3.9 - Noise

3.9.1 - Introduction

This section describes the existing noise setting including relevant acoustic fundamentals, ambient noise conditions and summary of regulations applicable to the Community Plan. Thresholds of significance are presented and an analysis of potential effects associated with implementation of the proposed project. Descriptions and analyses presented within this section are based on noise modeling performed by Extant Acoustical Consulting LLC. The noise modeling outputs are included in this EIR as Appendix F.

3.9.2 - Environmental Setting

Acoustic Fundamentals

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person. Common sources of environmental noise and relative noise levels are shown in Exhibit 3.9-1.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz (Hz), which is equivalent to one complete cycle per second.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. Sound level expressed in decibels (dB) is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure and the second pressure being that of the sound source of concern. For sound pressure in air, the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65-dB source of sound, such as a truck, when joined by another 65-dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100-fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason, the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise) such as automobiles, trucks, and airplanes and stationary sources (non-transportation noise) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (e.g., walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 3dBA (typical for hard surfaces, such as asphalt) to 4.5 dBA (typical for soft surfaces, such as grasslands) per doubling of distance, depending on the intervening ground type. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dBA per doubling of distance for hard and soft sites, respectively.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or “shielding” provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, as well as man-made features such as buildings, berms, and walls may be effective barriers for the reduction of source noise levels.

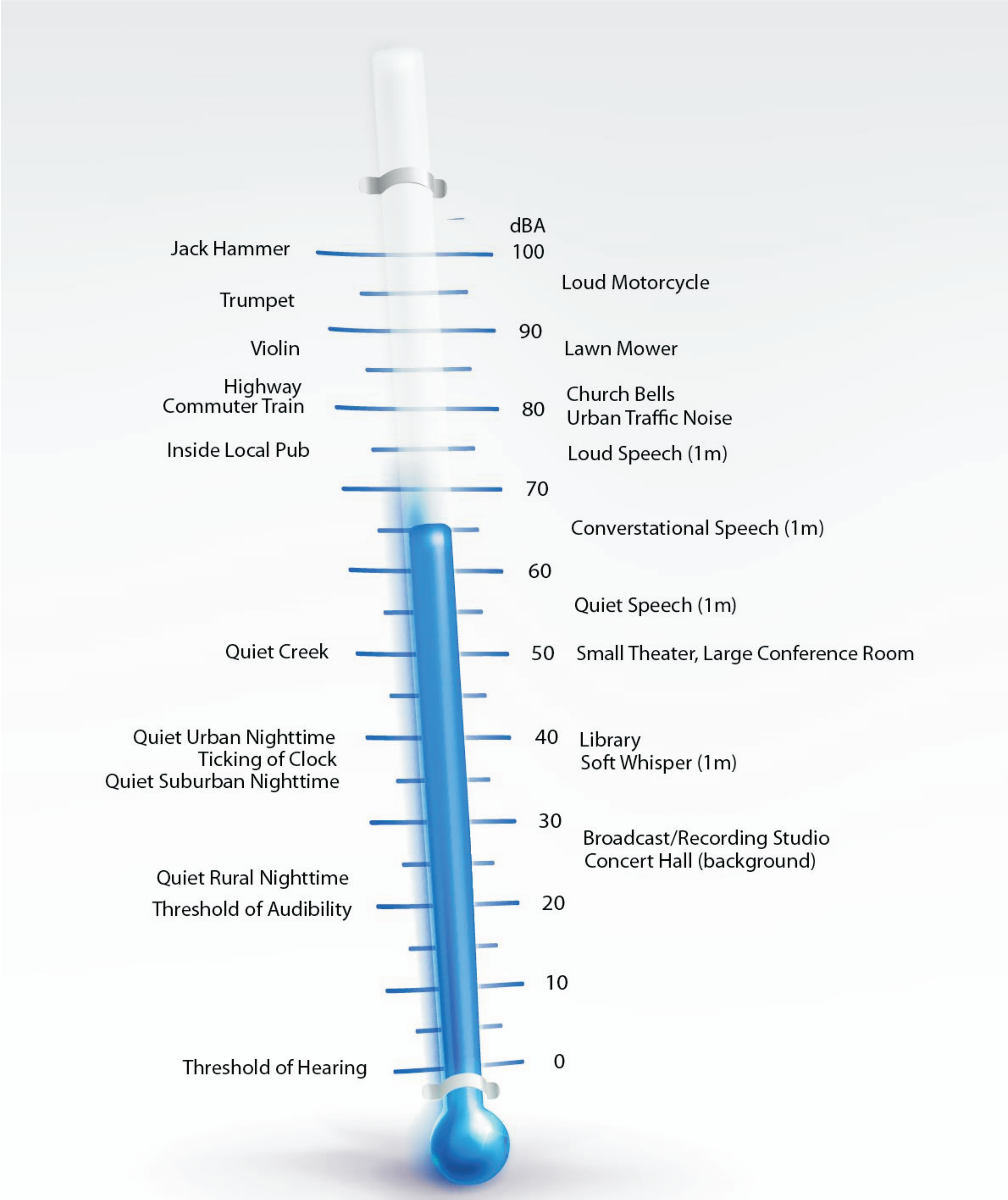
Noise Descriptors

The intensity of environmental noise levels can fluctuate greatly over time, and as such, several different descriptors of time-averaged noise levels may be used to provide the most effective means of expressing the noise levels. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment near the receptor(s). Noise descriptors most often used to describe environmental noise are defined below.

L_{max} (Maximum Noise Level): The maximum instantaneous noise level during a specific period of time.

L_{min} (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time.

L_x (Statistical Descriptor): The noise level exceeded X percent of a specific period of time. For example, L_{50} is the median noise level, or level exceeded 50 percent of the time.



Source: Fastl, et. al., 2006; Burge, 2002;
Adapted by Extant Acoustical Consulting, 2013

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Exhibit 3.9-1
Common Noise Sources and Levels

L_{eq} (Equivalent Noise Level): The average noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}. In noise environments determined by major noise events, such as aircraft over-flights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels.

L_{dn} (Day-Night Average Noise Level): The 24-hour L_{eq} with a 10-dBA "penalty" for noise events that occur during the noise-sensitive hours between 10 p.m. and 7 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5-dBA "penalty" added to noise events that occur during the noise-sensitive hours between 7 p.m. and 10 p.m., which are typically reserved for relaxation, conversation, reading and television. When the same 24-hour noise data are used, the reported CNEL is typically about 0.5 dBA higher than the L_{dn}.

SEL (Sound Exposure Level): The cumulative exposure to sound energy over a stated period of time; typically the energy of an event, summed into a one-second period of time.

Community noise is commonly described in terms of the ambient noise level which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent sound level (L_{eq})which corresponds to the steady-state A-weighted sound level containing the same total energy as the time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise. Use of these descriptors along with the maximum noise level occurring during a given time period provides a great deal of information about the ambient noise environment in an area.

Negative Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be to an individual.

With respect to how humans perceive and react to changes in noise levels, a 1-dBA increase is generally imperceptible outside of a laboratory environment, a 3-dBA increase is barely perceptible, a 6-dBA increase is clearly noticeable, and a 10-dBA increase is subjectively perceived as approximately twice as loud (Egan 1988). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state, pure tones or broad-band noise and to changes in levels of a given noise source. Perception and reaction to changes in noise levels in this manner is thought to be most applicable in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

Vibration Fundamentals

Vibration is similar to noise in that it is a pressure wave traveling through an elastic medium involving a periodic oscillation relative to a reference point. Vibration is most commonly described in respect to the excitation of a structure or surface, such as in buildings or the ground. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery) or transient in nature (e.g., explosions, impacts). Vibration levels can be depicted in terms of amplitude and frequency—relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal, or the quantity of displacement measured from peak to trough of the vibration wave. Root-mean-square is defined as the positive and negative statistical measure of the magnitude of a varying quantity. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a period of one second. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006, California Department of Transportation [Caltrans] 2004). PPV and RMS vibration velocity are nominally described in terms of inches per second (in/sec). However, as with airborne sound, vibration velocity can also be expressed using decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration and allow for the presentation of vibration levels in familiar terms.

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. Human response to vibration has been found to correlate well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the elevated levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration relevant to this analysis occurs from approximately 60 VdB, which is the typical background vibration-velocity level; to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006). Table 3.9-1 identifies some common sources of vibration, corresponding VdB levels, and associated human perception and potential for structural damage.

Table 3.9-1: Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB (re 1 µinch/sec, RMS)	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
	95	Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events	75	Commuter rail, typical bus or truck over bump or on rough roads
Residential annoyance, frequent events	72	Rapid transit, typical
Approximate human threshold of perception to vibration	65	Buses, trucks, and heavy street traffic
	60	Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	—

Source: U.S. Department of Transportation, Federal Transit Administration, May 2006.

Existing Noise Environment

The Warm Springs/South Fremont Community Plan area is located in the southern portion of Fremont. The plan area is generally bounded by Interstate 880 (I-880) to the west; Auto Mall Parkway (north); Interstate 680 (I-680) to the east; and Mission Boulevard (State Route 262[SR-262]) to the south. The plan area is bisected north to south by the existing Union Pacific Rail Road corridor and the Bay Area Rapid Transit (BART) Warm Springs Extension and station, which are currently under construction.

The plan area is characterized by large-parcels of underdeveloped and partially developed commercial and industrial properties. Developed areas surrounding the Community Plan area incorporate a mix of professional, commercial and industrial uses; along with multiple-family and single-family residences with supporting neighborhood commercial-retail uses.

The Community Plan area has a number of existing noise sources influencing the ambient noise environment. The most dominant noise source affecting the plan area is transportation noise, primarily generated from vehicular traffic on the local and regional roadway network and rail-line operations on the railroad corridor bisecting the plan area. Additionally, the area experiences aircraft over-flights, which a review of radar data for the area indicates to be largely associated with aircraft on approach to San Francisco International Airport (SFO) and Oakland International Airport (OAK), and operations of the San Jose International Airport (SJC). Light industrial facilities and commercial areas throughout the Community Plan area and surrounding community contribute to the ambient noise levels in the plan area to a lesser extent.

The existing ambient noise environment in the plan area was quantified through field surveys, implementation of a noise-monitoring program, and the application of accepted reference data and noise prediction methodologies. Separate discussions of identified major noise sources and their respective effects are provided in the following sections.

Existing Noise-Sensitive Land Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of the intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Existing land uses within the plan area consist of general commercial, service commercial, industrial, research and development and retail.

Noise-sensitive land uses in the vicinity of the Community Plan area are primarily single-family and multi-family residences located north of Auto Mall Parkway, east of I-680, and south of Mission Boulevard. Existing land uses in the project vicinity are further outlined within Section 2, Project Description.

Sources: Extant Acoustical, 2013

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Exhibit 3.9-2
Ambient Noise Monitoring Locations

Existing Ambient Noise Survey

An ambient noise survey was conducted between September 4 and September 6, 2013, and between September 10 and September 11, 2013, to document the existing noise environment within the plan area and at nearby representative noise-sensitive receptors. Specific consideration was given to document noise levels in the vicinity of nearby noise-sensitive receptors, and additionally to document existing periodic noise source levels in the plan area. Noise measurements were performed in accordance with American National Standards Institute (ANSI) and American Standards for Testing and Measurement (ASTM) guidelines, at 12 locations in the plan area.

Long-term noise monitoring was performed at four locations in the plan vicinity. The long-term noise monitoring equipment was configured to operate in a continuous manner, cataloging all noise metrics pertinent to identification and evaluation of noise levels (L_{eq}, L_{max}, L_n, etc.) in the project vicinity. Ambient noise levels recorded at the long-term noise monitoring locations are presented in Table 3.9-2. Short-term noise monitoring was conducted at eight locations to provide additional insight into the existing ambient noise environment in the plan area. Monitoring equipment was configured to catalog pertinent noise metrics as identified above. Ambient noise level data cataloged at the short-term monitoring locations is presented in Table 3.9-3. Ambient-noise survey locations are shown in Exhibit 3.9-2, above.

The primary noise source affecting all of the noise monitoring locations was vehicular traffic on the local and regional roadway network. Additional noise sources experienced during the noise-monitoring program included construction activities north of the project site, general landscaping activities, and an aircraft overflight. Ambient noise level exposure at the monitoring locations were dependent on the relative distance from nearby roadways and rail corridors to noise measurement locations, and shielding provided by nearby existing structures.

During the long-term noise monitoring, average day-night (L_{dn}) noise levels ranged from approximately 56 to 70 dBA L_{dn} in the plan area. Short-term monitoring recorded average noise levels (L_{eq}) ranging from approximately 54 to 70 dBA, with background (L_{90}) noise levels ranging from approximately 48 to 62 dBA and maximum noise levels from 60 to 91 dBA L_{max}.

Noise measurements were performed using Larson Davis Laboratories (LDL) Model 820 and Model 831, Type 1 precision integrating sound level meters (SLMs). Field calibrations were performed on the SLMs with acoustic calibrators before and after the measurements. All instrumentation components, including microphones, preamplifiers, and field calibrators have laboratory certified calibrations traceable to the National Institute of Standards and Technology (NIST). The equipment used meets all pertinent specifications of the ANSI for Type 1 SLMs (ANSI S1.4-1983 [R2006]). Meteorological conditions during the monitoring periods were stable with temperatures ranging from 53 to 87 degrees Fahrenheit (F), light winds from seven to 10 miles per hour, and clear skies.

Table 3.9-2: Summary of Long-Term Ambient Noise Measurements

Site	Location	L_{dn}	Average Noise Level (dBA)							
			Daytime				Nighttime			
			L_{eq}	L_{max}	L_{50}	L_{90}	L_{eq}	L_{max}	L_{50}	L_{90}
LT-1	Southern end of Lopes Court.	56.2	53.9	69.1	49.1	47.2	48.5	63.4	43.4	41.9
LT-2	Southern boundary of Planning Area 9	69.5	63.1	76.6	61.2	58.4	63.1	71.4	60.3	55.6
LT-3	Southern boundary of Planning Area 10	62.3	58.5	75.2	55.8	51.3	55.3	68.7	48.9	46.1
LT-4	South east boundary of Planning Area 1	63.4	58.7	75.1	56.6	52.2	56.6	70.9	49.0	45.1

Notes:
dBA = A-weighted decibels; L_{dn} = Day Night noise level; L_{eq} = average equivalent noise level; L_{max} = maximum noise level. L_{50} = sound level exceeded 50 percent of the period; L_{90} = sound level exceeded 90 percent of the period.
Source: Extant Acoustical Consulting LLC, 2013.

Table 3.9-3: Summary of Short-Term Ambient Noise Measurements

Site	Location	Date/ Time	Duration Min.	Average Noise Level (dBA)				Noise Sources
				L_{eq}	L_{max}	L_{50}	L_{90}	
ST-01	Ute Court	03:48 p.m. 04/09/13	10	55.8	60.1	55.6	53.4	I-680 traffic, aircraft flyovers, cars street-racing, birds
		08:51 a.m. 10/09/13	10	55.1	60.6	54.9	52.5	
ST-02	Boxwood Way	04:45 p.m. 04/09/13	10	54.6	64.4	53.5	51.3	I-680 traffic, aircraft flyovers, birds, talking, local traffic
		09:20 a.m. 10/09/13	10	54.1	64.2	53.3	51.4	
ST-03	Grimmer Blvd. and Old Warm Springs Blvd.	09:41 a.m. 05/09/13	15	59.4	72.3	56.3	50.3	Traffic on Grimmer, light traffic on Old Warm Springs Blvd.
ST-04	Fremont Blvd. and Ingot St.	10:37 a.m. 05/09/13	15	62.9	77.0	61.2	54.2	Traffic from Fremont and Tesla, aircraft flyovers, rebar facility noise
ST-05	Warm Springs Blvd. and Brown Rd.	11:28 a.m. 05/09/13	15	68.0	77.2	66.0	59.4	Traffic, back up alarms, light industrial noise
ST-06	Warm Springs Blvd. and Skyway Ct.	11:40 a.m. 06/09/13	15	64.7	76.0	62.6	55.2	Traffic, birds, truck idling
ST-07	Mission Blvd. (North)	02:51 p.m. 06/09/13	15	70.3	91.0	66.7	61.8	Traffic, horns, motorcycle

Table 3.9-3 (cont.): Summary of Short-Term Ambient Noise Measurements

Site	Location	Date/ Time	Duration Min.	Average Noise Level (dBA)				Noise Sources
				L_{eq}	L_{max}	L_{50}	L_{90}	
ST-08	Fremont Blvd. and Pestana Way	10:46 a.m. 10/09/13	10	55.2	68.9	52.1	48.6	Trucks, industrial noise, cars, small aircraft flyover
		10:56 a.m. 10/09/13	10	58.5	72.9	52.8	49.0	

Notes:
d_{BA} = A-weighted decibels; L_{eq} = average equivalent noise level; L_{max} = maximum noise level; L_{50} = sound level exceeded 50 percent of the period; L_{90} = sound level exceeded 90 percent of the period.
Locations of noise monitoring sites are shown on Exhibit 3.9-2.
Source: Extant Acoustical Consulting LLC, 2013.

Existing Traffic Noise

Existing traffic noise levels were modeled for roadway segments in the project vicinity based on the Federal Highway Administration (FHWA) Highway Traffic Noise Model (TNM) Version 2.5® prediction methodologies (FHWA 1998), and traffic data provided in the traffic impact study prepared for the project (Fehr and Peers 2013). The FHWA TNM incorporates state-of-the-art sound emissions and sound propagation algorithms, based on well-established theory and accepted international standards. The acoustical algorithms contained within the FHWA TNM have been validated with respect to carefully conducted noise measurement programs, and show excellent agreement in most cases for sites with and without noise barriers. The noise modeling accounted for factors as vehicle volume, speed, vehicle type, roadway configuration, distance to the receiver, and propagation over different types of ground (acoustically soft and hard ground).

To determine existing L_{dn} traffic noise levels in the project vicinity, the average daily traffic (ADT) volumes for roadways in the immediate vicinity of the project site were used as inputs to the noise model. Traffic data was provided in terms of peak-hour turning movements at intersections in the plan area. ADT volumes were calculated by summing all traffic movements for both the AM and PM peak hours, existing on- or turning on to a particular roadway segment during the peak-hour and multiplying the total peak-hour volume by a “k-factor” of 5.

Modeled existing traffic noise levels are summarized in Table 3.9-4, at a representative distance of 100 feet from the centerline of each major roadway in the project vicinity and distances from roadway centerlines to the 60-, 65-, and 70-dBA L_{dn} traffic noise level contours. The extent to which existing land uses in the plan area are affected by existing traffic noise depends on their respective proximity to the roadways and their individual sensitivity to noise. As shown in Table 3.9-4, the location of the 60-dBA L_{dn} traffic noise contour along the local roadway network ranges from within the right-of-way to approximately 753 feet from the centerline of the modeled roadways, with the 60-dBA contour for I-680 and I-880 ranging out to approximately 3,200 feet. Refer to Appendix F of this EIR for complete modeling inputs and results.

Table 3.9-4: Summary of Modeled Existing Traffic Noise Levels (dBA)

Roadway	Segment		ADT[1]	L_{dn} at 100 ft.	Distance to L_{dn} Contour (feet)		
	From	To			70 dBA	65 dBA	60 dBA
Auto Mall Parkway	Grimmer Boulevard	Fremont Boulevard	28,015	68.0	73	158	339
Auto Mall Parkway	Fremont Boulevard	Osgood Road	35,750	69.0	86	185	399
Auto Mall Parkway	Osgood Road	I-680 NB	35,000	68.9	85	183	394
Auto Mall Parkway	I-680 SB	I-680 NB	21,825	66.9	62	133	287
Durham Road	I-680 NB	Paseo Padre Parkway	8,465	62.8	33	71	153
Fremont Boulevard	Auto Mall Parkway	Old Warm Springs Boulevard	19,915	66.5	58	125	270
Fremont Boulevard	Old Warm Springs Boulevard	S Grimmer Boulevard	14,310	65.0	47	101	217
Fremont Boulevard	S Grimmer Boulevard	Ingot Street	19,335	66.4	57	123	265
Fremont Boulevard	Ingot Street	I-880 NB	20,810	66.7	60	129	278
Fremont Boulevard	I-880 NB	I-880 SB	21,970	66.9	62	134	289
Old Warm Springs Boulevard	Fremont Boulevard	S Grimmer Boulevard	3,945	60.8	24	52	113
Lopes Court	S Grimmer Boulevard	End of Lopes Court	140	42.5	1	3	7
Osgood Road	Auto Mall Parkway	S Grimmer Boulevard	12,020	65.6	51	110	237
Warm Springs Boulevard	S Grimmer Boulevard	Old Warm Springs Boulevard	17,665	67.3	66	142	307
Warm Springs Boulevard	Old Warm Springs Boulevard	Mission Boulevard	16,555	67.0	63	136	294
Warm Springs Boulevard	Mission Boulevard	E Warren Avenue	17,145	67.2	65	139	301
S Grimmer Boulevard	Paseo Padre Parkway	Warm Springs Boulevard	7,100	63.3	36	77	167
S Grimmer Boulevard	Warm Springs Boulevard	Old Warm Springs Boulevard	14,495	66.4	58	125	269
S Grimmer Boulevard	Old Warm Springs Boulevard	Kato Road	10,925	65.2	48	103	223
S Grimmer Boulevard	Kato Road	Fremont Boulevard	9,090	64.4	42	91	197

Table 3.9-4 (cont.): Summary of Modeled Existing Traffic Noise Levels (dBA)

Roadway	Segment		ADT[1]	L_{dn} at 100 ft.	Distance to L_{dn} Contour (feet)		
	From	To			70 dBA	65 dBA	60 dBA
S Grimmer Boulevard	Fremont Boulevard	Auto Mall Parkway	9,690	64.7	44	95	205
Paseo Padre Parkway	Auto Mall Parkway	S Grimmer Boulevard	6,035	58.9	18	39	84
Paseo Padre Parkway	S Grimmer Boulevard	Mission Boulevard	5,315	58.3	17	36	77
Mission Boulevard	Paseo Padre Parkway	I-680 NB	18,375	69.5	92	199	428
Mission Boulevard	I-680 NB	I-680 SB	28,530	71.4	124	267	574
Mission Boulevard	I-680 SB	Mohave Drive	42,780	73.1	162	349	753
Mission Boulevard	Mohave Drive	Warm Springs Boulevard	37,945	72.6	150	322	695
Mission Boulevard	Warm Springs Boulevard	I-880	38,735	72.7	152	327	704
Warren Avenue	East of	Warm Springs Boulevard	8,700	62.9	34	72	156
Warren Avenue	West of	Warm Springs Boulevard	13,950	64.9	46	99	213
I-680	Mission Boulevard	Auto Mall Parkway	136,000	82.5	677	1458	3142
I-680 NB Ramp	Mission Boulevard	I-680	225	52.6	7	15	32
I-680 NB Ramp	I-680	Mission Boulevard	5,115	66.2	56	120	259
I-680 SB Ramp	I-680	Mission Boulevard	7,755	68.0	74	159	342
I-680 SB Ramp	Mission Boulevard	I-680	9,115	68.7	82	177	381
I-880	Mission Boulevard	Auto Mall Parkway	178,000	82.5	685	1476	3179

Notes:
dBA = A-weighted decibels; L_{dn} = average day-night noise level.
ADT – Average Daily Traffic Volumes. ADT volumes calculated based on peak-hour turning movements provided in the
Not accounting for shielding provided by natural or man-made intervening objects. Actual distance to real-world noise level contours will be dependent upon shielding effects in the environment under consideration.
Source: Extant Acoustical Consulting LLC, 2013.

Railroad Operations

Existing railroad operations in the City of Fremont include freight and passenger train operations on the Union Pacific Railroad (UPRR) tracks and activities at the rail yard. The UPRR tracks and rail yard are centrally located, bisecting the Community Plan area. Noise associated with train pass-bys along the UPRR railroad line occurs throughout the central portion of the plan area. To quantify railroad noise levels on the project site, Extant Acoustical Consulting LLC conducted noise level measurements on the project site near the rail line. The sound level meter was programmed to collect overall sound levels, log train pass-by events at the site and summarize the pass-by events in the form of SEL data. During the 24-hour continuous railroad noise measurement survey, 19 railroad events were logged. The SEL data indicated that the typical train operation resulted in levels of 77 dB to 96 dB SEL, at a distance of 82 feet from the effective acoustical centerline of the railroad corridor. Based on the measured SEL train pass-by data at the site, typical noise levels associated railroad operations were predicted. The predicted railroad noise levels are provided in Table 3.9-5 at a standardized reference distance of 100-feet from the railroad centerline, with distances to the 60 dB, 65 dB and 70 dB L_{dn} noise level contours.

Table 3.9-5: Railroad Noise Levels

L_{dn}, at 100 feet	Distance to L_{dn} Contour (feet)		
	70 dBA	65 dBA	60 dBA
56 dBA	12	25	54

Notes:
dBA = A-weighted decibels L_{dn} = average day-night noise level.
Not accounting for shielding provided by natural or man-made intervening objects. Actual distance to real-world noise level contours will be dependent upon shielding effects in the environment under consideration.
Source: Data modeled by Extant Acoustical Consulting LLC, 2013.

Existing Vibration

The existing vibration environment, similar to that of the noise environment, is dominated by transportation-related vibration from roadways in the proposed Community Plan area. Heavy truck traffic can generate groundborne vibration, which varies considerably depending on vehicle type, weight, and pavement conditions. However, groundborne vibration levels generated from vehicular traffic are not typically perceptible outside of the roadway right-of-way.

3.9.3 - Regulatory Framework

Various private and public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and other adverse physiological and sociological effects associated with noise. Applicable standards and guidelines are described below.

Federal

Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, the EPA's

Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982, responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the EPA rulings in prior years are still adhered to by designated federal agencies where relevant. No federal noise regulations are applicable to the Community Plan.

Federal Transit Administration – Vibration

FTA has set forth guidelines for maximum-acceptable vibration criteria to address the human response to groundborne vibration for different types of land uses. These include 65 VdB (re: µ-in/sec RMS) for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bio Acoustics, and Bio Mechanics (CHABA) at the request of the EPA (FTA 2006). For fragile structures, CHABA recommends a maximum limit of 0.25 inch per second (in/sec PPV).

State

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

California Code of Regulations, Title 24

Title 24, also known as the California Building Standards Code, establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for both exterior-to-interior sound insulation as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24 regulations state that interior noise levels generated by exterior noise sources shall not exceed 45 dBA L_{dn}, with windows closed, in any habitable room for general residential uses. These regulations are applicable to the proposed Community Plan.

Governor's Office of Planning and Research

The State of California, Governor's Office of Planning and Research (OPR), published the State of California General Plan Guidelines (OPR 2003), which provides guidance for the acceptability of projects within specific day-night average noise level (L_{dn}) contours. Table 3.9-6 summarizes acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Generally, residential uses (e.g., single-family homes, mobile homes) are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA L_{dn}. Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 55 to 70 dBA L_{dn}. Schools are normally acceptable in areas up to 70 dBA L_{dn} and normally unacceptable in areas exceeding 70 dBA L_{dn}. Commercial uses are normally acceptable in areas up to 70 dBA L_{dn}. Between 67.5 and 77.5 dBA L_{dn}, commercial uses are conditionally acceptable, depending on the noise insulation features and the noise reduction requirements.

Table 3.9-6: Summary of Land-Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (dBA L_{dn})			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—Low-Density Single-Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential—Multifamily	<65	60–70	70–75	75+
Transient Lodging—Motel, Hotel	<65	60–70	70–80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	80+
Auditoriums, Concert Halls, Amphitheaters	—	<70	65+	—
Sports Arena, Outdoor Spectator Sports	—	<75	70+	—
Playgrounds, Neighborhood Parks	<70	—	67.5–75	72.5+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75	—	70–80	80+
Office Building, Business Commercial, and Professional	<70	67.5–77.5	75+	—
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	—

Notes:
dBA = A-weighted decibels; L_{dn} = day-night average noise level
[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
[4] New construction or development should generally not be undertaken.
Source: OPR 2003.

California Department of Transportation – Vibration

For the protection of fragile, historic and residential structures, Caltrans recommends a threshold of 0.2 in/sec PPV for normal residential buildings and 0.08 in/sec PPV for old or historically significant structures. These standards are more stringent than the federal standard established by the Committee of Hearing, Bioacoustics, and Biomechanics (CHABA), presented above.

Local

City of Fremont

General Plan

The City of Fremont General Plan sets forth the following goals, policies, and implementation measures related to noise:

- **Goal 10-8 and Policy 10-8.1** call for minimizing noise and vibration impacts to residents and property. Implementation 10-8.1.A sets forth the City's Land Use Compatibility for Community Exterior Noise Environments matrix, which is provided in Table 3.9-7.

Table 3.9-7: Land Use Compatibility Chart for Community Exterior Noise Environments (Table 10-4 of the Fremont General Plan)

Land Use Category	Exterior Noise Exposure (L_{dn})							
	<55	55	60	65	70	75	80	>80
Single-Family and Multi-Family Residential	NA	NA	CA	CA	CA	U	U	U
Hotels, Motels and other lodging	NA	NA	NA	CA	CA	U	U	U
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	NA	NA	NA	CA	CA	CA	U	U
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches	NA	NA	CA	CA	CA	U	U	U
Office Buildings, Business, Commercial, and Professional	NA	NA	NA	NA	CA	CA	U	U
Auditoriums, Concert Halls, Amphitheaters	CA	CA	CA	CA	U	U	U	U

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

- Policies 10-8.4, 10-8.5, 10-8.6, 10-8.7, and 10-8.9 call for controlling noise sources from commercial and industrial sources, limiting construction noise, protecting sensitive uses, use of quiet paving materials, and controlling vibration.

Municipal Code

The City of Fremont's Municipal Code contains additional guidance with the intent to control noise and vibration, and to promote and maintain the health, safety and welfare of its citizens. Portions of the City of Fremont Municipal Code with the potential to pertain to the proposed project are represented below.

17.25.110 Noise attenuation – Residential lots adjacent to freeways, railroads, thoroughfares, parkways and certain uses.

- Residential lots adjacent to the right-of-way of a freeway, railroad (including rapid transit district line), thoroughfare or parkway, or to industrial, commercial or recreational uses, shall be protected by suitable noise attenuation structures and/or design features, including but not limited to walls, fences and mounds, which are capable of reducing the community noise equivalent level (CNEL) emanating from such uses or rights-of-way to such lots to 60 dB(A); provided, however, that where the planning manager finds, based upon studies in the possession of the city as to the existing or projected ambient noise levels adjacent to any such right-of-way or use, that such community noise equivalent level will be at an acceptable level, or that the CNEL noise level on the residential lots will be reduced to 60 dB(A) or less by a reduction of noise transmitted to the subject site through the enforcement of other provisions of this code, including but not limited to noise performance standards and use permit conditions, the report prepared by a professional acoustician may be waived. The advisory agency shall have the power to require, as a condition of approval of a tentative map or tentative parcel map, that the subdivider install such noise attenuation structures or design features adjacent to such residential lots as are recommended in the acoustician's report as will be sufficient to reduce the community noise equivalent level to one which is normally acceptable.

18.25.700 Day and night average sound level.

- "Day-night average sound level (L_{dn})" shall mean the A-weighted average sound level for a given area (measured in decibels) during a 24-hour period with a 10 dB weighting applied to night-time sound levels.

18.50.040 Performance standards.

(a) Performance standards are established to ensure that adjoining properties, persons and the community as well as the region are provided protection against adverse conditions which may be created by the various uses operating within the industrial zoning districts. All uses within the I-L, I-R, and G-I districts, whether accessory, permitted, zoning administrator, or conditional, shall comply with the following performance standards.

(1) Noise. At all property lines, as measured consistent with subsection (c) of this section, the maximum noise level generated by any user shall not exceed an L_{dn} level of 70 dB when adjacent users are industrial or wholesale users. When adjacent to offices, retail, or sensitive industries, the noise level at all property lines shall be limited to an L_{dn} level of 65 dB. When users are adjacent or contiguous to residential, park, or institutional uses, the maximum noise level shall not exceed an L_{dn} level of 60 dB. Excluded from these standards are occasional sounds generated by the movement of railroad equipment, temporary construction activities or warning devices. Each of the noise level

standards specified in this section shall be reduced by five dB(A) for single-tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises when the site is adjacent to residential areas.

(2) Vibrations. No vibration shall be permitted which is discernible without instruments at any property line, as measured consistent with subsection (c) of this section.

(c) All measurements to determine the existence of any violation of the performance standards shall be made by the enforcing agency at the property line nearest the source of the suspected violation, except measurements of fire hazards, solid industrial wastes, or liquid wastes.

18.160.010 Construction hours – Limitations.

(a) Except as modified herein, construction activity for development projects in any zoning district on any property within 500 feet of one or more residences, lodging facilities, nursing homes or inpatient hospitals shall be limited to the weekday hours of 7:00 a.m. to 7:00 p.m. and the Saturday or holiday hours of 9:00 a.m. to 6:00 p.m., while Sunday construction is not allowed. Construction activity for projects not located within 500 feet of residences, lodging facilities, nursing homes or inpatient hospitals shall be limited to the weekday hours of 6:00 a.m. to 10:00 p.m. and the weekend or holiday hours of 8:00 a.m. to 8:00 p.m. A holiday shall be as defined in Section 2.35.010.

(b) Resident homeowners and their uncompensated volunteer workers performing construction activity on their own single-family detached home shall be limited to the weekday hours of 7:00 a.m. to 8:00 p.m. and the weekend hours of 8:00 a.m. to 8:00 p.m.

(c) This section shall not apply to construction necessary to prevent or repair an emergency condition, as reasonably determined by the city manager's designee.

(d) Projects requiring a permit under the authority of this code shall have construction hours noted on the cover sheet of the construction plans.

(e) Projects requiring a permit under the authority of this code, except additions and alterations to single-family residential homes or lots, shall have an all-weather notice board conspicuously placed adjacent to the most visible public right-of-way for the duration of construction activity. The placement, format and content of the notice board shall be prescribed by city staff, and shall contain, at a minimum, summary project information, allowable construction hours, and city staff contact information.

(f) The city manager's designee shall have the authority to modify these hours under any of the following conditions:

(1) To facilitate staff supervision or inspection or when the applicant is required to comply with more restrictive provisions of this code, state or federal law.

(2) When, based upon the nature of nearby uses and/or site-specific considerations, he or she makes a finding that such modified construction hours are reasonably foreseeable to result in an equal or superior level of comfortable enjoyment of life and property by the community.

(3) When the project is located in a right-of-way or easement or on publicly owned property, and such modified hours, on balance, will minimize disruption to the community as a whole, such as to facilitate the orderly flow of traffic or to reduce negative impacts on commercial or residential activity.

(g) Violations of the provisions of this section shall be considered a public nuisance as defined in Section 8.60.040 for purposes of enforcement and remedy. In addition to the provisions of Title 8, staff shall have the power to withhold inspections if construction hours are not observed.

Methodology

Extant Acoustical Consulting LLC evaluated noise impacts associated with the proposed Warm Springs/South Fremont Community Plan. Potential noise impacts associated with the proposed project were calculated and analyzed based on project information; information contained in the traffic analysis prepared for this project; and data obtained during onsite noise monitoring. Observations made during the site survey along with land-use information and aerial photography was used to determine potential locations of sensitive receptors in the project vicinity.

The SoundPLAN® computer noise model was used for computing short-term and long-term sound levels within the Community Plan area and throughout the surrounding community. An industry standard, SoundPLAN was developed by Braunstein + Berndt GmbH to aid in the calculation of sound levels from various noise sources, while taking into account the effects of relative exposure, shielding due to intervening objects (buildings, hills, trees), and ground effects due to areas of hard ground (pavement, water) and soft ground (grass, field, forest). The model incorporated a three-dimensional geometric model of the plan area developed from digital terrain information, available Graphic Information Systems information, aerial photography and information provided by the project team. SoundPLAN uses established assessment methodologies and algorithms to propagate noise levels into the surrounding community. In addition to computing sound levels at specific receiver locations, SoundPLAN can compute depict the location of equal level noise contours for noise sources affecting the project area. Visual comparison of various project scenarios can be performed, providing an intuitive way to illustrate areas of potential affect or substantial changes are predicted to occur.

Noise prediction receivers were placed within the noise model, representing noise-sensitive receptors (single-family residences, multi-family residential outdoor activity areas, schools, etc.), locations of key interest, and the locations of the noise monitoring sites used during the field survey. Noise levels at the specified noise prediction receivers were calculated as outlined herein, based on the assessment methodologies and algorithms applicable to various noise sources affecting the Community Plan area and the surrounding community.

Construction-related noise effects were assessed with respect to nearby noise-sensitive receptors and their relative exposure (accounting for intervening topography, barriers, distance, etc.), based on application of FHWA Roadway Construction Noise Model (RCNM) and FTA reference noise level data and usage-factors. The specific noise prediction receivers used in the SoundPLAN model are described in Table 3.9-8. Exhibit 3.9-3 graphically presented the location of the noise prediction receiver locations overlaid on map of the project vicinity.

Traffic noise levels for the roadway network in the project vicinity were incorporated into the noise model based on traffic volume data contained in the traffic analysis prepared for the project. Traffic noise levels were calculated using the FHWA Traffic Noise Model (TNM) Version 2.5® prediction algorithms within the SoundPLAN model. Traffic noise levels were modeled for no-project and plus-project under existing conditions, background conditions and cumulative (2035) conditions. Modeling outputs for plus project scenarios were evaluated against the existing case to determine the potential for the proposed project to result in an increase of traffic noise levels and cause an exceedance of applicable noise level criteria and impact thresholds.

Table 3.9-8: Noise Prediction Receiver Locations

Receiver No.	Description	Land Use Type
Prediction Receivers		
P-01	Residences at Papilon Terrace	Multi-Family Residential
P-02	Residences at Montrose Avenue	Single Family Residential
P-03	Residences at Cassett Commons	Single Family Residential
P-04	Residences at Lupine Place	Single Family Residential
P-05	Residences at Pomace Street	Single Family Residential
P-06	Residences at Camellia Drive	Single Family Residential
P-07	Residences at Parkmeadow Place	Single Family Residential
P-08	Mandan Court Vacant Lot	Single Family Residential
P-09	Residences at Ute Court	Single Family Residential
P-10	Residences at Parkmeadow Court	Single Family Residential
P-11	Residences at Pomace Street, 2nd Row	Single Family Residential
P-12	Residences at Camellia Dr, 2nd Row	Single Family Residential
P-13	Residences at Mandan/Nakoma Court, 2nd Row	Single Family Residential
P-14	Residences at Parkmeadow Court, 2nd Row	Single Family Residential
P-15	Residences at Paseo Padre	Single Family Residential
P-16	Residences at Paseo Padre	Single Family Residential
P-17	Residences at Crystalline Drive	Single Family Residential
P-18	Residences at Eaves Fremont	Multi-Family Residential
P-19	Residences at Mohave Terrace	Multi-Family Residential
Monitoring Receivers		
ST-01	Ute Court	Single Family Residential
ST-02	Boxwood Way	Single Family Residential

Table 3.9-8 (cont.): Noise Prediction Receiver Locations

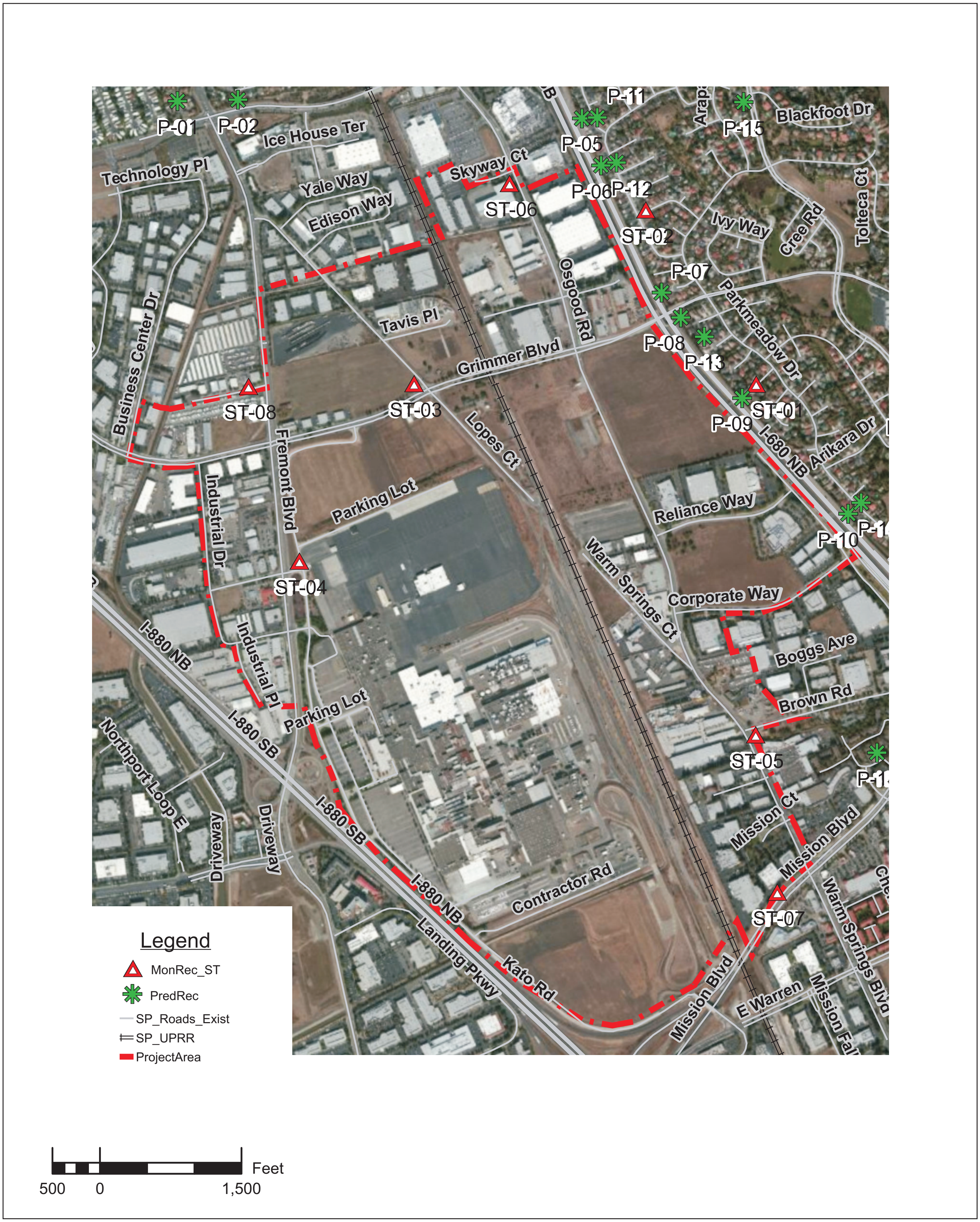
Receiver No.	Description	Land Use Type
ST-03	Grimmer Boulevard and Old Warm Springs Boulevard	—
ST-04	Fremont Boulevard and Ingot Street	—
ST-05	Warm Springs Boulevard and Brown Road	—
ST-06	Warm Springs Boulevard and Skyway Court	—
ST-07	Mission Boulevard	—
ST-08	Fremont Boulevard and Pestana Way	—

Note:
Receiver locations shown in Exhibit 3.9-3.
Source: Extant Acoustical Consulting LLC, 2013.

Potential effects associated with long-term noise sources were assessed based on project documentation, site reconnaissance data and reference noise level for the various noise sources. The propagation algorithm used for the evaluation of commercial-industrial noise sources was the ISO 9613-2[1] assessment methodology, within SoundPLAN. Use of this international standard propagation model is an accepted practice in the U.S. for industrial noise sources, due to its conservative propagation equations. ISO 9613-2 uses "worst-case" downwind propagation conditions in all directions, and accounts for variations in terrain and the effects of ground type.

Groundborne vibration impacts were qualitatively assessed based on existing reference documentation (e.g., vibration levels produced by specific construction equipment operations), through the application of Caltrans methodology outlined within the Transportation- and Construction- Induced Vibration Guidance Manual and the relative distance to potentially sensitive receptors from a given vibration source.

1 International Organization for Standardization (ISO), International Standard ISO 9613-2, "Acoustics – Attenuation of Sound during Propagation Outdoors," Part 2: General Method of Calculation, 1996-12-15.



Sources: Extant Acoustical, 2013

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Exhibit 3.9-3
Noise Prediction Receiver Locations

3.9.4 - Thresholds of Significance

According to Appendix G, Environmental Checklist, of the CEQA Guidelines, noise impacts resulting from the implementation of the proposed project would be considered significant if the project would cause:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c) Increase ambient noise levels in the project vicinity above levels existing without the project.

d) Temporarily or periodically increase ambient noise levels in the project vicinity above levels existing without the project.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels. (Refer to Section 7, Effects Found Not To Be Significant.)

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels. (Refer to Section 7, Effects Found Not To Be Significant.)

Generally, a project may have a significant effect on the environment if it would substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

For the proposed project, the significance of anticipated noise effects is based on a comparison between predicted noise levels and noise criteria defined by the City of Fremont. For this project, noise impacts are considered significant if existing or proposed noise-sensitive land uses would be exposed to noise levels in excess of the City of Fremont General Plan, Safety Element, and City of Fremont Municipal Code standards as described above.

3.9.5 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate.

Construction Noise

Impact NOI-1: Construction activities associated with the proposed project may expose sensitive receptors to noise levels in excess of adopted standards or cause a substantial temporary increase in ambient noise levels.

Impact Analysis

Adoption and implementation of the Warm Springs/South Fremont Community Plan would help guide and facilitate continued and further development of the plan area. Development of the Community Plan area would generate noise levels associated with the operation of heavy construction equipment and construction-related activities in the vicinity of the plan area. Construction noise levels in the project vicinity would fluctuate depending on the particular type, number, and duration of usage for the various pieces of equipment.

The effects of construction noise depend largely on the types of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment in the vicinity of the receiver. Construction generally occurs in several discrete stages, with each phase varying the equipment mix and the associated noise. These phases alter the characteristics of the noise environment generated on the project site and in the surrounding community for the duration of the construction stage.

The site preparation and grading phase typically generates the most substantial noise levels, which are due to onsite equipment grading, compacting, and excavating the site, which often utilizes the loudest mix of construction equipment. Specific site preparation equipment can include backhoes, bulldozers, and loaders; excavation equipment such as graders and scrapers; and compaction equipment. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate substantial noise. Table 3.9-9 lists the noise levels typically generated by various types of construction equipment.

Table 3.9-9: Noise Emission Levels from Construction Equipment

Equipment Type	Maximum Noise Levels, L_{max} (dBA) at 50 feet
Air Compressor	80
Asphalt Paver	80
Backhoe	80
Compactor	82
Concrete Pump	90
Concrete Saw	85
Crane, Mobile	85
Dozer	85

Table 3.9-9 (cont.): Noise Emission Levels from Construction Equipment

Equipment Type	Maximum Noise Levels, L_{max} (dBA) at 50 feet
Forklift	85
Front-End Loader	80
Generator	82
Grader	85
Paver	85
Pneumatic Tools	85
Rock Drill	85
Roller	85
Scraper	85
Trucks	84
Water Pump	84
Welder	84

Notes:
dBA = A-weighted decibels; L_{dn} = day-night average noise level.
All equipment fitted with a properly maintained and operational noise control device, consistent with manufacturer specifications.
Source: FHWA RCNM, 2008; FTA 2006.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Thus, it is necessary to determine the location of stationary sources during specific phases, or the effective acoustical center of operations for mobile equipment during various phases of the construction process. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions. These characteristics are accounted for through the application of typical usage factors (operational percentage) to the reference noise levels.

Although specific designs and construction requirements for buildout of the Community Plan area are currently unknown, it is anticipated that development of various elements within the plan area would incorporate the use of typical construction sources such as backhoes, compressors, bulldozers, excavators, loaders and other related equipment. Based on the reference noise levels, usage rates, fleet mixes and operational characteristics discussed above, overall hourly average noise levels attributable to project construction activities were calculated. Construction noise levels were predicted using reference noise emission data and operational parameters contained in the FHWA RCNM and the FTA guidance manual.

The City of Fremont Municipal Code limits weekday construction operational hours for activities within 500 feet of a noise-sensitive receptor, to the weekday hours of 7:00 a.m. and 7:00 p.m. and the Saturday or holiday hours of 9:00 a.m. to 6:00 p.m., while Sunday construction is not allowed. For projects located more than 500 feet from a noise-sensitive receptor, construction hours are limited to the weekday hours of 6:00 a.m. to 10:00 p.m. and weekend or holiday hours of 8:00 a.m. to 8:00 p.m.

As indicated in Table 3.9-9, operational noise levels for typical construction activities would generate maximum noise levels ranging from 80 to 90 dBA at a distance of 50 feet. Accounting for usage factors of individual pieces of equipment, and typical construction equipment fleet mix for grading activities, construction operations could have the potential to result in hourly average noise levels of approximately 88 dBA L_{eq}, at a distance of 50 feet. Based on the hours of operation as outlined in the City of Fremont Municipal Code, the operation of a basic complement of heavy construction equipment performing grading operations would result in average day-night noise levels of 84 to 85 dBA L_{dn} at 50 feet.

Noise from localized point sources (e.g., heavy construction equipment, mobile-source construction noise, stationary-source construction noise) typically decrease at a rate of 6 dB to 7.5 dB with each doubling of distance between the noise source and the receptor. Conservatively assuming an attenuation rate of 6 dB per doubling of distance, construction operations and related activities would have the potential to generate exterior day-night noise levels exceeding the City of Fremont 60 dBA L_{dn} standard at receptors located within approximately 920 feet of the acoustical center for construction operations.

The nearest offsite noise-sensitive receptors in the project vicinity are single-family residences, located approximately 200 feet east of the eastern boundary of Areas 7, 9, and 10 of the Community Plan. As such, it is feasible that further development of lands within the community plan area would have the potential to generate short-term construction noise levels that would exceed the City of Fremont 60 dBA L_{dn} residential noise level criteria. This impact would be considered potentially significant.

Application of the noise control techniques affecting and controlling the construction noise at the source (such as heavy equipment and pumps) set forth in Mitigation Measure NOI-1 can obtain reductions of 3 to 6 dBA; noise control techniques implemented along the path of the noise (for example, temporary noise barriers, enclosures, and relocation of equipment) have been shown to reduce construction noise levels between 2 and 7 dBA. The overall noise level reduction achieved through implementation of these mitigation measures is expected to range from 5 to 13 dBA. Through the application of the above outlined measures, through effective management of project noise levels and compliance with the City of Fremont General Plan Construction Noise Level Policies, as outlined in Policy 10-8.5 of the General Plan, impacts from construction noise levels would be less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Mitigation Measures

MM NOI-1 The following measures shall be implemented as part of construction activities within the Community Plan area, in order to reduce the effects of noise levels generated from construction operations.

- Construction operations and related activities within the plan area shall comply with the operational hour limitations for construction as outlined in the City of Fremont Municipal Code. For projects located within 500 feet of one or more residences, lodging facilities, nursing homes or inpatient hospitals, construction shall be limited to the weekday hours of 7:00 a.m. to 7:00 p.m. and the Saturday or holiday hours of 9:00 a.m. to 6:00 p.m., while Sunday construction is not allowed. For projects located beyond 500 feet of the facilities named above, construction hours shall be limited to the weekday hours of 6:00 a.m. to 10:00 p.m. and the weekend or holiday hours of 8:00 a.m. to 8:00 p.m. The City of Fremont shall have the discretion to permit construction activities to occur outside of allowable hours if compelling circumstances warrant such an exception.
- Construction equipment and vehicles shall be fitted with efficient, well-maintained mufflers that reduce equipment noise emission levels at the project site. Internal combustion powered equipment shall be equipped with properly operating noise suppression devices (e.g., mufflers, silencers, wraps) that meet or exceed manufacture specifications. Mufflers and noise suppressors shall be properly maintained and tuned to ensure proper fit, function and minimization of noise.
- Pumps that are not submerged and aboveground conveyor systems shall be located within acoustically treated enclosures.
- Portable and stationary site support equipment (such as generators, compressors, rock crushers, and cement mixers) shall be located as far as possible from nearby noise-sensitive receptors.
- Impact tools shall have the working area/impact area shrouded or shielded, with intake and exhaust ports on power equipment muffled or suppressed. This may necessitate the use of temporary or portable, application specific noise shields or barriers.
- Construction equipment shall not be idled for extended periods (e.g., 15 minutes or longer) of time in the immediate vicinity of noise-sensitive receptors.
- A disturbance coordinator shall be designated by the general contractor, which will post contact information in a conspicuous location near the entrance of the subject construction sites so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator shall manage complaints resulting from the construction noise. Reoccurring disturbances shall be evaluated by a qualified acoustical consultant retained by the project proponent to ensure compliance with applicable standards.

Level of Significance After Mitigation

Less than significant impact.

Groundborne Vibration

Impact NOI-2: Construction and operational activities associated with the proposed project may generate excessive groundborne vibration in the Community Plan area.

Impact Analysis

The plan area is an urban environment with existing groundborne vibration generated by railroad operations traffic, and light industrial operations. Implementation and development of the Community Plan area would have the potential to produce short-term intermittent groundborne noise and vibration from construction operations. Groundborne vibration levels associated with BART transit and roadway traffic rarely exceed criteria established for evaluation of building damage or human annoyance. Specific groundborne noise and vibration sources located in the plan area are discussed below.

Construction-Induced Vibration

Construction activities on the project site may result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Groundborne vibration levels caused by various types of construction equipment are summarized in Table 3.9-10. Pile driving and blasting are not currently expected to be utilized in the development of the Community Plan area. The representative vibration levels identified for various construction equipment types show that sensitive receptors could potentially be exposed to groundborne vibration levels exceeding recommended Caltrans and FTA thresholds of significance for existing residential areas at close distances.

Table 3.9-10: Representative Vibration Levels for Construction Equipment

Equipment		PPV at 25 feet (in/sec)[1, 3]	Approximate L_v (VdB) at 25 feet[2]
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (vibratory/sonic)	Upper range	0.734	105
	Typical	0.170	93
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Heavy-duty Trucks (Loaded)		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

Notes:
1 Where PPV is the peak particle velocity.
2 Where L_v is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.
3 Vibration levels can be approximated at other locations and distances using the above reference levels and the following equation: $PPV_{equip} = PPV_{ref} (25/D)^{1.1}$ (in/sec); where "PPV ref" is the given value in the above table, "D" is the distance for the equipment to the new receiver in feet.
Source: FTA 2006: 12-12.

To evaluate vibration impacts at sensitive receptors, the construction activity generating the highest vibration velocity levels, 0.089 in/sec. PPV (large bulldozer, hoe ram, or caisson drilling) was analyzed. The assumed distance to the nearest onsite sensitive receptor is unknown at this time; therefore, a minimum separation distance from construction activities is presented as the threshold of significance. Using standard FTA vibration attenuation formulas, non-pile-driving construction activities would exceed Caltrans's recommended threshold of significance of 0.2 in/sec. PPV at a distance of 15 feet. It is unlikely that large bulldozer or other heavy construction equipment would operate within 15 feet of any sensitive receptor, since existing sensitive receptors are more than 200 feet from the nearest area of construction. As a result, construction-induced vibration impacts would be less than significant.

Operationally Induced Vibration
Delivery and distribution of materials to and from the light industrial, research and development, retail, and commercial uses have the potential to generate groundborne vibration. Heavy truck traffic passing over uneven roadway surfaces can impart energy into the ground and induce groundborne vibration; however, heavy trucks used for delivery and distribution of materials generally operate at very low speeds while on the site. Additionally, the loading and unloading operations of heavy trucks typically benefit from the resiliency of the flexible suspension systems and pneumatic tires, which substantially limit the effect and transfer of energy to the ground.

Groundborne vibration induced by heavy truck traffic related to the light industrial, research and development, retail, or commercial uses is anticipated to generate approximately 0.076 in/sec. PPV at a distance of 25 feet, and is not expected to be readily perceptible at distances beyond 25 feet (FTA 2006: 7-8, 10-3). Sensitive receptors in the project vicinity typically incorporate a setback distance of 30 to 100 feet from the centerline of the near-travel lane of the adjacent roadways. Therefore, it is not anticipated that heavy truck traffic related to the light industrial, research and development, retail and commercial uses would result in groundborne vibration levels at adjacent sensitive receptors that approach or exceed the FTA and Caltrans guidelines of 80 VdB and 0.2 PPV. As a result, operationally induced vibration impacts would be considered less than significant.

Railroad-Induced Vibration
Railroad operations (e.g., heavy-rail trains) have a potential to generate excessive groundborne vibration levels depending on train speed, load, condition of track and wheels, amount of ballast used to support the track, and soil conditions. The FTA generalized ground surface vibration curves and parametric modeling of locomotive powered trains indicate that groundborne vibration levels would exceed 80 VdB at distances less than 100 feet, potentially resulting in human annoyance. Assuming a crest factor of 4, 80 VdB RMS is approximately equivalent to 0.04 in/sec PPV, which is substantially less than the Caltrans-recommended guideline of 0.2 in/sec PPV pertaining to the prevention of structural damage. Based on the location of the Warm Springs/South Fremont BART station, associated facilities, the UPRR right-of-ways and the conceptualized project roadway network, development within the Community Plan area is not anticipated to occur within the 100-foot constraint for potential vibration annoyance from heavy rail operations. However, implementation of Mitigation Measure NOI-2 would ensure vibration impacts are reduced to a level of less than significant.

Level of Significance Before Mitigation
Potentially significant impact.

Mitigation Measures
MM NOI-2 Prior to issuance of building permits for any vibration sensitive uses within 200 feet of the Union Pacific Railroad centerline, the applicant shall retain a qualified acoustical/vibration consultant to perform a site-specific groundborne noise and vibration assessment. The assessment shall be prepared in accordance with Federal Transit Administration and Caltrans guidelines and identify whether the proposed uses would be exposed to excessive vibration. No vibration sensitive uses shall be located within 100 feet of the railroad centerline unless it can be demonstrated that such uses would not be exposed to excessive vibration. The recommendations of the assessment shall be incorporated into the development plans.

Level of Significance After Mitigation
Less than significant impact.

Traffic Noise

Impact NOI-3: **The proposed project would not cause a long-term increase in traffic noise levels at existing noise-sensitive receptors.**

Impact Analysis
Long-term operation of the project would generate an increase in traffic volumes on the local roadway network in the project vicinity. Consequently, noise levels from vehicular traffic sources along affected roadway segments would increase. Traffic noise computations employed the latest version of the FHWA TNM 2.5 prediction algorithms within the SoundPLAN model. Potential offsite noise impacts resulting from the increase in vehicular traffic on the local roadway network, associated with long-term operations of the proposed project, were evaluated under existing conditions, background conditions (existing plus approved but not yet constructed projects), and future (2035) conditions with and without implementation of the proposed project.

Traffic volumes and the distribution of those volumes were obtained from the Traffic Impact Analysis prepared by Fehr & Peers (Appendix G). ADT volumes were calculated by summing all traffic movements for both the AM and PM peak hours, existing on or turning onto a particular roadway segment during the peak hour and multiplying the total peak-hour volume by a “k-factor” of 5. Average vehicle speeds on local area roadways were assumed to be consistent with posted speed limits and remain as such with or without implementation of the proposed project. Refer to Appendix G for complete modeling inputs and results.

As shown in Table 3.9-11, modeled traffic noise levels at noise-sensitive receivers in the vicinity of the plan area already exceed “normally acceptable” noise level thresholds under the existing no project condition. Therefore, the potential for the proposed project to result in a noise level impact at these receivers is evaluated by determining whether project traffic would cause a noise level increase of 3 dB or more.

Existing Conditions

Modeled traffic noise exposure levels at nearby noise-sensitive receivers in the project vicinity are shown in Table 3.9-11 for the existing conditions, with and without implementation of the proposed project. The table also presents relative traffic noise level increase (net change) resulting from implementation of the proposed project along with an evaluation of relative significance.

As shown in Table 3.9-11, the largest increase in roadway noise exposure levels at nearby noise-sensitive receptors (P-01 through P-19, and ST-01 through ST-02) in the vicinity of the plan area associated with development of the proposed project would be less than 1 dB, which would be barely perceptible. Additionally, short-term monitoring receiver locations ST-03 and ST-05 are predicted to be exposed to a 2.5-dB increase in noise levels due to development in the plan area. Implementation of the Community Plan would not result in an increase in traffic noise levels +3 dB L_{dn} or more in the plan area under the existing condition.

Table 3.9-11: Existing Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			Significant Impact
No.	Description	Existing No Project	Existing Plus Project	Net Change[1]	
Prediction Receivers					
P-01	Residences at Papilon Terrace	63.5	64.3	0.8	No
P-02	Residences at Montrose Avenue	68.2	68.8	0.6	No
P-03	Residences at Cassett Commons	67.1	67.3	0.2	No
P-04	Residences at Lupine Pl	67.9	68.2	0.3	No
P-05	Residences at Pomace Street	67.1	67.2	0.2	No
P-06	Residences at Camellia Dr	64.4	64.6	0.2	No
P-07	Residences at Parkmeadow Pl	67.9	68.2	0.3	No
P-08	Mandan Court Vacant Lot	74.4	74.6	0.2	No
P-09	Residences at Ute Court	64.8	65.0	0.2	No
P-10	Residences at Parkmeadow Court	64.8	65.0	0.2	No
P-11	Residences at Pomace Street, 2nd Row	64.1	64.3	0.2	No
P-12	Residences at Camellia Dr, 2nd Row	62.5	62.7	0.2	No
P-13	Residences at Mandan/Nakoma Court, 2nd Row	65.7	66.0	0.3	No
P-14	Residences at Parkmeadow Court, 2nd Row	65.3	65.4	0.2	No
P-15	Residences at Paseo Padre Parkway	61.6	61.7	0.1	No
P-16	Residences at Paseo Padre Parkway	61.3	61.4	0.1	No
P-17	Residences at Crystalline Drive	67.5	67.7	0.2	No

Table 3.9-11 (cont.): Existing Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			
No.	Description	Existing No Project	Existing Plus Project	Net Change[1]	Significant Impact
P-18	Residences at Eaves Fremont	68.3	68.9	0.6	No
P-19	Residences at Mohave Terrace	68.6	69.2	0.6	No
Monitoring Receivers					
ST-01	Ute Court	63.0	63.3	0.2	No
ST-02	Boxwood Way	61.9	62.2	0.3	No
ST-03	Grimmer Boulevard and Old Warm Springs Boulevard	65.8	68.3	2.5	No
ST-04	Fremont Boulevard and Ingot Street	66.9	67.9	1.0	No
ST-05	Warm Springs Boulevard and Brown Road	69.1	71.3	2.2	No
ST-06	Warm Springs Boulevard and Skyway Court	69.7	70.6	1.0	No
ST-07	Mission Boulevard	73.6	74.4	0.7	No
ST-08	Fremont Boulevard and Pestana Way	63.9	65.1	1.2	No

Notes:
dBA = A-weighted decibels L_{dn} = day-night average noise level.
[1]- Net change = No Project noise level, subtracted from Plus Project noise level.
Source: Extant Acoustical Consulting LLC, 2013.

Background Conditions

Modeled traffic noise exposure levels at nearby noise-sensitive receivers in the project vicinity are shown in Table 3.9-12 for the background conditions, with and without implementation of the proposed project. The table also presents relative traffic noise level increases (net change) resulting from implementation of the proposed project along with an evaluation of relative significance.

As shown in Table 3.9-12, the largest increase in roadway noise exposure levels at nearby noise-sensitive receptors (P-01 through P-19, and ST-01 through ST-02) in the vicinity of the plan area associated with the development of the proposed project would be less than 1 dB, which would be barely perceptible. Additionally, short-term monitoring receiver locations ST-03 and ST-05 are predicted to be exposed to a 2.4-dB increase in noise levels due to development in the plan area. Implementation of the Community Plan would not result in an increase in traffic noise levels +3 dB L_{dn} or more in the plan area.

Table 3.9-12: Background Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			Significant Impact
No.	Description	Background No Project	Background Plus Project	Net Change[1]	
Prediction Receivers					
P-01	Residences at Papilon Terrace	63.8	64.6	0.8	No
P-02	Residences at Montrose Avenue	68.3	69.0	0.6	No
P-03	Residences at Cassett Commons	67.2	67.4	0.2	No
P-04	Residences at Lupine Place	68.1	68.4	0.3	No
P-05	Residences at Pomace Street	67.1	67.2	0.2	No
P-06	Residences at Camellia Drive	64.4	64.6	0.2	No
P-07	Residences at Parkmeadow Place	67.9	68.2	0.3	No
P-08	Mandan Court Vacant Lot	74.4	74.6	0.2	No
P-09	Residences at Ute Court	64.9	65.1	0.2	No
P-10	Residences at Parkmeadow Court	64.8	65.0	0.2	No
P-11	Residences at Pomace Street, 2nd Row	64.2	64.4	0.2	No
P-12	Residences at Camellia Drive, 2nd Row	62.5	62.7	0.2	No
P-13	Residences at Mandan/Nakoma Court, 2nd Row	65.8	66.1	0.3	No
P-14	Residences at Parkmeadow Court, 2nd Row	65.3	65.5	0.2	No
P-15	Residences at Paseo Padre	61.6	61.9	0.3	No
P-16	Residences at Paseo Padre	61.4	61.5	0.1	No
P-17	Residences at Crystalline Drive	67.5	67.7	0.2	No
P-18	Residences at Eaves Fremont	68.5	69.1	0.6	No
P-19	Residences at Mohave Terrace	68.7	69.3	0.6	No
Monitoring Receivers					
ST-01	Ute Court	63.1	63.3	0.2	No
ST-02	Boxwood Way	61.9	62.2	0.3	No
ST-03	Grimmer Boulevard and Old Warm Springs Boulevard	66.1	68.4	2.4	No
ST-04	Fremont Boulevard and Ingot Street	66.8	68.1	1.3	No
ST-05	Warm Springs Boulevard and Brown Road	70.0	71.9	1.8	No
ST-06	Warm Springs Boulevard and Skyway Court	69.8	70.7	0.9	No
ST-07	Mission Boulevard	73.9	74.6	0.7	No
ST-08	Fremont Boulevard and Pestana Way	63.9	65.2	1.2	No

Table 3.9-12 (cont.): Background Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			Significant Impact
No.	Description	Background No Project	Background Plus Project	Net Change[1]	

Notes:
dBA = A-weighted decibels L_{dn} = day-night average noise level.
1 Net change = No Project noise level, subtracted from Plus Project noise level.
Source: Extant Acoustical Consulting LLC, 2013

Future (2035) Condition

Modeled traffic noise exposure levels at nearby noise-sensitive receivers in the project vicinity are shown in Table 3.9-13 for the future (2035) condition, with and without implementation of the proposed project. The traffic noise level increase (net change) resulting from implementation of the proposed project along with an evaluation of relative significance is also presented.

As shown in Table 3.9-13, the largest increase in roadway noise exposure levels at nearby noise-sensitive receptors (P-01 through P-19, and ST-01 through ST-02) in the vicinity of the plan area associated with the development of the proposed project would be less than 1 dB, which would be barely perceptible. Additionally, short-term monitoring receiver locations ST-03 and ST-05 are predicted to be exposed to an increase in noise levels due to development in the plan area of less than 1 dB. Implementation of the Community Plan would not result in an increase in traffic noise levels +3 dB L_{dn} or more in the plan area.

Table 3.9-13: Future (2035) Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			Significant Impact
No.	Description	Future (2035) No Project	Future (2035) Plus Project	Net Change[1]	
Prediction Receivers					
P-01	Residences at Papilon Terrace	65.9	66.3	0.3	No
P-02	Residences at Montrose Avenue	70.8	71.1	0.3	No
P-03	Residences at Cassett Commons	67.1	67.3	0.1	No
P-04	Residences at Lupine Place	67.2	67.5	0.2	No
P-05	Residences at Pomace Street	67.1	67.3	0.1	No
P-06	Residences at Camellia Drive	64.5	64.7	0.1	No
P-07	Residences at Parkmeadow Place	68.3	68.5	0.2	No
P-08	Mandan Court Vacant Lot	74.7	74.9	0.2	No
P-09	Residences at Ute Court	65.0	65.2	0.1	No
P-10	Residences at Parkmeadow Court	65.0	65.1	0.1	No

Table 3.9-13 (cont.): Future (2035) Traffic Noise Levels

Receiver		Noise Level Exposure (L_{dn}, dBA)			
No.	Description	Future (2035) No Project	Future (2035) Plus Project	Net Change[1]	Significant Impact
P-11	Residences at Pomace Street, 2nd Row	64.3	64.5	0.1	No
P-12	Residences at Camellia Drive, 2nd Row	62.7	62.9	0.2	No
P-13	Residences at Mandan/Nakoma Court, 2nd Row	66.2	66.4	0.2	No
P-14	Residences at Parkmeadow Court, 2nd Row	65.5	65.6	0.1	No
P-15	Residences at Paseo Padre	62.2	62.3	0.1	No
P-16	Residences at Paseo Padre	61.5	61.7	0.1	No
P-17	Residences at Crystalline Drive	67.8	67.9	0.2	No
P-18	Residences at Eaves Fremont	69.8	70.1	0.4	No
P-19	Residences at Mohave Terrace	70.0	70.3	0.4	No
Monitoring Receivers					
ST-01	Ute Court	63.4	63.5	0.2	No
ST-02	Boxwood Way	62.2	62.4	0.2	No
ST-03	Grimmer Boulevard and Old Warm Springs Boulevard	68.5	69.4	0.9	No
ST-04	Fremont Boulevard and Ingot Street	68.5	69.1	0.5	No
ST-05	Warm Springs Boulevard and Brown Road	73.5	74.2	0.7	No
ST-06	Warm Springs Boulevard and Skyway Court	71.8	72.2	0.4	No
ST-07	Mission Boulevard	76.4	76.7	0.3	No
ST-08	Fremont Boulevard and Pestana Way	65.1	65.8	0.7	No

Notes:
dBA = A-weighted decibels L_{dn} = day-night average noise level.
[1]- Net change = No Project noise level, subtracted from Plus Project noise level.
Source: Extant Acoustical Consulting LLC, 2013

Project Impact Discussion

As defined within the General Plan Policy 10-8.3, changes in the ambient noise environment created by development in the Community Plan area would be considered potentially significant if the project would cause the L_{dn} to increase by 5 dBA or more, but remain under 60 dBA L_{dn}; or the project would cause the L_{dn} to increase by 3 dBA or more and exceed 60 dBA L_{dn}. Traffic noise level impacts associated with development in the Community Plan area have been analyzed and presented for existing conditions, background conditions and future (2035) project buildout conditions.

Under the existing conditions (presented in Table 3.9-11), traffic noise associated with implementation of the Community Plan would result in noise level increases ranging from 0.1 to 0.8 dB L_{dn} at noise-sensitive receptors in the project vicinity and up to 2.5 dB L_{dn} at noise monitoring receptor locations.

Under the background conditions buildout scenario (presented in Table 3.9-12), traffic noise associated with implementation of the Community Plan would result in noise level increases ranging from 0.1 to 0.8 dB L_{dn} at noise-sensitive receptors in the project vicinity and up to 2.4 dB at noise monitoring receptor locations.

Under the future (2035) conditions (presented in Table 3.9-13), traffic noise associated with implementation and development of the Community Plan would result in noise level increases ranging from 0.1 to 0.4 dB L_{dn} at noise-sensitive receptors in the project vicinity and up to 0.9 dB at noise monitoring receptor locations.

As discussed in the traffic impact analysis, the Background conditions, with and without project buildout, is considered the most appropriate measurement upon which to determine potential impacts associated with the Community Plan, since it represents the earliest date that the plan area could reasonably be implemented and impact the existing project environment. The background conditions would account for traffic noise levels currently in the existing environment and those of all planned and approved projects anticipated for completion at that time. Background traffic noise level contours without implementation of the Community Plan are shown in Exhibit 3.9-4 and noise level contours with implementation of the Plan are shown in Exhibit 3.9-5. Exhibit 3.9-6 graphically depicts the traffic noise level increase ("net increase" as presented in Table 3.9-12) associated with implementation of the proposed project through illustration of the associated equal level noise contours.

As presented above, the project would not cause a significant increase of 3 dB L_{dn} or more in traffic noise levels without the project under background conditions; furthermore, implementation of the project was not predicted to result in a significant increase under the existing and future conditions. As a result, this impact is considered less than significant.

Level of Significance Before Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is necessary.

Level of Significance After Mitigation
Less than significant impact.

Long-Term/Operational Noise

Impact NOI-4: **Long-term operational noise associated with the proposed project may result in noise levels in excess of applicable standards at offsite sensitive receptors.**

Impact Analysis

As discussed in Section 2, Project Description, the Community Plan area is currently proposed to include the development and redevelopment of light industrial, research and development, commercial, retail, residential and public uses within the approximately 879-acre plan area. A variety of noise sources associated with future development within the plan area would have the potential to create noise levels that could exceed applicable City noise standards or result in annoyance at existing and future noise-sensitive receptors within the plan area.

Because specific locations for the proposed uses are not yet known and detailed site and grading plans have not yet been developed for the areas within the Community Plan, it is not feasible to identify specific noise impacts associated with development at individual project sites. However, a general discussion and assessment of impacts is provided based on the possible types of uses associated with envisioned land uses of the Community Plan.

Commercial and Industrial Uses

The specific types of commercial and light industrial uses that would be developed in the plan area have not yet been determined and the potential sources of noise associated with these types of uses can vary substantially. Stationary noise sources associated with these operations can be periodic or continuous and may contain tonal components, which commonly result in annoyance at lower levels. Primary noise sources typically would include mechanical building equipment (e.g., heating, ventilation, and air conditioning [HVAC]), property maintenance, landscaping, parking lots, trash collection, onsite truck circulation, and commercial deliveries.

According to the EPA, noise attributable to mechanical building equipment has the potential to be a primary noise source associated with commercial or industrial uses. Equipment is often mounted on rooftops, located on the ground, or located within mechanical rooms shielded from direct public exposure. Associated noise sources could take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from HVAC equipment vary significantly depending on unit efficiency, size and location, but generally range from 45 dB to 70 dB L_{eq} at a distance of 50 feet. With typical duty cycles of 40 percent to 60 percent, average day-night noise levels would range from 47 to 73 dBA L_{dn} at 50 feet. Based on standard attenuation rate of 6 dB per doubling of distance for point sources, the operation of mechanical building equipment could result in the exposure of future noise-sensitive receptors within approximately 450 feet to noise levels that exceed the City's 60 dBA L_{dn} noise standard.

Noise sources from the proposed commercial uses could also include occasional parking lot related noise (e.g., opening and closing of vehicle doors, people talking, car alarms), commercial delivery activities (e.g., use of forklifts, hydraulic lifts), trash compactors, and air compressors. Noise from such equipment can reach intermittent levels of approximately 90 dB at 50 feet from the source. Early morning truck deliveries also may be a source of elevated noise levels at nearby noise-sensitive receptors.

Overall, stationary source noise levels associated with commercial and retail operations in the plan area could potentially exceed the City of Fremont noise standards at nearby existing and future noise-sensitive receptors.

Neighborhood Parks and Elementary School

The proposed Community Plan area would include development of an elementary school, parks, and public plazas. Daytime noise typically associated with parks or schools typically include adult and children's voices, the opening and closing of vehicle doors in parking lots, and use of landscape maintenance equipment. Maximum intermittent noise levels commonly associated with parking lots can reach levels of 70 dBA at 500 feet associated with the occasional sounding of car alarms and amplified music. Noise levels associated with landscape maintenance activities, including the use of large gasoline-powered mowers and leaf blowers can range from approximately 66 to 72 dBA at 25 feet.

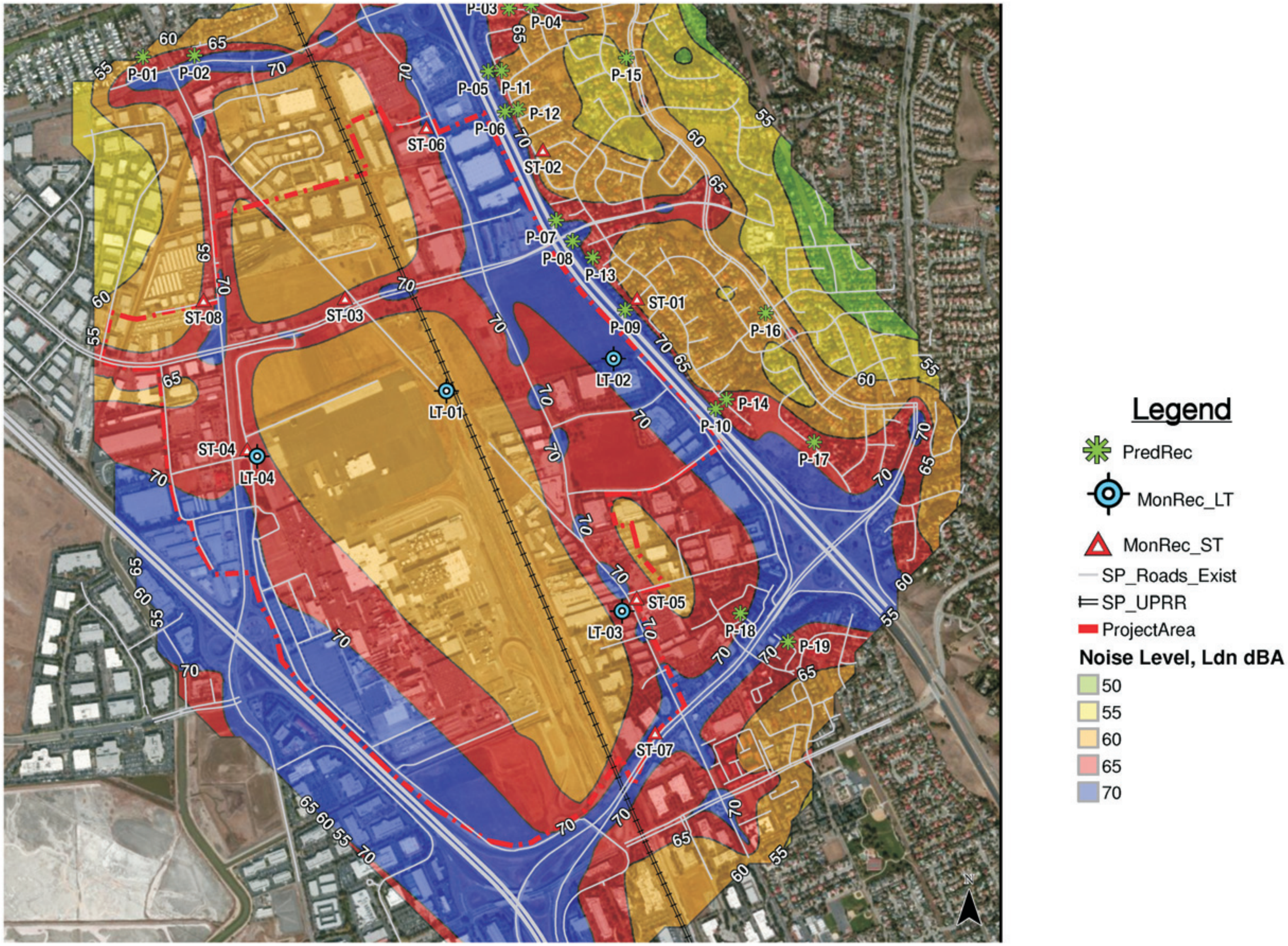
Parks and public plazas can result in additional noise extending into the evening and nighttime hours associated with recreational activities. Noise sources commonly associated with these types of events include elevated voices from crowds, people recreating, exterior public address systems, and musical instruments. However, because of the intermittent nature of these noise sources and the averaging effect of the L_{dn} noise level metric, noise levels from these sources may be detectible at times but would not be expected to largely affect the existing noise environment in the Community Plan area.

Other Operational Stationary Noise Sources

Additional intermittent stationary noise attributable to the long-term operation of the commercial uses in the plan area may include landscape maintenance activities, garbage compaction and waste collection services and people congregating and talking at various outdoor uses. Such noise-generating activities occur infrequently, are generally intermittent in nature, and are consistent with other noise events occurring in the community, making it infeasible to ascertain potential contributions to the noise environment. Additionally, these sources are expected to be less intensive than other project-related operational contributions such as parking, mechanical equipment, truck deliveries, and traffic. Therefore, these additional stationary noise sources would be predicted to comply with the City of Fremont 60 dBA L_{dn} exterior noise level standards.

Summary of Impacts

Based on the assumptions outlined within the impact analysis, implementation of the Community Plan and development of the plan area has the potential to result in long-term operational and stationary-source noise levels that exceed the noise level standards outlined in the City of Fremont General Plan and Municipal Code. Mitigation Measures NOI-4a through NOI-4c are proposed to reduce impacts to within acceptable levels. Implementation of these mitigation measures would reduce potential noise exposure levels from long-term operational and stationary noise sources. Impacts would be less than significant.



Sources: Extant Acoustical, 2013

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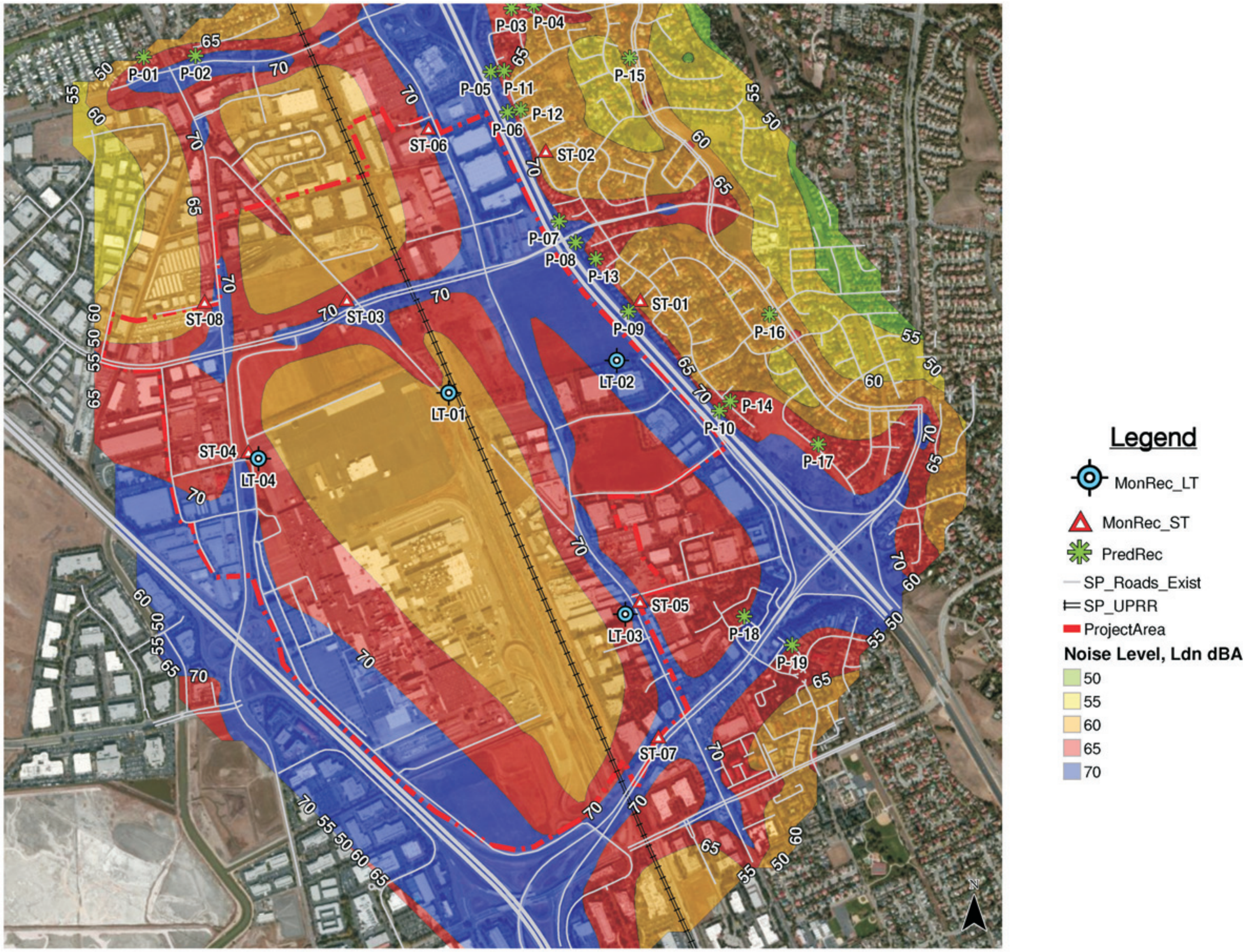
Exhibit 3.9-4
Background No Project Traffic Noise Levels



Sources: Extant Acoustical, 2013

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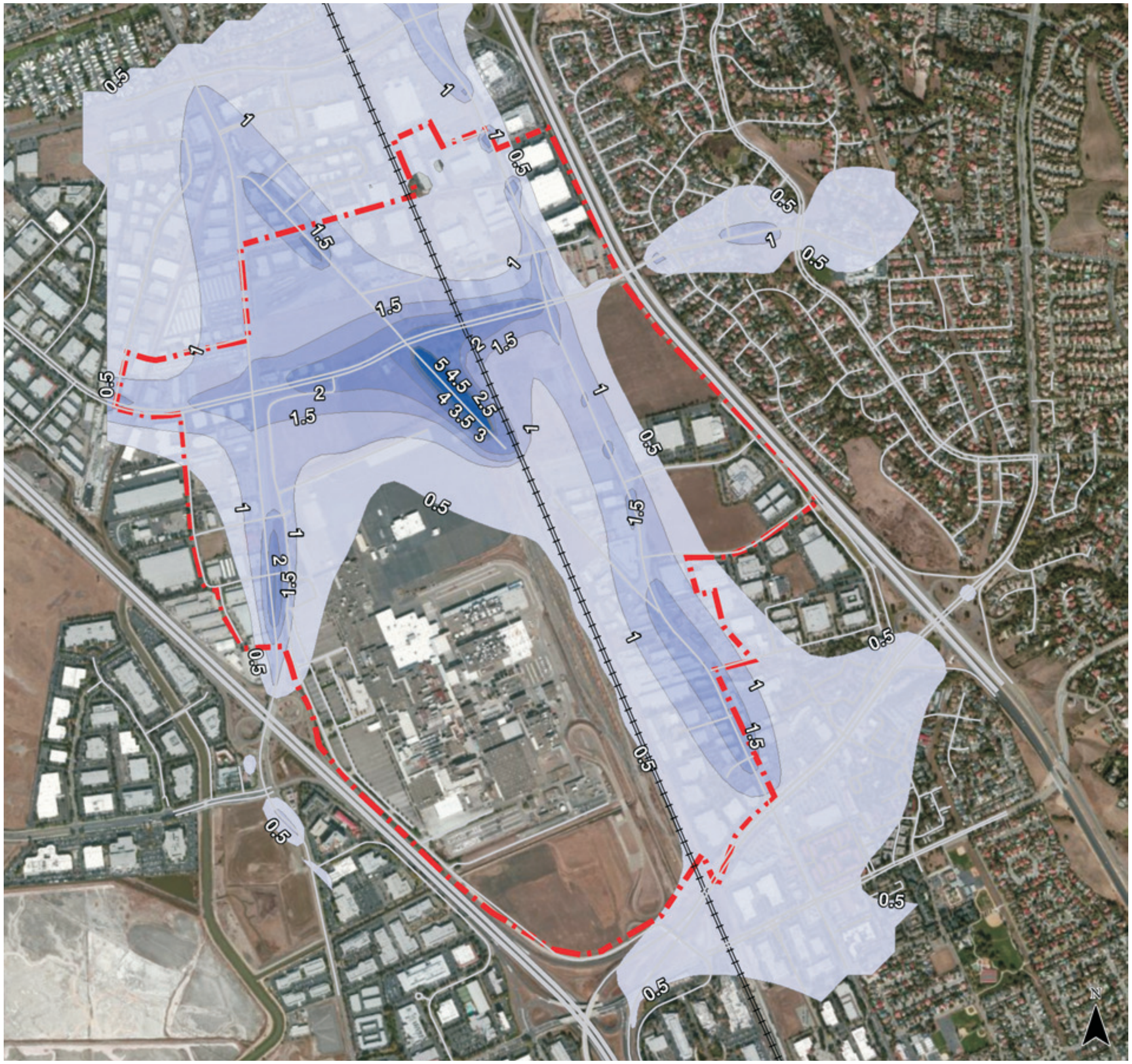
Exhibit 3.9-5
Background Plus Project Traffic Noise Levels



Legend

- SP_Roads_Exist
- SP_UPRR
- ProjectArea

Noise Level Increase, Ldn dBA

- >= 0.5
- >= 1
- >= 1.5
- >= 2
- >= 2.5
- >= 3
- >= 3.5
- >= 4
- >= 4.5
- >= 5

Sources: Extant Acoustical, 2013

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Exhibit 3.9-6
Background Traffic Noise Levels – Net Change

Level of Significance Before Mitigation

Potentially significant impact.

Mitigation Measures

MM NOI-4a Plans submitted for building and/or grading permits shall include an acoustical analysis that verifies that they project would meet applicable noise standards. Projects determined to have the potential to generate or expose noise-sensitive uses to noise levels exceeding the City of Fremont noise standards or result in a substantial (3 to 5 dB or greater) permanent increase in ambient noise levels shall include noise attenuation measures such as use of sound-rated door and window assemblies, mechanical ventilation, orientation of buildings away from roadways, sound barriers (walls or berms), or other methods to reduce noise levels to acceptable standards.

MM NOI-4b Specific development of proposed land uses shall be designed so that onsite mechanical equipment (HVAC units, compressors, generators, etc.) and area source operations (e.g., loading docks, parking lots, and recreational use areas) are located at the furthest distance from and/or shielded from nearby noise-sensitive land uses.

MM NOI-4c Loading, unloading, and delivery areas of commercial and industrial uses shall be located so that buildings shield nearby noise-sensitive land uses from noise generated by loading dock and delivery activities. If necessary, additional sound barriers shall be constructed on the commercial sites to protect nearby noise-sensitive uses. Loading dock activity and delivery truck activity at the commercial uses developed within the Plan Area shall only occur between the hours of 7 a.m. and 10 p.m., in order to prevent sleep disturbance at nearby noise-sensitive land uses.

Level of Significance After Mitigation

Less than significant impact.

Land Use Compatibility of Proposed Sensitive Receptors with Transportation Noise

Impact NOI-5: **Proposed noise-sensitive receptors associated with the proposed project may be exposed to transportation noise levels in excess of applicable standards.**

Impact Analysis

The Community Plan area proposes to include the development and redevelopment of light industrial, research and development, commercial, retail, residential and public uses within the approximately 879-acre plan area. Residential development within the Community Plan is currently proposed for planning areas 3, 4, 8 and 9, with up to 4,000 dwelling units within these four areas. Specific locations and detailed plans for development of the proposed noise-sensitive uses within the Community Plan area have not yet been developed. Therefore, it is not feasible to identify specific noise impacts associated with development at individual project sites or within the

Community Plan planning areas. However, a general discussion and assessment of impacts are provided for the Community Plan.

Traffic Noise

To determine land use compatibility of proposed onsite noise-sensitive receptors with traffic noise levels in the plan area, the traffic noise model previously developed for this project was employed. Traffic noise level contours for roadways in the plan area were modeled under Future (2035) conditions for evaluation of land use compatibility. Future traffic noise contours were modeled in the same manner as previously discussed in Impact NOI-3, for the future-plus-project scenario. Table 3.9-14 summarizes the traffic noise level at 100 feet from the roadway centerline and distances to the 60-, 65-, and 70-dBA L_{dn} traffic noise level contours for future (2035) plus project conditions. The predicted noise contour distances shown in Table 3.9-14 do not take into account shielding or reflection of noise from existing structures or topography; actual noise levels may vary from day to day, depending on variations in local traffic volumes, intervening topography, or structures; landscaping; and meteorological conditions in the immediate vicinity.

Based on the locations of propose residential development within planning areas 3, 4, 8 and 9, traffic noise levels along Fremont Boulevard, Grimmer Boulevard, Old Warm Springs Boulevard, Warm Springs Boulevard, and I-680 would be the primary traffic noise sources affecting the residential areas within the Community Plan. The 60 dBA L_{dn} Future (2035) plus project traffic noise level contours for these roadways are calculated to range from approximately 232 to 700 feet from the centerline of the surface streets, and approximately 3,200 feet from the centerline of I-680. Noise-sensitive receptors located within the 60-dBA L_{dn} noise level contours, as shown in Table 3.9-14, could be exposed to noise levels that potentially exceed the City of Fremont noise standards. As a result, this impact is considered potentially significant.

Table 3.9-14: Future (2035) Traffic Noise Level Contours

Roadway	Segment		ADT[1]	L_{dn} at 100 ft.	Distance to L_{dn} Contour (feet)		
	From	To			70 dBA	65 dBA	60 dBA
Auto Mall Parkway	Grimmer Boulevard	Fremont Boulevard	55,215	70.9	115	248	534
Auto Mall Parkway	Fremont Boulevard	Osgood Road	71,055	72.0	136	293	631
Auto Mall Parkway	Osgood Road	I-680 NB	66,660	71.7	130	281	605
Auto Mall Parkway	I-680 SB	I-680 NB	35,540	69.0	86	185	398
Durham Road	I-680 NB	Paseo Padre Parkway	6,795	61.8	28	61	132
Fremont Boulevard	Auto Mall Parkway	Old Warm Springs	35,835	69.0	86	186	400
Fremont Boulevard	Old Warm Springs	S Grimmer Boulevard	22,830	67.1	64	137	296
Fremont Boulevard	S Grimmer Boulevard	Ingot Street	42,830	69.8	97	209	450
Fremont Boulevard	Ingot Street	I-880 NB	53,455	70.8	112	242	522
Fremont Boulevard	I-880 NB	I-880 SB	53,220	70.7	112	242	521
Old Warm Springs	Fremont Boulevard	S Grimmer Boulevard	11,620	65.5	50	108	232
Lopes Court	S Grimmer Boulevard	End of Lopes Court	3,600	56.6	13	28	60
Osgood Road	Auto Mall Parkway	S Grimmer Boulevard	44,330	71.3	122	263	566
Warm Springs Boulevard	S Grimmer Boulevard	Old Warm Springs	36,935	70.5	108	233	501
Warm Springs Boulevard	Old Warm Springs	Mission Boulevard	62,405	72.8	153	330	711
Warm Springs Boulevard	Mission Boulevard	E Warren Avenue	49,710	71.8	132	284	611
S Grimmer Boulevard	Paseo Padre Parkway	Warm Springs Boulevard	15,645	66.8	61	131	283
S Grimmer Boulevard	Warm Springs Boulevard	Old Warm Springs	52,820	72.1	137	295	636
S Grimmer Boulevard	Old Warm Springs	Kato Road	24,920	68.8	83	179	386
S Grimmer Boulevard	Kato Road	Fremont Boulevard	25,270	68.9	84	181	389
S Grimmer Boulevard	Fremont Boulevard	Auto Mall Parkway	26,855	69.1	87	188	405

Table 3.9-14 (cont.): Future (2035) Traffic Noise Level Contours

Roadway	Segment		ADT[1]	L_{dn} at 100 ft.	Distance to L_{dn} Contour (feet)		
	From	To			70 dBA	65 dBA	60 dBA
Paseo Padre Parkway	Auto Mall Parkway	S Grimmer Boulevard	7,000	59.5	20	43	93
Paseo Padre Parkway	S Grimmer Boulevard	Mission Boulevard	5,350	58.4	17	36	78
Mission Boulevard	Paseo Padre Parkway	I-680 NB	21,050	70.1	101	218	469
Mission Boulevard	I-680 NB	I-680 SB	43,715	73.2	164	354	764
Mission Boulevard	I-680 SB	Mohave Dr.	67,760	75.1	220	475	1023
Mission Boulevard	Mohave Dr	Warm Springs Boulevard	64,980	75.0	214	462	994
Mission Boulevard	Warm Springs Boulevard	I-880	78,440	75.8	243	523	1127
Warren Avenue	East of	Warm Springs Boulevard	16,700	65.7	52	112	240
Warren Avenue	West of	Warm Springs Boulevard	21,435	66.8	61	132	284
I-680	Mission Boulevard	Auto Mall Parkway	140,015	82.6	690	1487	3204
I-680 NB Ramp	Mission Boulevard	I-680	250	53.1	7	16	35
I-680 NB Ramp	I-680	Mission Boulevard	9,675	69.0	85	184	396
I-680 SB Ramp	I-680	Mission Boulevard	17,835	71.6	128	277	596
I-680 SB Ramp	Mission Boulevard	I-680	13,885	70.5	109	234	504
I-880	Mission Boulevard	Auto Mall Parkway	182,015	82.6	695	1498	3227

Notes:
dBA = A-weighted decibels; L_{dn} = average day-night noise level.
ADT – Average Daily Traffic Volumes. ADT volumes calculated based on peak-hour turning movements provided in the
Not accounting for shielding provided by natural or man-made intervening objects. Actual distance to real-world noise level contours will be dependent upon shielding effects in the environment under consideration.
Source: Extant Acoustical Consulting LLC, 2013.

Rail Noise

The Community Plan area is bisected by the UPRR rail corridor. Rail operations associated with the UPRR are not anticipated to change substantially in the near future; however, commuter-rail, and light-rail operations will increase following the completion of the BART Extension Project and the Warm Springs/South Fremont BART Station currently under construction. The proposed Community Plan would not include residential and sensitive land uses immediately adjacent to the station. Therefore, analysis of operational rail noise focuses on the analysis of pass-by noise from light-rail, commuter-rail, and freight rail operations. Rail noise was calculated from noise measurement data and observations collected for this project, and from key assumptions for the BART Extension and Warm Springs/South Fremont BART Station, as presented in the WSX Final Environmental Impact Statement published June 2006. FTA and Federal Rail Administration methodologies were employed for the prediction of rail and transit noise levels in the plan area. Rail noise calculations are presented in further detail in Appendix F. Assuming a standard transportation-source attenuation rate of 4.5 dB/DD, noise-sensitive land uses located within approximately 218 feet of the railroad corridor would be exposed to railroad noise levels are above 60 dBA L_{dn}. As a result, implementation of the proposed project has the potential to result in exposure of noise-sensitive receptors to rail-transit generated noise levels in excess of the City of Fremont's exterior noise level standard of 60 dBA L_{dn}. Therefore, this impact is considered potentially significant.

Summary of Impacts

Based on the assumptions outlined within the impact analysis, implementation of the Community Plan and development of noise-sensitive receptors in planning areas 3, 4, 8 and 9 of the Community Plan would have the potential to result in noise level exposures that exceed the noise level standards outlined in the City of Fremont General Plan and Municipal Code. Exhibit 3.9-7 illustrates the combined transportation noise level contours in the Community Plan area, including noise generated from traffic on the local and regional roadway network, as well as rail operations along the UPRR and BART corridors. Mitigation Measures NOI-5a through NOI-5b are proposed to reduce impacts to within acceptable levels. Implementation of the following mitigation measures would reduce potential noise exposure levels from long-term operational and stationary noise sources. Impacts would be less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Mitigation Measures

MM NOI-5a Plans submitted for building and/or grading permits shall include an acoustical analysis that verifies that the project would meet applicable noise standards.

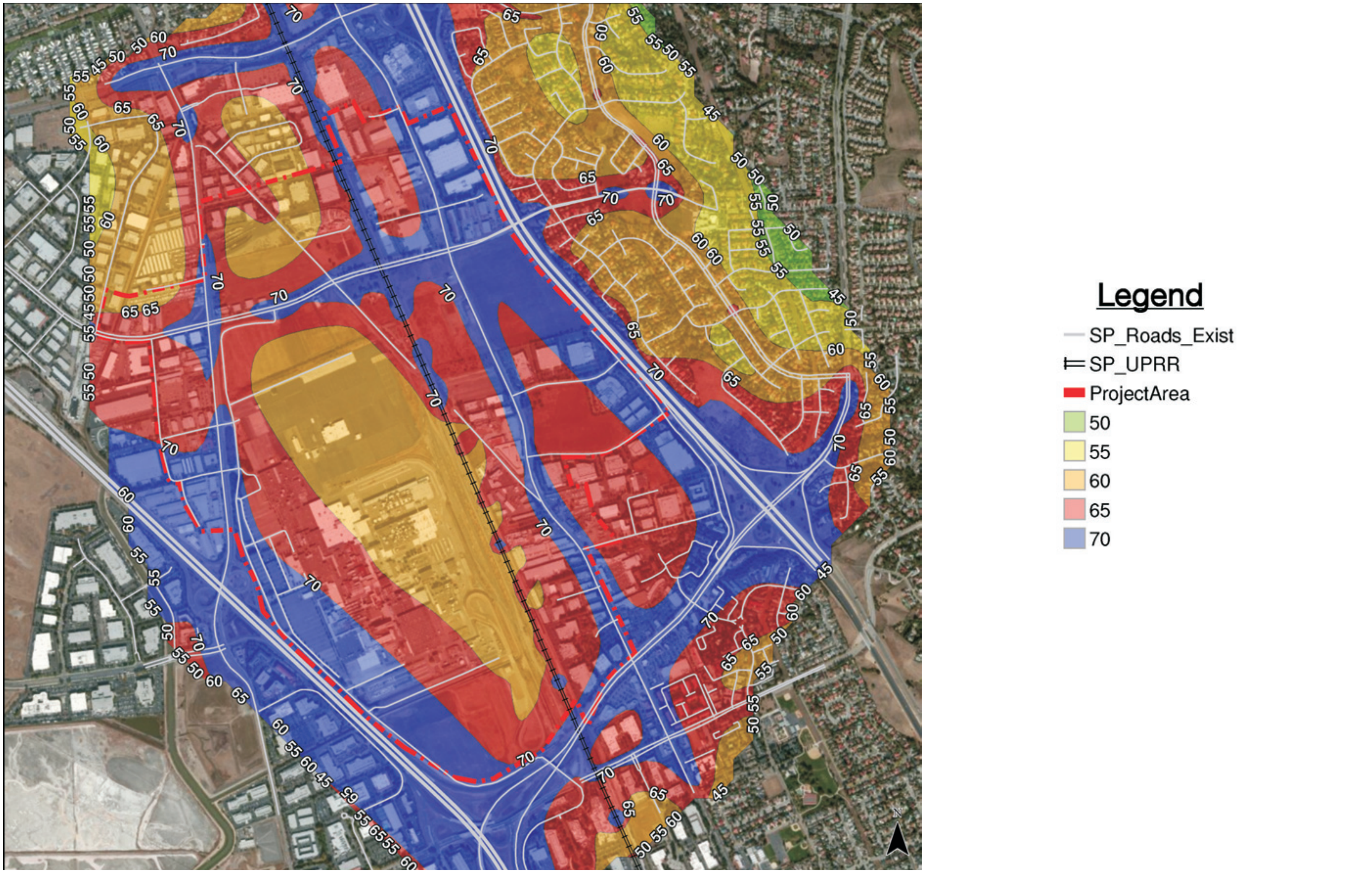
MM NOI-5b Projects determined to have the potential to expose noise-sensitive uses to noise levels exceeding the City of Fremont noise standards shall incorporate site-specific design considerations to reduce exterior noise exposure levels. Site design includes but is not limited to the following measures:

- Distances between noise sources and noise-sensitive uses shall be maximized through the use of noise buffers/setbacks. Setback areas can take the form of open space, frontage roads, recreational areas, storage yards, or other City approved setback.

- Common outdoor activity areas, such as play structures, swimming pools, or other outdoor congregation areas included in multi-family residential and/or mixed-use developments shall be located such that the building(s) serve as a sound barrier to the nearest predominant noise source whenever feasible.
- Noise barriers shall be constructed to provide shielding of noise-sensitive uses and outdoor activity areas. Barriers may include man-made walls, earthen berms, a combination of walls and berms, and other structures breaking line of sight from noise source to receptor. Barriers shall be located close to either the noise source or the sensitive receptor.
- A site-specific acoustical analysis shall be performed to determine noise level exposure, and determine effectiveness of various site design measures based on detailed project construction plans. The acoustical analysis shall verify that incorporation of the mitigation measures into the project design would reduce exterior noise level exposures to comply with applicable City of Fremont noise standards.

Level of Significance After Mitigation

Less than significant impact.



Sources: Extant Acoustical, 2013

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Exhibit 3.9-7
Combined Background Transportation Noise Levels