit of 75 dBA

These limits are in terms of the one-hour average sound level ($L_{eq\text{-}1hr}$) and apply at any point on the property boundary or beyond. These above-referenced limits would apply to the Project, based on use, upon annexation. However, refuse collection vehicles are exempted from these noise level limits, per Section 4.12.830(c).

b. Construction Noise Prohibitions (Section 4.12.820(h))

The City's Municipal Code specifically prohibits the overnight operation of certain noisy, construction-related equipment (i.e. between the hours of 10:00 p.m. and 7:00 a.m. These specified equipment items include any pneumatic or air hammer, pile driver, steam shovel, derrick, steam or electric hoist, parking lot cleaning equipment or other appliance that creates a "loud or unusual" noise. Noise Element Policy P4 under Objective N-1.2 constrains all construction in the vicinity of noise sensitive land uses (such as residences, hospitals, or convalescent homes) to daylight hours of 7:00 a.m. to 7:00 p.m. Further, this Policy lays out 'best practices' strategies for reducing noise from construction equipment and operations.

c. Other Municipal Code Noise Considerations

Sections 4.12.780, 4.12.790, and 4.12.800 provide for (a) time extensions to achieve compliance with the noise level limits and/or (b) a process to apply for a variation to the requirements and/or (c) a process to apply for an exception plus an alternative sound level limit.

Also, Section 4.12.810 discusses the general prohibition of "disturbing, excessive, and offensive" noise which may cause "discomfort or annoyance to reasonable persons of normal sensitivity." The determination for a noise source being "disturbing, excessive, and offensive" is made based on characteristics such as the noise level, the nature of the noise (usual or unusual), the background noise environment (without the noise source of concern), the time of day, the duration of the noise source, and the temporal characteristics of the source (such as being recurrent, intermittent, or constant).

d. Vibration Standards

The City of Tracy does not have regulatory standards for construction or operational vibration sources. For the purpose of this analysis, to evaluate the Project's impacts under CEQA, federal standards are used to address vibration impacts to adjacent uses from construction and the operation of equipment.

The United States Department of Transportation (Federal Transit Administration [FTA]) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. The human reaction to various levels of vibration is highly subjective and varies from person to person. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance.

The FTA provides criteria to evaluate potential human annoyance due to groundborne vibration caused by frequent and intermittent events. These criteria, shown in Table 4.11-5, are used in this analysis to evaluate impacts from transportation sources to sensitive land uses throughout the City.

The FTA also provides criteria to evaluate potential structural damage associated with vibration. Structures amplify groundborne vibration and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier buildings. The level at which groundborne vibration is strong enough to cause architectural damage varies based upon building type and the quality of construction. The most conservative estimates are reflected in the FTA standards, shown in Table 4.11-6.

TABLE 4.11-5 **GROUNDBORNE VIBRATION AND GROUNDBORNE NOISE IMPACT CRITERIA REGARDING ANNOYANCE IMPACTS**

	Groundborne Vibration Impact Levels (VdB re 1 micro-inch/sec.)		Groundborne Noise Impact Levels (dB re 20 micropascals)	
Land Use Category	Frequent Events[a]	Infrequent Events[b]	Frequent Events[a]	Infrequent Events[b]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[c]	65 VdB[c]	NA[d]	NA[d]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

[a] "Frequent Events" is defined as more than 70 vibration events per day.
[b] "Infrequent Events" is defined as fewer than 70 vibration events per day.
[c] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels.
[d] Vibration-sensitive equipment is not sensitive to groundborne noise.
Source: United States Department of Transportation Federal Transit Administration, "Transit Noise and Vibration Impact Assessment" manual, May 2006.

TABLE 4.11-6 **GROUNDBORNE VIBRATION CRITERIA: ARCHITECTURAL DAMAGE**

Building Category	PPV (in/sec)	L_v (VdB)[1]
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

[a] RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.
Source: FTA 2006.

C. Existing Conditions

1. Uses within the Specific Plan Area

The predominant existing land use in the Specific Plan Area is agricultural which includes irrigated crop production, dry farming, and periodic cattle grazing. There are also twelve residences in the Specific Plan Area, which are considered sensitive receptors for noise, although the non-residential uses (the PG&E facility and cell tower installation) would not be considered sensitive receptors. The Specific Plan Area also includes utility and irrigation infrastructure, as described in detail in Chapter 3, Project Description. Neither of these uses is considered sensitive noise receptors.

1. Adjoining Land Uses

Some of the land immediately surrounding the Specific Plan Area is used as farmland, with dispersed farmhouses and associated agricultural facilities. In addition to these agricultural land uses, the surrounding area includes warehousing/distribution, power generation, and suburban/rural residential uses. The area of suburban/rural residential land uses is located across the Interstate 205 freeway, adjacent to and north of the Specific Plan Area. This area is composed of the single-family residential development roughly centered on Hansen Road. The adjacent warehousing and distribution center land uses in the Patterson Pass Industrial Park are located southwest of the Specific Plan Area, across the Delta Mendota Canal. The power generation facilities uses lie to the south and east of the Specific Plan Area,[4] across Old Schulte Road. The eastern edge of the Specific Plan Area is entirely agricultural with the nearest human-occupied structure more than half a mile to the east of the edge of the Specific Plan Area. Further to the east, past South Lammers Road, are suburban residential areas and Kimball High School; this area is located approximately one mile from the eastern edge of the Specific Plan Area.

[4] The Tracy Biomass Plant and the GWF Tracy Peaker Power Plant are located between Old Schulte Road and the Delta-Mendota Canal.

2. Existing Noise Conditions

The existing acoustical environment on the Specific Plan Area and at surrounding uses is influenced primarily by noise generated by traffic. Roadways which are substantial sources of traffic noise on the Specific Plan Area and in adjoining areas include:

- Interstate 205,
- Interstate 580,
- Old Schulte Road, and
- Mountain House Parkway.

In addition to traffic-related noise, the area's flat topography and general lack of structures or meaningful forestation often results in wind-induced background noise which contributes to the noise environment.

The warehousing and distribution uses associated with the Patterson Pass Industrial Park also contribute to the noise environment of the Specific Plan Area, primarily in the easternmost areas along the Delta Mendota Canal, and adjacent to Mountain House Parkway and Old Schulte Road. A portion of the traffic noise discussed above is generated by vehicle movements associated with this industrial park. Additional sources of noise from this industrial use include trucks idling onsite, the loading/unloading of goods, and any noise generated by onsite machinery such as generators or HVAC systems.

3. Ambient Noise Measurements

Existing ambient noise levels were measured at several locations around and within the Specific Plan Area to document noise levels in the vicinity of representative noise-sensitive uses. Off-site noise levels were measured between May 1st and 3rd, 2012 at locations adjacent to the Specific Plan Area and along roadways expected to receive increased traffic due to project development. On-site noise levels were measured on March 4, 2013 to document noise levels at the existing land uses within the Specific Plan Area.[5]

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[5] The off-site noise measurement locations were chosen by Illingworth and Rodkin, Inc. who also conducted the ambient and data acquisition in May 2012. The

As shown on Figure 4.11-2, three long-term (LT) and four short-term (ST) measurements were made at locations surrounding the Specific Plan Area. In addition, six more short-term measurements were made within the Specific Plan Area; for a total of 13 locations. In all cases, noise measurements were made using Larson Davis (LD) Model 820 sound level meters fitted with precision microphones. The sound level measurement systems were calibrated prior to and immediately after the noise measurement and the pre- and post-calibration levels were found to be within 0.1 dB of each other; indicating no measurement 'drift' during the data acquisition sessions.

a. Long-Term Ambient Measurements

Long-term measurements were conducted at three locations – one to the north, one to the west, and one to the east of the Specific Plan Area, as discussed in more detail below. The long-term noise measurement data provides the hour-by-hour distribution of noise levels over the measurement period, along with the levels needed to calculate the 24-hour day/night average noise level (L_{dn}). The location of the three long-term measurement locations are shown in Figure 4.11-2 and the hourly records for several noise metrics are shown graphically in Appendix K.

Long-Term Location 1: LT-1 is representative of the noise environment that would be experienced by receptors located along a rural roadway and removed from substantial noise contributions from freeway traffic flows. This would be indicative of the residential areas centered on Hansen Road that are the farthest from Interstate 205 freeway (both to the north and south of the freeway). This would also be comparable to expected sound levels at Lammersville School (at the intersection of Hansen Road and Von Susten Road).

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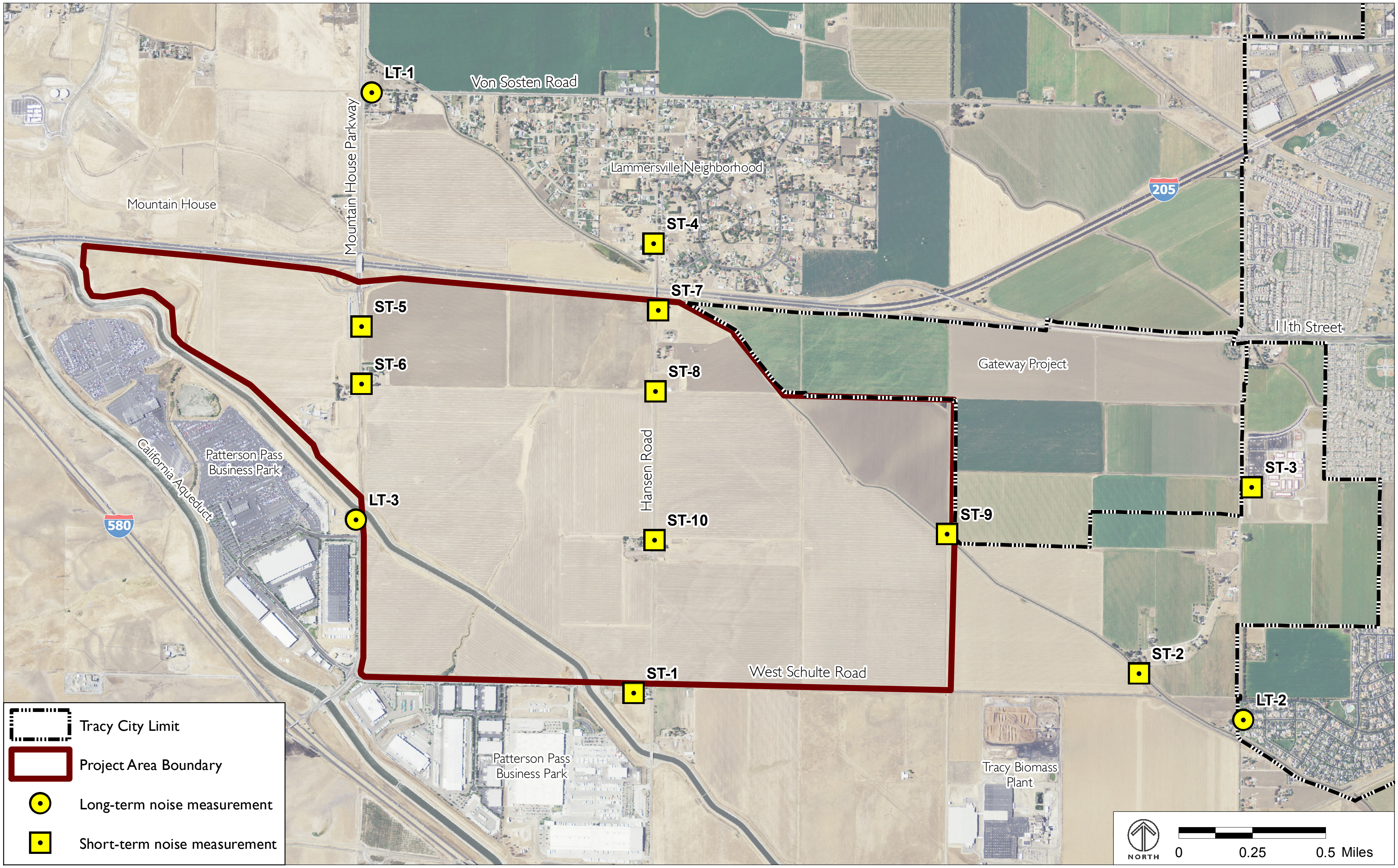
on-site noise data acquisition in March, 2013 was conducted by The Planning Center|DC&E staff.



Source: California Department of Conservation, 2009; The Planning Center | DC&E, 2013.

FIGURE 4.11-2

NOISE MEASUREMENT LOCATIONS

LT-1 was located about 195 feet east of centerline of Mountain House Parkway and 21 feet south of the centerline of Von Sosten Road; adjacent to rural residential uses north of the Specific Plan Area. The measurement was made on a utility pole at a height of approximately 12 feet above the surrounding ground level. As this location is over ½ mile from the Interstate 205 freeway, the primary noise source was local traffic on Mountain House Parkway and wind-induced noise. Occasional traffic on Von Sosten Road also contributed to noise levels measured at this location. Hourly L_{eq} noise levels ranged from 62 dBA to 71 dBA during daytime hours and 56 dBA to 68 dBA at night. The calculated day-night average noise level at this location was 71 dBA L_{dn}.

Long-Term Location 2: LT-2 is representative of the nearest suburban residential receptors, which are located east of Lammers Road and south of Old Schulte Road. This location is approximately 1.3 miles from Interstate 205 and 2.0 miles from Interstate 580, resulting in minimal noise from these facilities due to distance attenuation.

LT-2 was located about 75 feet from the centerline of Lammers Road, between Old Schulte Road and Redbridge Road. The location was in the buffer strip off of Lammers Road and adjacent to suburban residential uses east of the Specific Plan Area. The measurement was made in a tree at a height of approximately 10 feet above the surrounding ground level. The primary noise source at this location was local traffic on Lammers Road, plus some contributions from wind-induced noise. Hourly L_{eq} noise levels ranged from 55 dBA to 75 dBA during daytime hours and 49 dBA to 60 dBA at night. The calculated day-night average noise level at this location was 65 dBA L_{dn}.

Long-Term Location 3: LT-3 is representative is of the noise environment resulting from activities in the Patterson Pass Industrial Park, which is located to the west and southwest of the Specific Plan Area. The precise position of LT-3 was at a residence located near the boundary of the Specific Plan Area and the Patterson Pass Industrial Park. For this particular site, the 0.6-mile distance from Interstate 580, in conjunction with the shielding effects of large, intervening structures, served to substantially reduce traffic noise from the freeway.

Location LT-3 was located about 75 feet from the centerline of Mountain House Parkway and just south of the Delta Mendota Canal near the existing residences. The measurement system was mounted in a tree approximately 8 feet above the roadway level. The primary noise source at this location was local traffic on Mountain House Parkway, as well as contributions from wind-induced noise. Hourly L_{eq} noise levels ranged from 64 dBA to 71 dBA during daytime hours and 64 dBA to 71 dBA at night. The calculated day-night average noise level at this location was 74 dBA L_{dn}.

b. Short-Term Ambient Measurements

Short-term noise measurements were made at additional representative locations on May 3, 2012. The short-term measurements were conducted for 10-minute periods, simultaneously with the measurements at the long-term locations. The patterns of hourly noise levels at the short-term measurement locations were estimated based on data from the long-term measurements, thereby extrapolating a comprehensive baseline for the entire measurement network.

Short-Term Location 1: ST-1 is representative of the noise environment at receptors that on a rural roadway and separated from substantial noise contributions from freeway traffic flows. This would be indicative of the scattered residential areas that are within the Specific Plan Area along Hansen Road or Mountain House Parkway, and which are separated from Interstate 205.

ST-1 was located along Old Schulte Road adjacent to South County Fire Authority Station 94/California Department of Forestry and Fire Protection Station 26 at the southwest corner of Old Schulte Road and Hansen Road; just south of the Specific Plan Area. The measurement was made at a distance of about 165 feet from the centerline of Old Schulte Road at a height of about

5 feet above the ground. The primary noise source at this location was traffic on Old Schulte Road with background contributions from wind-induced noise. The 10-minute equivalent noise level (L_{eq}) was 59 dBA. Based on the 24-hour distribution of sound levels at comparable long-term locations, the L_{dn} noise level at this measurement location was estimated to be 64 dBA.

Short-Term Location 2: ST-2 was located on a farm road north of Old Schulte Road in the vicinity of the closest farmhouse; east of the Specific Plan Area. The measurement was made at a distance of about 300 feet from the centerline of Old Schulte Road and 600 feet south west of the farmhouse. The microphone was approximately 5 feet above the ground. The primary noise source at this location was traffic on Old Schulte Road with background contributions from wind-induced noise. The 10-minute equivalent noise level (L_{eq}) was 60 dBA. Based on the 24-hour distribution of sound levels at nearby location LT-2, the L_{dn} noise level at this measurement location was estimated to be 66 dBA.

Short-Term Location 3: ST-3 is representative of the noise environment at the John C. Kimball High School campus, on the east side of South Lammers Road, and near the school's athletic facilities, specifically. The microphone was located approximately 150 feet west of the roadway centerline at a height of about 5 feet above the ground. The primary noise source at this location was traffic on South Lammers Road with background contributions from wind-induced noise. The 10-minute equivalent noise level (L_{eq}) was 54 dBA. The estimated L_{dn} noise level at this measurement location was 60 dBA.

Short-Term Location 4: ST-4 is representative of the noise environment in the Lammersville area north of Interstate 205. The noise received and subsequent overall noise level at this location would result predominantly from traffic on Interstate 205.

Location ST-4 was in the residential area north of Interstate 205 along Hansen Road at a distance of approximately 36 feet west of the Hansen Road centerline and 840 feet north of Interstate 205. The microphone was positioned at a height of approximately 5 feet above the ground. The primary noise sources at this location was local traffic on Hansen Road, traffic flows on Interstate 205, and wind-induced noise. The 10-minute equivalent noise level (L_{eq}) was 64 dBA. The estimated L_{dn} noise level at this measurement location was 68 dBA.

Short-Term Location 5: ST-5 is representative of areas near the intersection of Mountain House Parkway and Interstate 205. Land uses in the vicinity of this location were primarily agricultural, with some widely scattered, single-family residences. Additionally, there was a small P&GE facility across Mountain House Parkway from the location. Location ST-5 was located in a small treed area along Mountain House Road, approximately 1,125 feet south of the Centerline of Interstate 205. The microphone and sound meter were positioned approximately 35 feet from the centerline of Mountain House Parkway. Fifteen minutes of noise measurements were taken beginning at 10:02 a.m. on Monday, March 4, 2013, at which time the air temperature was 55°F and winds were 12 mph out of the west.

The noise environment of the site is dominated by the passage of large freight trucks along Mountain House parkway, with additional noise from regular passenger vehicles. The area is also characterized by a degree of background noise caused by the prevailing westerly winds. Although noise from Interstate 205 could on occasion be discerned, this noise was often overwhelmed by that of traffic along Mountain House Parkway. The 15-minute equivalent noise level (L_{eq}) was 71.9 dBA and the estimated L_{dn} noise level at this location was 76 dBA.

Short-Term Location 6: ST-6 is also representative of areas along Mountain House Parkway, relatively near Interstate 205. As with ST-5, land uses in the vicinity of this location were primarily agricultural, with widely scattered farm houses. There were two such single-family homes in close proximity to this noise monitoring location. One single-family home was located approximately 80 feet northeast of the measurement position (24335 Mountain House Parkway) and the other was located approximately 285 feet east of this location. This location was approximately 2,150 feet south of the centerline of Interstate 205. The microphone and sound meter were positioned approximately 32 feet from the centerline of Mountain House Parkway. Fifteen minutes of noise measurements were taken beginning at 10:29 a.m. on Monday, March 4, 2013. The air temperature was 55°F and winds were approximately 10 mph out of the west.

The noise environment at this location was dominated by the passage of large freight trucks along Mountain House Parkway, with additional noise from regular passenger vehicles. The area is also characterized by a degree of background noise caused by the consistently strong, prevailing westerly winds. Noise from Interstate 205 was generally not discernible due to the noise from passing vehicles on Mountain House Parkway and due to the background noise generated by wind. The 15-minute equivalent noise level (L_{eq}) was 71.8 dBA and the estimated L_{dn} noise level at this location was 76 dBA.

Short-Term Location 7: ST-7 is representative of areas near the intersection of Hansen Road and the Interstate 205 freeway. As with the other on-site locations, the predominant land uses are agricultural, with scattered farm houses. This location was along a small, single-lane service road running alongside Hansen Road and it was adjacent to a single-family residence and associated buildings that were approximately 24 feet to the east of the monitoring equipment. The service road was located at the base of an embankment, approximately 20 feet below the grade of Hansen Road. The microphone and sound meter were positioned approximately 70 feet from the centerline of Hansen Road and 8 feet from the centerline of the service road. This position is also approximately 370 feet south of the centerline of Interstate 205 and 1.3 miles north of Old Schulte Road. Fifteen minutes of noise measurements were acquired, beginning at 11:50 a.m. on Monday, March 4 2013. During the measurements, the winds were approximately 5 mph out of the south-southwest and the air temperature was 61°F.

The noise environment of the site was dominated by the sound of nearby traffic along Interstate 280, and was also occasionally punctuated by the sound of a passing vehicle on Hansen Road. No vehicles passed by on the service road while measurements were being taken. Winds at this site were relatively calm and contributed only slightly to background noise at the time the measurements were taken. The 15-minute equivalent noise level (L_{eq}) was 54.9 dBA and the estimated L_{dn} noise level at this location was 59 dBA.

Short-Term Location 8: ST-8 was located further south (than Location ST-7) along Hansen Road. The measurement was made adjacent to a single-family residence and associated structures along Hansen Road, approximately 1,230 feet south of the centerline of Interstate 205 and 1.1 miles north of Old Schulte Road. The microphone and sound meter were positioned approximately 38 feet from the centerline of Hansen Road and approximately 180 feet to the west-southwest of the collection of farmhouse buildings. Fifteen minutes of noise measurements were taken beginning at 11:24 a.m. on Monday, March 4, 2013. The air temperature was 59°F and winds were approximately 5 mph out of the west. These winds were judged to contribute only slightly to background noise at the time the measurements were taken.

The noise environment of the site was dominated by the sound of distant traffic along Interstate 280 and by the sounds of birds. The noise environment was also occasionally punctuated by the sound of a passing vehicle on Hansen Road. The 15-minute equivalent noise level (L_{eq}) was 52.4 dBA and the estimated L_{dn} noise level at this location was 56 dBA.

Short-Term Location 9: ST-9 was located alongside a dirt service road among agricultural fields at the eastern boundary of the Specific Plan Area. This location was chosen to document the quietest area on the project site, since it is the most distant from all the nearby roadways, including the Interstate 205 freeway (to the north), West 11th Street (to the north), Hansen Road (to the west), Old Schulte Road (to the south), and South Lammers Road (to the east). Specifically, the location was approximately 0.8 miles to the south-southeast of Interstate 205 and approximately 1 mile from both Hansen Road and South Lammers Road. Land uses in the vicinity of short-term location were almost entirely agricultural, with the Tracy Biomass Plant located approximately 0.6 miles to the south-southeast of the site. Residential uses were all located at a significant distance from the site, with the nearest being 0.8 miles to the southeast along an unnamed road. The microphone and sound meter were positioned approximately 15 feet from the centerline of the dirt road. Fifteen minutes of noise measurements were taken beginning at 12:24 p.m. on Monday, March 4, 2013. Wind speeds were generally low; approximately 5 mph out of the west. The air temperature was 63°F during the measurement session.

Due to the relatively quiet background noise conditions at this location, the noise environment of the site was dominated by the distant traffic flows along Interstate 205. No vehicles passed by on the service road while measurements were being taken and there were no other noteworthy sources of noise. Winds at this site were relatively calm and contributed only slightly to background noise at the time the measurements were taken. The 15-minute equivalent noise level (L_{eq}) was 44.2 dBA and the estimated L_{dn} noise level at this location was 48 dBA.

Short-Term Location 10: ST-10 was located approximately 0.85 miles south of the centerline of Interstate 205 and 0.5 miles north of Old Schulte Road; adjacent to a collection of agriculture related buildings and a farmhouse along Hansen Road. As with the other measurement locations along Hansen Road, land uses in the vicinity of this location were almost entirely agricultural. There was one residence and a small collection of agricultural buildings approximately 400 feet west and 200 feet southwest of the monitoring equipment, respectively.[6] The sound meter was positioned approximately 40 feet from the centerline of Hansen Road. Fifteen minutes of noise measurements were taken beginning at 10:59 a.m. on Monday, March 4, 2013.

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[6] Reportedly, these structures are owned by one of the Project applicants and will be removed during Phase 1 development. Thus, they are not considered to be sensitive receptors and this measurement location is included in the existing conditions study for informational purposes only.

The air temperature was 58°F and winds were generally less than 5 mph out of the west.

The noise environment of the site was dominated by the sound of birds; primarily crowing roosters at one of the adjacent agricultural uses. The noise environment was also occasionally punctuated by the sound of a passing vehicle on Hansen Road. Noise from traffic flows on the distant Interstate 205 freeway was also discernible during lulls in the general ambient conditions. An occasional aircraft over-flight in the distance was also noted. Winds at this site were relatively calm and did not contribute to significant background noise at the time the measurements were taken. The 15-minute equivalent noise level (L_{eq}) was 54.5 dBA and the estimated L_{dn} noise level at this location was 59 dBA.

A summary of the data measured at the short term locations are shown in Table 4.11-7.

D. Standards of Significance

The Project would have a significant impact with respect to noise or vibration if implementation of the Project would:

1. Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or other applicable standards.
2. Expose people to or generate excessive groundborne vibration or groundborne noise levels.
3. Create a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. Create a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (Including construction impacts)

TABLE 4.11-7 **SUMMARY OF SHORT-TERM NOISE LEVELS MEASUREMENTS**

Measurement Location (Date/Time)	L_{eq} dBA	L_{10} dBA	L_{50} dBA	L_{90} dBA	Estimated L_{dn}, dBA
ST-1: Schulte Road at Fire Protection Station (5/3/12, 11:10-11:20)	58	61	55	52	64
ST-2: Farmhouse east of the Specific Plan Area (5/3/12, 11:30-11:40)	60	63	58	55	66
ST-3: S. Lammers Road near Kimball High School (5/3/12, 12:00-12:10)	54	58	53	50	60
ST-4: Hansen Road, North of Specific Plan Area (5/3/12, 12:30-12:40)	64	64	60	57	68
ST-5: Mountain House Parkway, in Specific Plan Area, south of I-205 (3/4/13, 10:02-10:17)	72	77	65	56	76
ST-6: Mountain House Parkway, in Specific Plan Area, at future Capital Parks Drive (3/4/13, 10:29-10:44)	72	77	65	51	76
ST-7: Hansen Road, in Specific Plan Area, just south of I-205 (3/4/13, 11:50-12:05)	55	57	54	51	59
ST-8: Hansen Road, in Specific Plan Area, at future Capital Parks Drive (3/4/13, 11:24-1139)	52	53	45	44	56
ST-9: Far east boundary of Specific Plan Area (3/4/13, 12:24-12:39)	44	46	44	43	48
ST-10: Hansen Road, in Specific Plan Area, between future New Schulte Road and future Road E (3/4/13, 10:59-11:14)	55	55	43	40	59

Sources: Illingworth & Rodkin, 2012 for Locations ST-1 through ST-4; The Planning Center | DC&E, 2013 for Locations ST-5 through ST-10.

5. 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;
6. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

CEQA does not define what noise level increase would be considered substantial on a permanent or a temporary basis. Typically, a substantial increase leading to a significant noise impact would result from either:

- An increase in the day-night average noise level (L_{dn}) at noise sensitive land uses resulting from a project contribution of 3 dBA or greater where noise levels exceed those considered as 'normally acceptable' for the particular use, or
- An increase in the day-night average noise level (L_{dn}) at noise sensitive land uses resulting from a project contribution of 5 dBA or greater where noise levels would remain "normally acceptable."

The dBA increases associated with the above thresholds are a function of the human ear's ability to discern changes in noise level. As illustrated in Table 4.11-1 and discussed in Section A, 3 dB is the minimal difference in noise level perceptible by the human ear, and 5 dB is generally the minimal clearly noticeable change in noise level. Therefore, in areas already exceeding their applicable standard, any perceptible change constitutes an impact, whereas in areas where the threshold would not be exceeded, a clearly noticeable change in noise level would constitute an impact.

E. Impact Discussion

The following section discusses changes in the noise environment and community noise exposure that could result from implementation of the proposed Project.

1. Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or other applicable standards.

a. City of Tracy General Plan Noise Element

While no new residential development is proposed as part of the Project, the small number of existing, on-site residential uses (accessed from either Hansen Road or Mountain House Parkway) may or may not remain as individual site-specific developments are constructed in the Specific Plan Area. For the purposes of this CEQA assessment, the on-site residential land uses are assumed to be present for the Phase 1 development, except for ST-10 (see Figure 3-20 in Chapter 3, Project Description). Between the completion of the Phase 1 development and the Project's full buildout, all these existing, on-site residential uses are assumed to be replaced by the proposed commercial or light-industrial uses.

Based on the noise measurement survey results and traffic noise contour distances contained in the City of Tracy General Plan Noise Element, the exterior noise levels at areas designated for General Office could exceed the City of Tracy's 'normally acceptable' noise and land use compatibility standard level of 70 dBA L_{dn} for Office Buildings, Business Commercial and Professional Uses Buildings within about 1,000 feet of the centerline of Interstate 205, about 200 feet of the centerline of Mountain House Parkway and about 70 feet of the centerline of New Schulte Road. While noise levels at portions of the Project could potentially reach the Noise Element's 'unacceptable' noise level of 80 dBA L_{dn}.[7] For purposes of this assessment, future noise levels generated from the Project may result in *potentially significant* impacts for existing sensitive receptors and future buildings constructed close to heavily-traveled roadways.

b. City of Tracy Noise Ordinance

As discussed in the Regulatory Framework section above, the City of Tracy establishes one-hour L_{eq} operational noise level limits at the receiving

[7] This may occur within approximately 300 feet of the centerline of I-205 and within about 90 feet of the centerline of Mountain House Parkway.

property boundary (or within the receiving property) of 55, 65, and 75 dBA for residential, commercial, and industrial areas, respectively. The primary stationary sources of noise from the proposed Project would be noise from on-site mechanical equipment such as HVAC units, refrigeration packages, and/or compressors. These types of on-site mechanical equipment would be acoustically engineered with mufflers and barriers to minimize noise and to ensure that their noise emissions do not exceed the City's maximum noise level limits. This would be particularly relevant during the Project's Phase I development, given the proximity of on-site residential uses near the intersections of Mountain House Parkway with Capital Parks Drive and Hansen Road with Capital Parks Drive. Individual, site-specific developments within the nearby General Commercial (GC) and Business Park Industrial (BPI) areas would need to account for their mechanical equipment noise emissions during their respective design stages to ensure that they adhere to the noise ordinance requirements. For all phases of the Project's development, implementation of mechanical equipment noise control and the associated adherence to the City noise ordinance would result in impacts from noise generated by on-site stationary sources that would be *less than significant*. Thus, no additional mitigation measures are necessary.

Mobile sources are discussed more fully below in subsection 3. As set forth therein, implementation of the Project would result in an increase in traffic, particularly truck traffic, and related traffic noise in the Specific Plan Area and vicinity. Depending on a number of factors such as distance from roadway, traffic flows, vehicle speeds, car/truck mix, length of exposed roadway, and roadway width, exceedances of the standards under the City's Noise Element could occur. Therefore, without mitigation, traffic noise increases related to the Project are considered a *significant* impact. As explained further below, traffic noise cannot be reduced to a less than significant level, and therefore the impact will remain *significant and unavoidable*.

2. Expose people to or generate excessive groundborne vibration or groundborne noise levels.

CEQA does not specify quantitative thresholds for what is considered "excessive" vibration or ground-borne noise. Neither the City of Tracy nor the County of San Joaquin establishes such thresholds. Therefore, based on criteria from the FTA, a significant impact would occur if:

- Implementation of the Project would exceed the criteria for annoyance presented in Table 4.11-5.
- Implementation of the Project would result in vibration exceeding the criteria presented in Table 4.11-6 that could cause buildings architectural damage.

The following discusses short-term construction and long-term operations impacts from implementation of the Project:

a. Short-Term Construction Impacts

Project construction would take place in phases and, thus, construction vibration would be variable, depending on the specific location and type of construction activity. Construction activities may include demolition of existing structures, site preparation work, foundation work, and framing. Site preparation, excavation, and foundation work for an individual site may last several weeks to months and, at times, may produce substantial vibration. Excavation for underground levels could potentially also occur on some sites within the Specific Plan Area and vibratory pile driving could be used to stabilize the walls of excavated areas. Piles or drilled caissons may also be used to support building foundations.

The effect on buildings in the vicinity of a construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures, but groundborne vibration and groundborne noise can reach perceptible and audible levels in buildings that are very close to the construction site (such as for already-completed structures from previous phases in the project's development). Table 4.11-8 lists vibration levels for construction equipment.

As shown in Table 4.11-8, pile driving has the potential to generate the highest ground vibration levels and is of primary concern to structural damage, particularly when it occurs within 100 feet of structures. Vibration levels generated by pile driving activities would vary depending on site-specific conditions, such as soil characteristics, construction methods, and equipment used. Other Project construction activities, such as caisson drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may also potentially generate substantial vibration in the immediate vicinity. However, groundborne vibration is almost never annoying to people who are outdoors, so it is usually evaluated in terms of indoor receivers.[8]

Based on available information, vibration impacts would be as follows. Grading and demolition activities typically generate the highest vibration levels during construction activities. Except for pile driving, maximum vibration levels measured at a distance of 25 feet from an individual piece of typical construction equipment rarely exceed the thresholds for human annoyance for industrial uses (i.e. 84 to 90 VdB) or the thresholds for architectural damage at any type of receptor land use (i.e. 0.2 to 0.5 RMS velocity in inches per second), as shown above in Table 4.11-8.

In general, construction would be localized, would occur intermittently and variably, and would only occur for relatively short periods of time. However, it is acknowledged that there are numerous individual development sites that could develop under the Specific Plan; thereby effectively extending the construction period. Methods to reduce vibration during construction could include the use of smaller equipment, use of static rollers instead of

[8] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.*

TABLE 4.11-8 **GROUNDBORNE VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT**

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS[a] Velocity at 25 Feet (in/sec)
Pile Driver (impact) Upper Range	112	1.518
Pile Driver (impact) Lower Range	104	0.644
Pile Driver (sonic) Upper Range	105	0.734
Pile Driver (sonic) Lower Range	93	0.170
Large Bulldozer	87	0.089
Caisson Drilling	87	0.089
Jackhammer	79	0.035
Small Bulldozer	58	0.003
Loaded Trucks	86	0.076
FTA Criteria – Human Annoyance (Daytime)	78 to 90[b]	—
FTA Criteria – Structural Damage	—	0.2 to 0.5[c]

[a] RMS velocity calculated from vibration level (VdB) using the reference of 1 microinch/second.
[b] Depending on affected land use. For residential 78VdB, for offices 84 VdB, workshops 90 VdB.
[c] Depending on affected building structure, for timber and masonry buildings 0.2 in/sec, for reinforced-concrete, steel or timber 0.5 in/sec.
Source: Federal Transit Administration, Transit Noise, and Vibration Impact Assessment, 2006.

vibratory rollers, and drilling piles, as opposed to pile driving. However, it is not known as this time the specific type(s) of technology that would be employed. Also, by use of administrative controls, such as notifying adjacent uses of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration to hours with least potential to affect nearby residences or businesses, perceptible vibration could be further reduced. However, even with these vibration reduction approaches, it is still possible that an individual, site-specific development could periodically and temporarily exceed the annoyance thresholds (as shown in Table 4.11-5). As such, groundborne vibration from construction could result in a *potentially-significant* impact with respect to perception and annoyance.

For architectural damage, this situation would be exacerbated with the potential use of standard pile driving techniques; particularly with respect to pile-driving activities that may be conducted within approximately 50 to 100 feet of a previously built structure. From the vibration thresholds for architectural damage (shown in Table 4.11-5) and given the typical groundborne vibration caused by pile driving activities (shown in Table 4.11-8), this type of construction process, if performed in close proximity to then-existing buildings, could result in a *potentially-significant* impact with respect to potential architectural damage.

To summarize, given the unknown future development timetables, unknown specific site designs and construction processes/technologies to be utilized, some construction activities that may be conducted in close proximity to then-existing buildings could result in a *potentially-significant* impact with respect to both annoyance and architectural damage.

b. Vibration Related to Transportation Activity

The California Department of Transportation (Caltrans) has studied the effects of propagation of vehicle vibration on sensitive land uses and notes that "heavy trucks, and, quite frequently, buses, generate the highest earthborn vibrations of normal traffic." Caltrans further notes that the highest traffic-generated vibrations are along freeways and state routes. Their study finds that "vibrations measured on freeway shoulders (five meters from the centerline of the nearest lane) have never exceeded 0.08 inch per second, with the worst combinations of heavy trucks. This level coincides with the maximum recommended safe level for ruins and ancient monuments (and historic buildings)." Typically, trucks do not generate high levels of vibration because they travel on rubber wheels and do not have vertical movement, which generates ground vibration. Vibrations from trucks may be noticeable if there are any roadway imperfections such as potholes.[9]

Given the width of the freeway shoulders and the distances from the freeway right-of-way edges to the Specific Plan Area boundaries, vibration-sensitive structures or uses would be sited well beyond the aforementioned Caltrans demarcation of 5 meters (approximately 16 feet) from the centerline of the nearest lane of Interstate 205 or Interstate 580. Because vibration dissipates rapidly with distance and because vibration-sensitive uses would not typically be sited to freeways or major arterials without attenuation, any potential for significant vibration impacts would not occur. Therefore, development of the Project is not expected to result in exposure to excessive transportation-related vibration and the impact would be *less than significant*.

c. Long-Term Operational Vibration Impacts

Depending on the development phasing and the exact order of how the individual Project sites are developed, existing residential or future Project facilities (already constructed during previous phases) may be in the vicinity of the subsequently developed uses. However, given the distances between facilities and the general commercial, general office, and business park light-industrial use types,[10] it is anticipated that the operation of nearby commercial, office, or industrial facilities would not generate substantial vibration levels that would be incompatible with the current and future uses. Therefore, development of the Project is not expected to result in exposure to excessive operations-related vibration and the impact would be *less than significant*.

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[9] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.*

[10] Such uses would preclude heavy industry, manufacturing, large-scale raw material handling (such as aggregate processing plants) and the like.

3. Create a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project.

The Project has been strategically designed to avoid, to the extent feasible, routing truck traffic on roadways near long-term sensitive receptors. For example, as explained more fully in Chapter 4.14 (Traffic and Transportation), the Project would not route truck trips onto Hansen Road north of I-205 given the long-term residential uses in that area.

Nevertheless, implementation of the Project would result in an increase in traffic and related traffic noise in the Specific Plan Area and surrounding areas. The City of Tracy General Plan in Objective N-1.2, Policy P2 requires mitigation for noise sensitive uses for new development which would cause the L_{dn}/CNEL to increase by 3 dB or more and exceed the "normally acceptable" level, and by 5 dB or more and remain "normally acceptable." Though CEQA does not define what noise level increase would be considered substantial, the common practice in impact assessments generally considers these same increases in noise level as being significant.

To assess the potential for traffic noise impacts, average daily traffic (ADT) volumes on roadway segments in the Specific Plan Area and vicinity were used to calculate noise level contours for all roadway segments evaluated in the Section 4.14, Traffic and Transportation. Consistent with the available roadway segment ADT data included in Section 4.14, the analysis was performed for existing conditions and for the Project's build out horizon year of 2035.

The traffic noise levels for this Project were estimated using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (RD-77-108). The FHWA model predicts noise levels through a series of adjustments to a reference sound level. These adjustments account for distances from the roadway, traffic flows, vehicle speeds, car/truck mix, length of exposed roadway, and road width. The distances to the 70, 65, and 60 CNEL contours for selected roadway segments and Freeways in the study area are included in Appendix K. Tables 4.11-9 thru 4.11-12 compare the noise levels at 100 feet from the centerline of each roadway segment with the project buildout for existing, and 2035 conditions.

a. Existing Conditions Plus Project Buildout

Tables 4.11-9 and 4.11-10 show the traffic noise increase that would result from full buildout of the project in comparison to existing traffic conditions.

As shown on Tables 4.11-9 and 4.11-10, Project-related trips would not cause a substantial traffic noise increase to receptors located along the nearby freeways, but they would cause a substantial noise increase to most nearby roadways within and in the vicinity of the Specific Plan Area. It is important to note that most roadways are projected to have over a 5 dB increase which is considered to be a clearly noticeable change in noise level as shown on Table 4.11-1. In addition, as describe above in Section 4.11.B.2, the City of Tracy General Plan specifies that mitigation measures shall be required for new development projects that exceed the following criteria:

- Hansen Road from New Schulte Road to Old Schulte Road – single family homes (to be removed as part of Phase 1).
- *Hansen Road south of Old Schulte Road – single family homes*
- *Lammers Road from 11th Street to Capital Parks Drive-single family homes*
- *Lammers Road from Capital Parks Drive to New Schulte Road – Kimball High School*
- *Lammers Road from New Schulte Road to Old Schulte Road – single family homes*
- *Lammers Road from Old Schulte Road to Valpico Road – single family homes*
- *Lammers Road south of Valpico Road – single family homes*
- *Old Schulte Road from Hansen Road to Lammers Road – single family home (partially outside of Specific Plan Area)*
- *Valpico Road east of Lammers Road – single family home*

TABLE 4.11-9 **EXISTING CONDITIONS – PROJECT-RELATED TRAFFIC NOISE IMPACTS, ROADWAYS**

		CNEL at 100 Feet (dBA)[a]		
Roadway	Segment	No Project	With Project[b]	Project Contribution
Mountain House Parkway	*North of I-205*	*67.8*	*74.3*	*6.5*
Mountain House Parkway	I-205 to Road A	66.1	79.7	13.6
Mountain House Parkway	Road A to Capital Parks Drive	66.1	79.3	13.2
Mountain House Parkway	Capital Parks Drive to New Schulte Road	66.1	76.7	10.6
Mountain House Parkway	New Schulte Road to Old Schulte Road	66.1	76.1	10.0
Mountain House Parkway	*Old Schulte Road to I-580*	*66.6*	*74.6*	*8.0*
Mountain House Parkway	*South of I-580*	*64.3*	*65.8*	*1.5*
Hansen Road[3]	*North of Capital Parks Drive*	*57.6*	*71.5*	*13.9*
Hansen Road	Capital Parks Dr. to New Schulte Road	57.6	75.4	17.8
Hansen Road	New Schulte Road to Old Schulte Road	57.6	76.4	18.8
Hansen Road	*South of Old Schulte Road*	*60.8*	*64.4*	*3.6*
Lammers Road	*North of 11th Street*	*66.7*	*68.6*	*1.9*
Lammers Road	*11th Street to Capital Parks Drive*	*67.9*	*75.8*	*7.9*
Lammers Road	*Capital Parks Drive to New Schulte Road*	*67.9*	*76.2*	*8.3*
Lammers Road	*New Schulte Road to Old Schulte Road*	*66.0*	*75.3*	*9.3*
Lammers Road	*Old Schulte Road to Valpico Road*	*68.1*	*77.8*	*9.7*
Lammers Road	*South of Valpico Road*	*54.4*	*67.7*	*13.3*
Old Schulte Road	*West of Mountain House Pkwy.*	*65.2*	*66.8*	*1.6*

Roadway	Segment	CNEL at 100 Feet (dBA)[a] No Project	With Project[b]	Project Contribution
Old Schulte Road	Mountain House Pkwy. to Hansen Road	68.9	79.4	10.5
Old Schulte Road[3]	*Hansen Road to Lammers Road*	*67.3*	*80.0*	*12.7*
Valpico Road	East of Lammers Road	65.1	74.4	9.3
11th Street	West of Lammers Road	71.8	76.6	4.8
11th Street	East of Lammers Road	72.3	78.6	6.3

Note: *Italic = Roadways outside of Specific Plan Area.* Bold = Potentially significant noise impact.
[a] Project impacts evaluated by comparing existing conditions without and with Project buildout.
[b] Project buildout.
[c] Includes roadway segments inside and outside the Specific Plan Area.

TABLE 4.11-10 **EXISTING CONDITIONS PROJECT-RELATED TRAFFIC IMPACTS, FREEWAYS[1]**

Freeway	Segment	CNEL at 100 feet (dBA)[a] No Project	With Project[b]	Project Contribution
I-205	West of Mountain House Parkway	82.5	83.1	0.6
I-205	Mountain House Parkway to Tracy Boulevard	82.7	84.1	1.4
I-205	East of Tracy Boulevard	82.3	84.1	1.8
I-580	West of I-205 Interchange	85.3	85.9	0.6
I-580	I-205 Interchange to Patterson Pass Road	79.4	80.1	0.7
I-580	Patterson Pass Road to Corral Hollow Road	79.3	80.9	1.6
I-580	East of Corral Hollow Road	78.7	81.0	2.3

[a] Project impacts evaluated by comparing for existing conditions without and with Project buildout.
[b] Project buildout.

- *11th Street west of Lammers Road – single family homes*
- *11th Street east of Lammers Road – single family homes*

Implementation of the Project would result in a significant noise increase to noise sensitive receptors along roadways inside and outside the Specific Plan Area. Therefore, without mitigation, traffic noise increases on these roadways are considered a *significant* impact.

i. 2035 Conditions Plus Project Buildout

Tables 4.11-11 and 4.11-12 show the traffic noise increase that would result from buildout of the Project in comparison to long-range 2035 traffic conditions.

As shown on Tables 4.11-11 and 4.11-12 Project-related trips would not cause a substantial traffic noise increase to receptors located along the nearby freeways, but they would cause a substantial noise increase to most study area roadways (over a 5 dB increase) within and in the vicinity of the Specific Plan Area. (Roadways outside of the Specific Plan Area are shown in *Italics*):

- Mountain House Parkway from Road A to Capital Parks Drive – single family homes
- Mountain House Parkway from New Schulte Road to Old Schulte Road – single family home (outside of Specific Plan Area)
- *Hansen Road from Capital Parks Drive to north of Interstate 205 – single family homes (partially outside of Specific Plan Area)*
- Hansen Road from New Schulte Road to Old Schulte Road – single family homes (to be removed as part of Phase 1)
- Old Schulte Road from Hansen Road to Lammers Road – single family home

TABLE 4.11-11 **2035 CONDITIONS AND PROJECT-RELATED TRAFFIC NOISE IMPACTS-ROADWAYS**

		CNEL at 100 feet (dBA)[a]		
Roadway	Segment	No Project	With Project[b]	Project Contribution
Mountain House Parkway	*North of I-205*	*75.7*	*76.2*	*0.5*
Mountain House Parkway	I-205 to Road A	69.0	75.8	6.8
Mountain House Parkway	Road A to Capital Parks Drive	69.7	75.6	5.9
Mountain House Parkway	Capital Parks Drive to New Schulte Road	69.2	74.8	5.6
Mountain House Parkway	New Schulte Road to Old Schulte Road	68.7	72.5	3.8
Mountain House Parkway	Old Schulte Road to I-580	68.6	72.8	4.2
Mountain House Parkway	*South of I-580*	*65.3*	*67.2*	*1.9*
Hansen Road[3]	*North of Capital Parks Drive*	*60.0*	*70.1*	*10.1*
Hansen Road	Capital Parks Drive to New Schulte Road	68.4	71.5	3.1
Hansen Road	New Schulte Road to Old Schulte Road	69.4	73.4	4.0
Hansen Road	*South of Old Schulte Road*	*69.9*	*71.7*	*1.8*
Lammers Road	*North of 11th Street*	*72.8*	*72.8*	*0.0*
Lammers Road	*11th Street to Capital Parks Drive*	*76.6*	*77.6*	*1.0*
Lammers Road	*Capital Parks Drive to New Schulte Road*	*77.4*	*77.6*	*0.2*
Lammers Road	*New Schulte Road to Old Schulte Road*	*77.3*	*77.6*	*0.3*
Lammers Road	*Old Schulte Road to Valpico Road*	*77.9*	*78.8*	*0.9*
Lammers Road	*South of Valpico Road*	*77.3*	*78.3*	*1.0*
Old Schulte Road	*West of MHP*	*69.8*	*74.5*	*4.7*

TABLE 4.11-11 **2035 CONDITIONS AND PROJECT-RELATED TRAFFIC NOISE IMPACTS-ROADWAYS**

		CNEL at 100 feet (dBA)[a]		
Roadway	Segment	No Project	With Project[b]	Project Contribution
Old Schulte Road	Mountain House Pkwy. to Hansen Road	68.1	74.2	**6.1**
Old Schulte Road[3]	*Hansen Road to Lammers Road*	*70.4*	*74.1*	*3.7*
Valpico Road	*East of Lammers Road*	*69.5*	*72.9*	*3.4*
11th Street	*West of Lammers Road*	*75.7*	*76.2*	*0.5*
11th Street	*Ease of Lammers Road*	*69.0*	*75.8*	***6.8***

Notes: *Italics=Roadways outside of the Specific Plan Area;* **Bold**=Potentially significant noise impact.
[a] Project impacts evaluated by comparing 2035 cumulative without and with Project buildout.
[b] Project buildout.
[c] Includes roadway segments inside and outside the Specific Plan Area

TABLE 4.11-12 **2035 CONDITIONS AND PROJECT-RELATED TRAFFIC NOISE IMPACTS- FREEWAYS**[1]

		CNEL at 100 feet (dBA)[a]		
Freeway	Segment	No Project	With Project[b]	Project Contribution
I-205	West of Mountain House Parkway	84.1	84.5	0.4
I-205	Mountain House Parkway to Tracy Boulevard	85.3	85.9	0.6
I-205	East of Tracy Boulevard	86.6	87.2	0.6
I-580	West of I-205 Interchange	86.7	87.2	0.5
I-580	I-205 Interchange to Patterson Pass Road	80.3	80.8	0.5
I-580	Patterson Pass Road to Corral Hollow Road	80.9	82.0	1.1
I-580	East of Corral Hollow Road	80.3	82.0	1.7

[a] Project impacts evaluated by comparing 2035 conditions without and with Project buildout.
[b] Project buildout.

Based on the modeling results, development of the Project would result in a significant noise increase to noise sensitive receptors along roadways inside and outside the Specific Plan Area. Therefore, without mitigation, traffic noise increases on these roadways are considered a *significant* impact.

Mitigation of anticipated noise level increases to the existing school and residential receivers along the segments where impacts would occur would require a parcel-by-parcel review of potential exterior use areas and a confirmation of the acoustical performance of each building exposed to the increase. Such assessment would require site and grading data, building construction plans, and specific road alignments. Mitigation measures could possibly include paving roadways with rubberized asphalt, increasing the height of existing sound walls; constructing new sound walls; or retrofitting windows, walls, and doors to provide additional noise interior reduction.

It is important to note, however, that sound walls may be infeasible at most properties that front each road, since such walls would preclude adequate access to these existing properties. In addition, because a high percentage of traffic is related to trucks (where most of the noise is related to exhaust and engine noise, as opposed to tire/pavement noise which is the component that is reduced by the application of rubberized asphalt), rubberized asphalt is anticipated to have very limited benefits and would not be effective. Lastly, the retrofitting of windows, walls, and doors with improved noise-reduction materials would only address interior sound environments and would not treat exterior areas. Thus, this last option would not yield compliance with either the city's Noise Element or the Municipal Code standards.

Thus, the projected noise impacts to existing sensitive receptors within and outside of the Specific Plan Area would be significant and may not be able to be fully mitigated. Therefore, given the lack of feasible mitigation, traffic noise increases on the roadways identified above are considered a *significant and unavoidable* impact.

4. Create a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Construction is performed in distinct steps, each of which has its own mix of equipment, and, consequently, its own noise characteristics. The noise emissions from construction activities are typically localized and would occur intermittently for varying periods of time; depending on the type of project and on its particular stage of development. Table 4.11-13 lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and the noise receptor.

As illustrated in this table, large pieces of earth-moving equipment, such as graders, scrapers, and bulldozers generate maximum noise levels of 85 to 90 dBA at a distance of 50 feet. Typical hourly-average construction-generated noise levels are about 80 to 85 dBA measured at a distance of 50 feet from the noise source. Typical construction activities may elevate daytime noise levels at adjacent uses by as much as 15 to 20 dBA, depending on the type of construction activity and the location of the activity relative to the adjoining land use. In addition, pile driving can conceivably occur at some development sites during the early stages of construction.[11] This type of construction activity can produce very high noise levels – approximately 105 dBA at 50 feet – which are difficult to control. For individual, site-specific developments that do not include pile driving processes, the highest construction noise levels would typically be generated during grading, excavation, and foundation work, with lower noise levels occurring during building construction or infrastructure finishing.

[11] The need for pile driving will be dependent on the parcel-by-parcel geotechnical characteristics, as well as the foundational load bearing needs for each future project. For example, piles may be called for on individual, site-specific developments that utilize very heavy pieces of mechanical equipment (say, greater than 25,000 pounds in dead weight).

TABLE 4.11-13 **CONSTRUCTION EQUIPMENT NOISE EMISSION LEVELS**

Construction Equipment	Typical Noise Level (dBA) at 50 Feet	Construction Equipment	Typical Noise Level (dBA) at 50 Feet
Air Compressor	81	Pile-Driver (Impact)	101
Backhoe	80	Pile-Driver (Sonic)	96
Ballast Equalizer	82	Pneumatic Tool	85
Ballast Tamper	83	Pump	76
Compactor	82	Rail Saw	90
Concrete Mixer	85	Rock Drill	98
Concrete Pump	71	Roller	74
Concrete Vibrator	76	Saw	76
Crane, Derrick	88	Scarifier	83
Crane, Mobile	83	Scraper	89
Dozer	85	Shovel	82
Generator	81	Spike Driver	77
Grader	85	Tie Cutter	84
Impact Wrench	85	Tie Handler	80
Jack Hammer	88	Tie Inserter	85
Loader	85	Truck	88
Paver	89		

Source: Federal Transit Administration, Transit Noise, and Vibration Impact Assessment, 2006.

Normally, construction noise levels are analyzed using only spherical spreading loss of the sound energy, which results in propagation reductions at the rate of 6 dB for every doubling of distance between the noise source and a given receptor. However, during the early stages of development, the soft soil characteristics of the existing agricultural uses may afford additional ground effect attenuation which can increase the effective propagation reductions to 7.5 dB per doubling of distance. Further, as more development takes place, each previously constructed building would act as a sound barrier for some source-to-receptor propagation pathways. In short, the amount of construction noise experienced by any given on-site or off-site receptor would vary greatly and would depend on the overall propagation distance from the focal point(s) of the construction activities, the type of activities being conducted, the soil conditions between the source(s) and the receptor(s), and the presence of intervening structures (that will act as sound barriers). Additionally, several methods could be implemented to reduce noise during construction such as appropriate equipment selection, arranging staging areas as far as possible from nearby noise-sensitive areas, and/or the use of temporary construction noise barriers.

The Tracy Municipal Code restricts the operation of pile drivers, hammers, and other loud noise sources between 10:00 p.m. and 7:00 a.m.[12] Further, the General Plan Noise Element generally restricts construction activities to the hours of 7:00 a.m. and 7:00 p.m. Under the premise that individual, site-specific development of parcels would follow this time-of-day restriction, future Specific Plan Area construction would be in compliance with the City of Tracy Municipal Code. However, possible future construction activities in close proximity to existing and/or previously completed land uses may cause notable sound level increases at these residential and commercial receptors, and therefore, future construction-related noise is considered to be a *potentially significant* impact.

[12] The word "construction" never appears in the Municipal Code under the Noise Control Section (Title 4, Chapter 4.12, Article 9), so this restriction is interpreted as covering activities associated with commercial building projects.

5. Noise related to an airport land use plan.

The Specific Plan Area is not located within an airport land use plan. Therefore, there would be no impact in this regard.

6. Noise related to a private airstrip.

The Specific Plan Area is not located within two miles of a public airport or public use airport, or within the vicinity of a private airstrip. Therefore, there would be no impact in this regard.

F. Cumulative Impacts

The Project would introduce the use of stationary equipment that would increase noise levels within the Specific Plan Area and vicinity. Based on the long-term stationary noise analysis, impacts from anticipated stationary sources would be less than significance with adherence to the Municipal Code. Because noise dissipates as it travels away from its source, noise impacts from on-site stationary sources would be limited to each of the respective sites and their vicinities. Therefore, as explained more fully above, it is not anticipated that existing sensitive receptors or future on-site Project users would be exposed to stationary noise levels in excess of the Municipal Code standards from the Project in combination with other past, present and reasonably foreseeable future stationary noise sources. Future development proposals within the City of Tracy would also require separate discretionary approvals and CEQA evaluation, which would require the study and mitigation of potential noise impacts, as feasible. Therefore, in conjunction with other cumulative projects, the Project would not have the potential to result in cumulatively significant stationary noise impacts.

Cumulative traffic noise impacts were addressed in Subsection E-3 above under the 2035 Plus Project Buildout scenario. Tables 4.11-14 and 4.11-15 show the cumulative traffic-related noise that would result from full buildout of the Project, combined with all other past, present, and reasonably foreseeable future developments with a comparison to existing conditions.

TABLE 4.11-14 **CUMULATIVE TRAFFIC NOISE- ROADWAYS**

		CNEL at 100 Feet (dBA)				
Roadway	Segment	Existing	2035 With Project[a]	Cumulative Increase	Project Contribution	Cumulative Impact?
Mountain House Parkway	N/O I-205	67.8	76.2	8.4	0.5	No
Mountain House Parkway	I-205 to Road A	66.1	75.8	9.7	6.8	Yes
Mountain House Parkway	Road A to Capital Parks Drive	66.1	75.6	9.5	5.9	Yes
Mountain House Parkway	Capital Parks Drive to New Schulte Road	66.1	74.8	8.7	5.6	Yes
Mountain House Parkway	New Schulte Road to Old Schulte Road	66.1	72.5	6.4	3.8	Yes
Mountain House Parkway	Old Schulte Road to I-580	66.6	72.8	6.2	4.2	Yes
Mountain House Parkway	S/O I-580	64.3	67.2	2.9	1.9	No
Hansen Road	N/O Capital Parks Drive	57.6	70.1	12.5	10.1	Yes
Hansen Road	Capital Parks Drive to New Schulte Road	57.6	71.5	13.9	3.1	Yes
Hansen Road	New Schulte Road to Old Schulte Road	57.6	73.4	15.8	4.0	Yes
Hansen Road	S/O Old Schulte Road	60.8	71.7	10.9	1.8	No
Lammers Road	N/O 11th Street	66.7	72.8	6.1	0.	No
Lammers Road	11th Street to Capital Parks Drive	67.9	77.6	9.7	1.0	No
Lammers Road	Capital Parks Drive to New Schulte Road	67.9	77.6	9.7	0.2	No
Lammers Road	New Schulte Road to Old Schulte Road	66.0	77.6	11.6	0.3	No
Lammers Road	Old Schulte Road to Valpico Road	68.1	78.8	10.7	0.9	No
Lammers Road	S/O Valpico Road	54.4	78.3	23.9	1.0	No
Old Schulte Road	W/O MHP	65.2	74.5	9.3	4.7	Yes
Old Schulte Road	MHP to Hansen Road	68.9	74.2	5.3	6.1	Yes
Old Schulte Road	Hansen Road to Lammers Road	67.3	74.1	6.8	3.7	Yes
Valpico Road	E/O Lammers Road	65.1	72.9	7.8	3.4	Yes

Note: Bold = Potentially significant noise impact.
[a] Project buildout..

TABLE 4.11-15 **CUMULATIVE TRAFFIC NOISE- FREEWAYS**

		CNEL at 100 Feet (dBA)				
Freeway	Segment	Existing	2035 With Project[a]	Cumulative Increase	Project Contribution	Significant Impact?
I-205	West of Mountain House Parkway	82.5	84.5	2.0	0.6	No
I-205	Mountain House Parkway to Tracy Boulevard	82.7	85.9	3.2	1.4	No
I-205	East of Tracy Boulevard	82.3	87.2	4.9	1.8	No
I-580	West of I-205 Interchange	85.3	87.2	1.9	0.6	No
I-580	I-205 Interchange to Patterson Pass Road	79.4	80.8	1.4	0.7	No
I-580	Patterson Pass Road to Corral Hollow Road	79.3	82.0	2.7	1.6	No
I-580	East of Corral Hollow Road	78.7	82.0	3.3	2.3	No

[a] Project buildout.

For the purpose of this analysis and to be consistent with both the Noise Element Objectives and Policies, as well as with typical CEQA practice for community noise impact assessments, a cumulative impact would occur when an overall increase over 5 dBA occurs, and the Project contribution is greater than 3 dBA. As shown on Tables 4.11-14 and 4.11-15, cumulative traffic noise impacts with this cumulative impact threshold would occur at several segments in the Specific Plan Area and vicinity. This would be a *significant impact* at the indicated roadway segments.

G. *Impacts and Mitigation Measures*

The noise- and vibration-related impacts, as discussed in detail above, as well as the related mitigation measures, are summarized as follows:

Impact NOISE-1: Regarding land use compatibility with respect to the City of Tracy General Plan Noise Element, exterior noise levels at areas designated for some Specific Plan Area site-specific developments could potentially reach the Noise Element's 'unacceptable' noise level thresholds due to future traffic noise. Thus, future noise levels at Specific Plan Area developments may result in *significant* impacts for buildings close to heavily-traveled roadways.

> Mitigation Measure NOISE-1: As part of the development process for each individual, site-specific project under the Specific Plan, the development at issue shall adhere to all applicable Building Code and Municipal Code provisions and standards[13] and other requirements, as noted in the above Regulatory Framework discussion. Regarding mitigation of impacts relating to mobile sources for an individual, site-specific project, the City will consider, as appropriate and feasible, a

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[13] For example, Section 5.507.4 of the 2010 California Green Building Standards Code requires that the building envelope assemblies must have a Sound Transmission Coefficient (STC) rating of at least 50 if buildings are to be located within 1,000 feet of freeways or on lands wherein sound levels at the property line regularly exceed 65 dBA.

variety of techniques to reduce noise, which may include, for example, building setbacks, berms, walls, fences of various materials, and rubberized asphalt, taking into account relevant General Plan policies (as they relate to sound walls) and the nature and location of sensitive receptors at issue.

Significance After Mitigation: While imposition of the above mitigation would reduce impacts to a certain extent, as feasible, for the reasons set forth in the Impact Analysis, mitigation of mobile source noise is unlikely to be reduced to a less than significant level. Accordingly, the impact in this regard would remain *significant and unavoidable*.

Impact NOISE-2: For construction-related vibration, construction activities would be localized, would occur intermittently and variably, and for any individual project site, would only occur for relatively short periods of time. However, numerous individual project sites could be developing concurrently; thereby effectively extending the construction period. Vibration effects could be reduced by a combination of appropriate equipment and process selection and by implementation of proper administrative controls. Even with these vibration reduction approaches, it is still possible that individual, site-specific developments could exceed either the annoyance threshold and/or the architectural damage threshold. This potential situation would be exacerbated with the use of standard pile driving techniques. As such, groundborne vibration from construction could result in a *potentially-significant* impact with respect to perception or architectural damage.

Mitigation Measure NOISE-2a: The following measures, in addition to the best practices for construction activities (as specified in Mitigation Measure NOISE-4), are recommended to reduce groundborne noise and vibration from construction activities:

1. Avoid impact pile driving process, when feasible. The use of a pre-drilling pile installation process shall be utilized when feasible, where

geological conditions permit their use, so as to reduce vibration levels at adjacent receptors.

2. Avoid using vibratory rollers and vibratory tampers near vibration-sensitive uses.

Mitigation Measure NOISE-2b: Before any individual, site-specific development conducts any high vibration-generating activities (such as pile driving or vibratory compacting) within one hundred (100) feet of existing structures, the following mitigation measures shall apply:

1. Develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before- and after-construction conditions. Construction contingencies would be identified for when vibration levels approached the limits. Vibration limits shall be applied to all vibration-sensitive structures located within 100 feet of each individual, site-specific development that is subject to this mitigation measure. Limits shall be based on Table 4.11-6 to preclude architectural damage and on Table 4.11-5 to preclude vibration annoyance. For the Specific Plan Area proposed development types (i.e. "institutional land uses with primarily daytime use"), the Table 4.11-5 Category 3 land uses would indicate a threshold of 83 VdB. For future developments that have special, vibration-sensitive operations or equipment,[14] the criteria in the FTA Guideline Manual, Table 8-3[15] should be implemented. The monitoring and construction contingency plan shall include the following contents described in Numbers 2 through 4 below.

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[14] This would include future developments that may use optical microscopes, lithography and inspection equipment (down to 1 micron detail), electron microscopes, and other extremely vibration-sensitive equipment.

[15] United States Department of Transportation, Federal Transit Administration, "Transit Noise and Vibration Impact Assessment" Manual, May 2006, page 8-8.

2. At a minimum, monitor vibration during initial demolition activities and during pile driving activities. Monitoring results may indicate the need for more or less intensive measurements.

3. When vibration levels approach the above limits, construction should be suspended and contingencies should be implemented to either lower vibration levels or to secure the affected structures.

4. Conduct post-survey on structures where either monitoring has indicated high levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.

Significance After Mitigation: With the implementation of the above measures, the vibration impacts during construction activities would be *less than significant*.

Impact NOISE-3: Implementation of the proposed Project would result in substantial traffic noise level increases on several on-site and off-site roadway segments around the Specific Plan Area, as discussed in detail above. These increases would start with the initial implementation of the Project and would continue to grow as the Project approached full buildout. The traffic noise assessment above focused on the full buildout conditions and followed the general development timeline assessed in the Project's traffic analysis. As such, the exact time at which each segment would be expected to cross the impact threshold is dependent on how fast the Specific Plan is implemented and on when each specific parcel was developed.

Mitigation Measure NOISE-3: Implement Mitigation Measure NOISE-1.

Significance After Mitigation: While imposition of the above mitigation would reduce impacts to a certain extent, as feasible, for the reasons set forth in the Impact Analysis, mitigation of mobile source noise is unlikely to be reduced to a less than significant level. Accordingly, the impact in this regard would remain *significant and unavoidable*.

Impact NOISE-4: Construction activities for individual, site-specific developments would be required to adhere to time-of-day restrictions in the City of Tracy Municipal Code and the General Plan Noise Element. However, possible future construction activities in close proximity to existing and/or previously completed land uses may cause notable sound level increases (by 15 to 20 dBA or more) at these sensitive receptors. Therefore, this is considered to be a *potentially significant* impact.

Mitigation Measure NOISE-4: The following measures, when applicable and feasible, shall be required to reduce noise from construction activities:

1. Ensure that all internal combustion engine-driven equipment is equipped with mufflers that are in good operating condition and appropriate for the equipment.
2. Utilize “quiet” models of air compressors and other stationary noise sources where such technology exists.
3. Locate stationary noise-generating equipment as far as reasonable from sensitive receptors when sensitive receptors adjoin or are near a construction Project area.
4. Prohibit unnecessary idling of internal combustion engines (i.e. in excess of five minutes).
5. Pre-drill foundation pile holes to minimize the number of impacts required to seat the pile.
6. Erect temporary noise control blanket barriers and/or temporary solid plywood fences[16] around construction sites adjacent to operational businesses or noise-sensitive land uses. This mitigation would only be necessary if (a) potential conflicts could not be resolved by proper scheduling and (b) the temporary barrier could

[16] Noise control blanket barriers can be rented and both this type of temporary wall and ones made with post-and-plywood panel techniques can be quickly erected.

demonstrate a benefit at the façade of the receptor building of at least 10 dB.

7. Route construction-related traffic along major roadways and as far as feasible from sensitive receptors.

8. Notify businesses and noise-sensitive land uses adjacent to construction sites of the construction schedule in writing. Designate a “Construction Liaison” that would be responsible for responding to any local complaints about construction noise. The liaison would determine the cause of the noise complaints (e.g. starting too early, bad muffler, etc.) and institute reasonable measures to correct the problem. A telephone number for the Liaison should be conspicuously posted at the construction site.

Significance After Mitigation: With the implementation of these detailed, site-specific construction noise reduction practices and with adherence to the City of Tracy time-of-day restrictions for heavy/noisy equipment usage, noise impacts during construction activities would be *less than significant*.

Impact NOISE-5: For the purpose of this analysis, a cumulative impact would occur when an overall increase over 5 dBA occurs, and the project contribution is greater than 3 dBA. As shown on Tables 4.11-14 and 4.11-15, cumulative traffic noise impacts with this cumulative impact threshold would occur at several segments in the Specific Plan Area and vicinity.

Mitigation Measure NOISE-5: Implement Mitigation Measure NOISE-1.

Significance After Mitigation. As discussed above in Impact NOISE-1 and NOISE-3, while implementation of Mitigation Measure NOISE-1 may reduce impacts to a certain extent, there is no feasible mitigation available to reduce the traffic noise impacts at all receptors to below the significance thresholds. In general, then, the Project’s cumulative traffic-related noise impacts would be *significant and unavoidable*.