4.10 NOISE

This chapter describes the regulatory framework and existing conditions related to noise sources and the overall noise environment in Menlo Park, and evaluates the potential noise impacts that could occur by adopting and implementing the proposed project on the noise environment, as well as the potential impacts of the noise environment on future development under the proposed project. The technical data and modeling used to for the analysis in this chapter are located in Appendix G, Noise Data, of this Draft EIR.

4.10.1 ENVIRONMENTAL SETTING

4.10.1.1 BACKGROUND

Noise Descriptors

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

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

- Sound. A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- Noise. Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- Intrusive. Noise that intrudes over and above the existing ambient noise at a given location. Relative intrusiveness depends on amplitude, duration, frequency, time of occurrence, and tonal or informational content, as well as the prevailing ambient noise level.
- Decibel (dB). A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 µPa).
- Vibration Decibel (VdB). A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).
- A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- Ambient Noise Level. The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
- Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level. The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (Ln).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m. As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Characteristics of Sounds

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

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale to better account for the large variations in pressure amplitude (the above range of human hearing, 0 to 140 dBA, represents a ratio in pressures of one hundred trillion to one). All noise levels in this study are relative to the industry-standard pressure reference value of 20 micropascals. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 4.10-1 presents the subjective effect of changes in sound pressure levels.

TABLE 4.10-1 CHANGE IN APPARENT LOUDNESS

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

Source: Bies and Hansen, 2009.

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

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. For example, L_{50} is the noise level that is exceeded 50 percent of the time. Similarly, the L_{02}, L_{08}, and L_{25} values are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with community noise measurements. The L_{eq} metric is a single-number noise descriptor of the energy-average sound level over a given period of time. An hour is the most common period of time over which average sound is measured, but it can be measured over any duration. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values are the minimum and maximum root-mean-square (RMS) noise levels obtained over the stated measurement period.

Since sensitivity to noise increases during the evening and at night, when excessive noise can interfere with relaxation and/or the ability to sleep, 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. Because of this increased sensitivity to unwanted noise intrusion during the evening and nighttime hours, State law requires, for planning purposes, that this increased noise sensitivity be accounted for. The Day/Night Average Sound Level, L_{dn}, is a measure of the cumulative noise exposure in a community, with a 10 dB addition to nocturnal (10:00 p.m. to 7:00 a.m.) noise levels. The Community Noise Equivalent Level (CNEL) is a similar 24-hour cumulative measure of noise; however it differs slightly from L_{dn} in that 5 dB is added to the levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system; prolonged noise exposure in excess of 75 dBA increases body tensions, thereby affecting blood pressure and functions of the heart and nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage. This is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less-developed areas. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Table 4.10-2 shows typical noise levels from noise sources. Causes for annoyance include interference with speech, radio, television, and sleep and rest, as well as induced structural vibrations. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. The threshold for annoyance from vehicle noise is about 55 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately 8 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the highly annoyed proportion of the population increases to about 20 to 25 percent. There is, therefore, an increase of about 2 percent per decibel of increased noise between an L_{dn} of 60 to 70 dBA. The thresholds for speech interference indoors are approximately 45 dBA for continuous noise and approximately 55 dBA for fluctuating noise. Outdoors the thresholds are roughly 15 dBA higher. Steady noise above 35 dBA and fluctuating noise levels above roughly 45 dBA have been shown to affect sleep.

NOISE

TABLE 4.10-2 TYPICAL NOISE LEVELS

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

Source: Bies, David A. and Colin H. Hansen. 2009. Engineering Noise Control: Theory and Practice. 4th ed. New York: Spon Press.

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers.

Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is the velocity, and the rate of change of the speed is the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. These types of vibration are best measured and described in terms of velocity and acceleration.

The three main types of waves associated with groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation. Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.

Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

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

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

Effects of Vibration

Table 4.10-3 displays human annoyance and the effects on buildings resulting from continuous vibration. As discussed previously, annoyance is a subjective measure and vibrations may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons exposed to elevated ambient vibration levels such as people in an urban environment may tolerate a higher vibration level.

TABLE 4.10-3 REACTION OF PEOPLE AND DAMAGE TO BUILDINGS FOR CONTINUOUS/FREQUENT INTERMITTENT VIBRATION LEVELS

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.02	Barely perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe – Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Transportation- and Construction-Induced Vibration Guidance Manual, California Department of Transportation, June 2004.

Human response to ground vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1×10^{-6} inch/second RMS, which equals 0 VdB, and 1 inch/second equals 120 VdB. The abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels. One of the problems with developing suitable criteria for groundborne vibration is the limited research into human response to vibration and, more importantly, human annoyance inside buildings. The U.S. Department of Transportation, Federal Transit Administration has developed rational vibration limits that can be used to evaluate human annoyance to groundborne vibration. These criteria are primarily based on experience with rapid transit and commuter rail systems, and are discussed in greater detail in the regulations section of this document.

Railroad and transit operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of track. Trains generate substantial vibration due to their engines, steel wheels, heavy loads, and wheel-rail interactions.

Construction operations generally include a wide range of activities that can generate groundborne vibration, which varies in intensity depending on several factors. In general, blasting and demolition of structures, as well as pile driving and vibratory compaction equipment generate the highest vibrations. Because of the impulsive nature of such activities, the use of the peak particle velocity descriptor (PPV) has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, etc., all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions.

"Architectural" damage can be classified as cosmetic only, such as minor cracking of building elements, while "structural" damage may threaten the integrity of a building. Safe vibration limits that can be

applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to a building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is in a high state of disrepair and the construction activity occurs immediately adjacent to the structure. Table 4.10-4 shows the criteria established by the Federal Transit Administration (FTA) for the likelihood of structural damage due to vibration.

TABLE 4.10-4 GROUNDBORNE VIBRATION CRITERIA: ARCHITECTURAL DAMAGE

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

a. RMS velocity calculated from vibration level (VdB) using the reference of one micro-inch/second.
Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006.

Noise- and Vibration-Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration, including residential, school, and open space/recreation areas where quiet environments are necessary for enjoyment, public health, and safety. Sensitive receptors within Menlo Park include residences, senior housing, schools, places of worship, and recreational areas. These uses are regarded as sensitive because they are where citizens most frequently engage in activities that are likely to be disturbed by noise, such as reading, studying, sleeping, resting, or otherwise engaging in quiet or passive recreation. Commercial and industrial uses are not considered noise- and vibration-sensitive receptors for the purposes of this analysis because these uses often generate noise in excess of what they receive from other types of land uses.

4.10.1.2 REGULATORY FRAMEWORK

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the State have established standards and ordinances to control noise. This section describes the regulatory framework related to noise and vibration in Menlo Park.

State of California Noise Standards

The State of California, through its General Plan Guidelines, discusses how ambient noise should influence land use and development decisions and includes a table of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels expressed in CNEL. These Land Use Compatibility Guidelines are shown in Table 4.10-5.

NOISE

State of California Building Code

The State of California provides a minimum standard for building design through the California Building Code (CBC), which is located in Part 2 of Title 24 of the California Code of Regulations (CCR), commonly referred to as the "California Building Code" (CBC). The CBC is located in Part 2 of Title 24. The CBC is updated every three years, and the current 2013 CBC went into effect in January 2014. It is generally adopted on a jurisdiction-by-jurisdiction basis, subject to further modification based on local conditions. The 2013 CBC has been adopted for use by the City of Menlo Park, according to Section 12.04.010 of the Menlo Park Municipal Code.

Commercial and residential buildings are plan-checked by local City and County building officials for compliance with the CBC, including noise insulation standards. These noise standards are applied to new construction in California for the purpose of ensuring that the level of exterior noise transmitted to and received within the interior living spaces of buildings is compatible with their comfortable use. For new residential dwellings, hotels, motels, dormitories, and school classrooms, the acceptable interior noise limit for new construction is 45 dBA CNEL or L_{dn}. Title 24 requires acoustical studies for development in areas exposed to more than 60 dBA CNEL to demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. Where exterior noise levels are projected to exceed 60 dBA CNEL or L_{dn} at the façade of a building, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the 45 dBA noise limit.

Local Noise Regulations

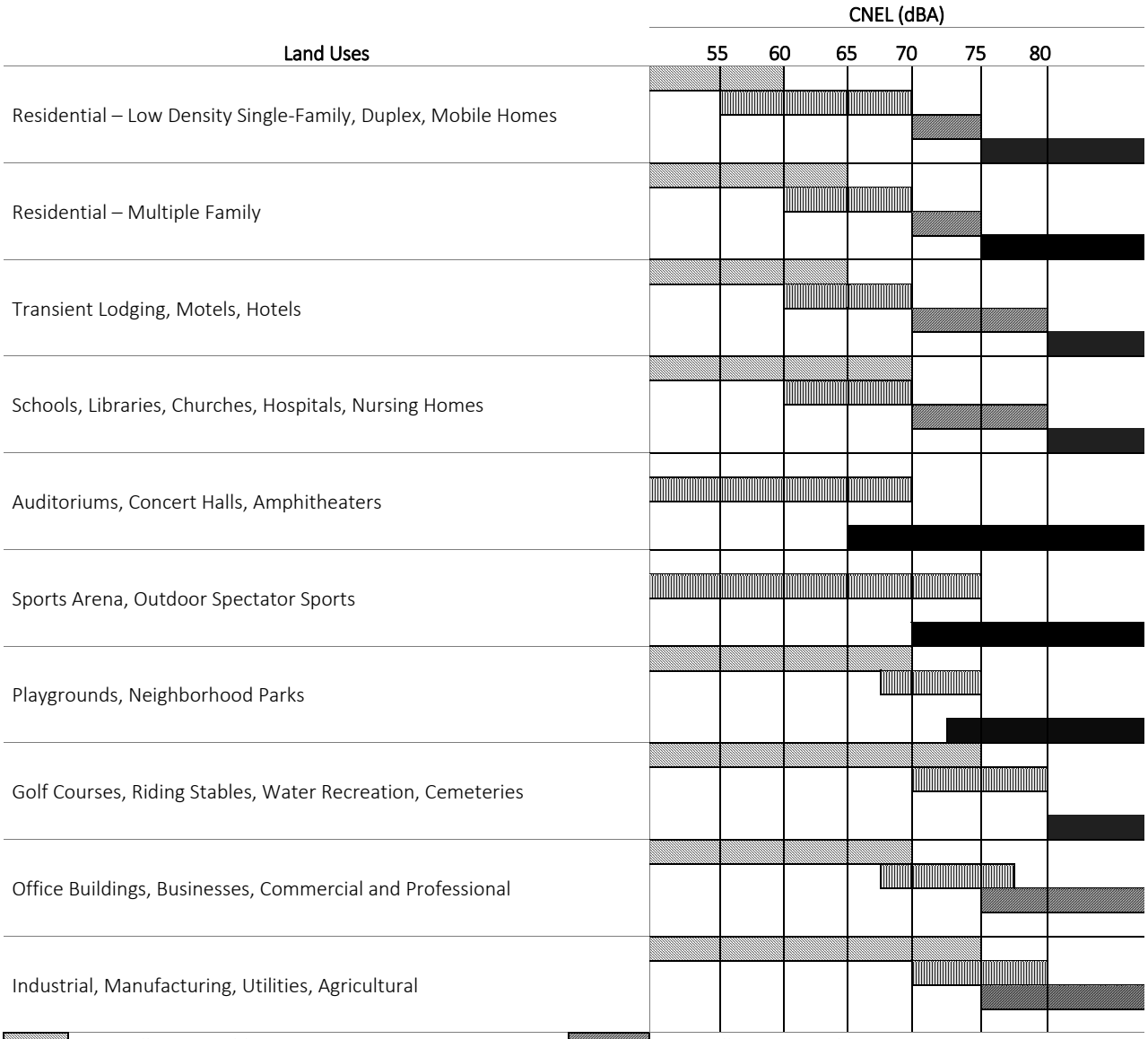
Menlo Park General Plan

The Noise Element of the General Plan was updated in 2013. The City's Noise Element discusses how ambient noise should influence land use and development decisions and includes a chart of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels expressed in either L_{dn} or CNEL. The Noise Element directs the City to adopt development and noise insulation standards generally consistent with the contemporaneous version of the State of California's Noise Insulation Standard. Menlo Park's Land Use Compatibility Noise Standards for new development presented in the Noise Element are the same as the State's Land Use Compatibility Guidelines, shown above in Table 4.10-5.

Menlo Park Municipal Code

Menlo Park addresses noise in various capacities under multiple chapters of its municipal code. Noise is primarily addressed in Chapter 8.06 (Noise); additional chapters making brief mention of minor and/or incidental noise issues and regulations include Chapters 8.07 (Leaf Blowers), 8.12 (Business Operations after Midnight), 8.28 (Parks and Recreation), 9.26 (Poultry and Rabbits), 11.64 (Transportation Systems Management), and 13.18 (Use of Public Rights-of-Way).

TABLE 4.10-5 CALIFORNIA LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS



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

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

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

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

Source: Governor's Office of Planning and Research, General Plan Guidelines, November 2003.

NOISE

Chapter 8.06, Noise

Basic Exterior Residential Noise Limitations

Chapter 8.06, Noise, contains the primary set of statutes through which Menlo Park regulates noise. For all noise measurements pursuant to the noise ordinance, the municipal code specifies standard procedures for conducting noise measurements, with specifications for sound-meter settings and placement. Section 8.06.030 sets maximum noise levels at any residential receiving property to a maximum of 60 dBA during the daytime hours between 7:00 a.m. to 10:00 p.m., and to 50 dBA during the nighttime hours between 10:00 p.m. and 7:00 a.m. The ordinance applies an additional 5 dBA penalty to sounds of a particularly annoying nature, such as tones, screeches, whines, and pulses, among others. The ordinance also includes a qualitative standard which prohibits noises which can be reasonably determined to be disturbing to an entire neighborhood or any considerable number of residents.

Exceptions – Noise Limitation Exceptions and Exemptions

The Menlo Park noise ordinance also contains a number of qualified exceptions to the limitations stipulated in the ordinance; these include construction, powered equipment, and leaf blowers, deliveries, social gatherings, pavement sweeping, garbage collection, and animals. Additionally, the ordinance contains general exemptions for emergencies and emergency warning devices, sporting and City-permitted events, City and State projects, and the normal operation of typical motor vehicles. Of these, the most notable exceptions and exemptions for the purposes of this analysis include those for construction, motor vehicles, and deliveries.

Construction activities are exempted from the noise ordinance between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday; construction activities are only allowed on Saturday and Sunday between the hours of 9:00 a.m. and 5:00 p.m. and only if they are being personally undertaken by property owners performing maintenance or improvements. Despite these allowances for weekend residential maintenance, the ordinance still prohibits the use of any equipment that results in noise levels exceeding 85 dBA at a distance of 50 feet. Construction that is sufficiently quiet so as to be fully compliant with the basic exterior noise limitations set out by the ordinance is generally allowed at any time.

Notwithstanding specialized vehicle equipment or sound amplification systems, noise from the normal operation of motor vehicles (including cars, trucks, busses, trains, and airplanes) is exempted from the provisions of the noise ordinance. Noise from deliveries to food retailers and restaurants are generally excepted from the ordinance, while noise from other commercial and industrial deliveries are generally excepted between 7:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. Saturday and Sunday. Temporally and geographically specific exceptions for street sweeping and garbage collection are also described in detail by the noise ordinance.

Other Chapters with Noise Regulations

In addition to Chapter 8.06, Noise, there are several other chapters in the Menlo Park municipal code that mention noise. In Chapter 8.07, Leaf Blowers, the municipal code mentions that leaf blowers are a source of loud noise and stipulates that operators of these devices must wear ear protection. In Chapter 8.12, Business Operations after Midnight, Section 8.12.040 indicates that a permit for late-night business

operations may be revoked if noise from the establishment exceeds that foreseen by the permit. Chapter 8.28, Parks and Recreation, prohibits the creation of obtrusive noise in parks. Section 9.26.080 of Chapter 9.26, Poultry and Rabbits, prohibits the keeping of animals or fowl which cause unreasonable and disturbing noise for residents. In the goals of Chapter 11.64, Transportation Systems Management, it is stated that noise reduction through decreased traffic is a goal of the chapter. Finally, in Chapter 13.18, Use of Public Rights-of-Way, Section 13.18.110, Regulations, stipulates that all regulations, including those related to noise, apply to the construction, operation, maintenance, and repair of facilities in the public rights-of-way.

Vibration Standards

Neither the City of Menlo Park nor the County of San Mateo have regulatory standards for construction or operational vibration sources. For the purpose of this analysis, to evaluate the impacts of the proposed project under CEQA, federal standards are used to address vibration impacts from the operation of equipment to adjacent uses.

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

The FTA provides criteria to evaluate potential human annoyance due to groundborne vibration caused by frequent and intermittent events. These FTA criteria, shown in Table 4.10-6, are used in this analysis to evaluate impacts from transportation sources to sensitive land uses throughout the city. The FTA also provides criteria to evaluate potential structural damage associated with vibration, and these FTA criteria are used in this analysis. Structures amplify groundborne vibration and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier buildings. The level at which groundborne vibration is strong enough to cause architectural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards, shown in Table 4.10-7.

4.10.1.3 EXISTING CONDITIONS

Menlo Park is surrounded by multiple other cities and towns are of various sizes. Municipalities surrounding Menlo Park include Redwood City, Atherton, Palo Alto, Woodside, and Portola Valley. The land in these cities that border Menlo Park consists of residential and commercial uses.

TABLE 4.10-6 GROUNDBORNE VIBRATION AND NOISE IMPACT CRITERIA

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 micro-inch/second)		Groundborne Noise Impact Levels (dB re 20 micropascals)	
	Frequent Events[a]	Infrequent Events[b]	Frequent Events[a]	Infrequent Events[b]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[3]	65 VdB[3]	NA[4]	NA[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

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

TABLE 4.10-7 GROUNDBORNE VIBRATION CRITERIA: ARCHITECTURAL DAMAGE

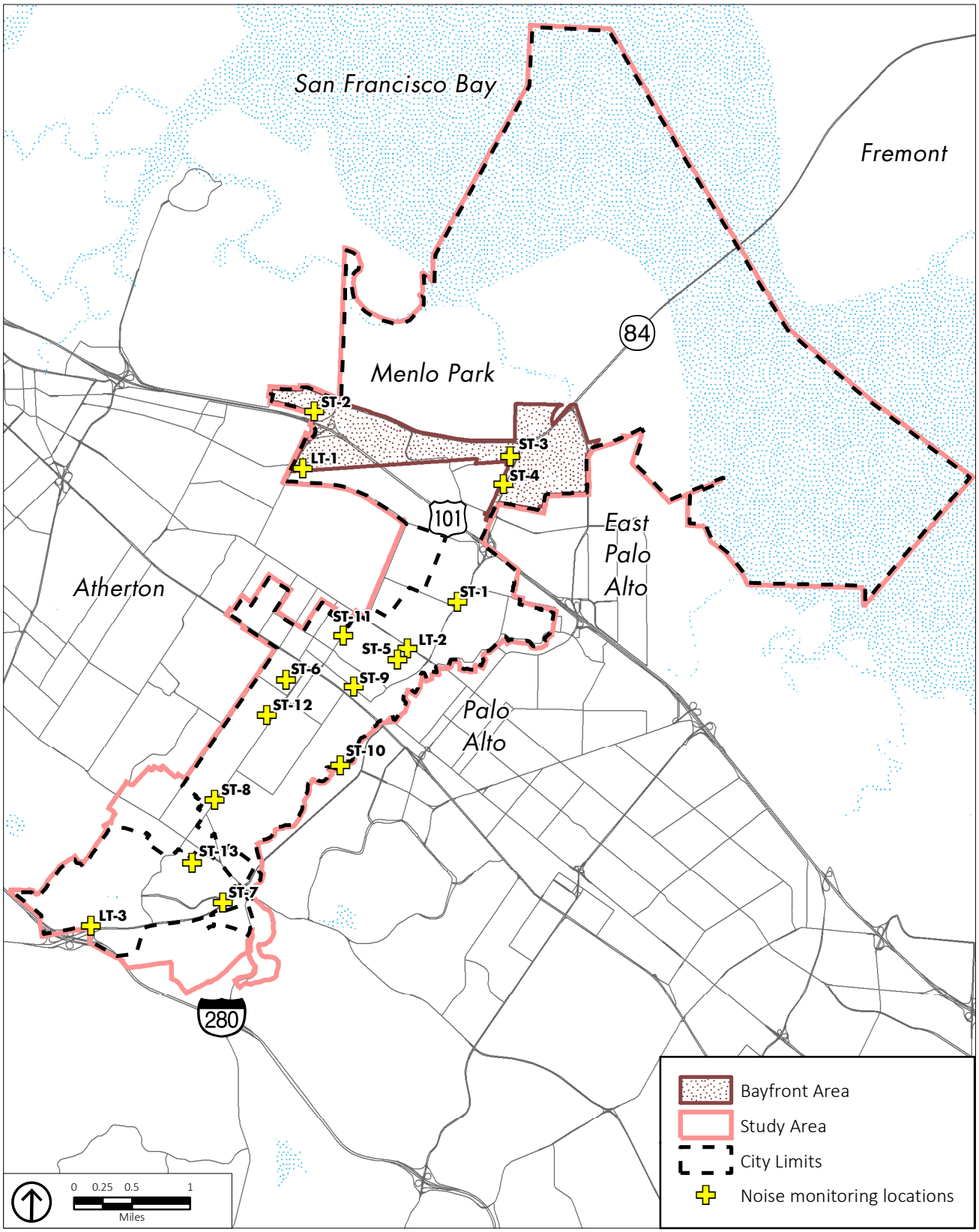
	Building Category	PPV (in/sec)	L_v (VdB)[a]
I.	Reinforced concrete, steel, or timber (no plaster)	0.5	102
II.	Engineered concrete and masonry (no plaster)	0.3	98
III.	Non-engineered timber and masonry buildings	0.2	94
IV.	Buildings extremely susceptible to vibration damage	0.12	90

a. RMS velocity calculated from vibration level (VdB) using the reference of one micro-inch/second.
Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006.

Noise Measurements

Existing ambient noise levels were measured at 16 locations in the city to document representative noise levels at several locations. These locations are shown on Figure 4.10-1. Short-term (ST) noise level measurements were taken at thirteen locations for a minimum period of 15 minutes during the daytime on December 6, 2012 and December 10, 2012, all between the hours of 10:00 a.m. and 6:00 p.m. Long-term (LT) noise level measurements were taken at three locations for a period of 24 hours on December 10 and 11, 2012.

The noise levels were measured using a Larson-Davis Model 820 sound level meter, which satisfies the American National Standards Institute for Type 1 general environmental noise measurement instrumentation. The sound level meter and microphone were mounted on a tripod 5 feet above the ground and equipped with a windscreen during all short-term measurements. For long-term measurements, the microphone and windscreen were attached to available objects including a fence and two sturdy trees/shrubs.



Source: City of Menlo Park; PlaceWorks, 2012; ESRI, 2010; FHA, 2002.

Figure 4.10-1
Noise Monitoring Locations

NOISE

The sound level meters were programmed to record noise levels with the "slow" time constant and using the "A" weighting filter network. Meteorological conditions during the measurement periods were favorable and were noted to be representative of typical conditions for the season. Generally, conditions included clear to partly cloudy skies, daytime temperatures of approximately 60 to 70 degrees Fahrenheit (°F), and less than 5-mile-per-hour winds. A description of the noise level measurement location is included in Appendix G, Noise Data, of this Draft EIR. The results of both the Long Term and Short Term measurements are summarized in Table 4.10-8.

TABLE 4.10-8 NOISE LEVEL MEASUREMENTS

Monitoring Site	L_{min}	L_{eq}	L_{max}	CNEL
LT-1	—	—	—	67.1
LT-2	—	—	—	68.6
LT-3	—	—	—	67.5
ST-1	52.2	67.3	74.4	—
ST-2	53.9	63.6	78.8	—
ST-3	50.6	56.5	60.9	—
ST-4	50.9	59.5	72.3	—
ST-5	41.3	55.9	71.3	—
ST-6	51.5	62.9	82.6	—
ST-7	52.6	69.1	79.4	—
ST-8	48.5	69.8	80.2	—
ST-9	44.7	60.9	78.2	—
ST-10	42.1	49.2	67.8	—
ST-11	46.6	66.8	78.2	—
ST-12	42.2	54.6	72.6	—
ST-13	41.2	57.4	72.6	—

Note: ST = Short-Term, LT = Long-Term

Principal Noise Sources in Menlo Park

On-Road Vehicles

Highway 101 passes through the northeastern part of Menlo Park, and Interstate 280 runs along the southwestern boundary of the city. In addition to Highway 101 and I-280, major roadways running northwest to southeast through or adjacent to Menlo Park include Alameda de las Pulgas, El Camino Real, Middlefield Road, Bay Road, and Bayfront Expressway. Major southwest-northeast roadways include Valparaiso Avenue, Santa Cruz Avenue, Sand Hill Road, Ravenswood Avenue, Ringwood Avenue, Marsh Road, and Willow Road. Together, Highway 101, I-280, and these streets comprise the major roads in the

City of Menlo Park. Figure 4.10-2 shows existing noise contours for Menlo Park, including the roadways referenced above.

In addition to the 2012 measurements taken by PlaceWorks, monitoring was also conducted by Wilson, Ihrig & Associates, Inc. in 2015, in the vicinity of the TE Connectivity site. A summary of the results of the measurements is shown in Table 4.10-9. The complete report, including a noise measurement location map, by Wilson, Ihrig & Associates, Inc. is included in Appendix G, Noise Data, of this Draft EIR.

Train Noise

Two rail lines traverse Menlo Park. One minor rail line crossing the northern-most portion of the city from east to west is a little-used segment of a former Union Pacific line, which once crossed San Francisco Bay. This rail line currently consists of a single track and the rail bridge that served as the connection for this line is no longer functional; however, this bridge is planned for reconstruction and future use as part of the Dumbarton Rail Project. The second and major rail line that crosses the city is the Caltrain right-of-way, which bisects a portion of Menlo Park along the city's short northwest-southeast axis. The Caltrain tracks run in the area between El Camino Real and Alma Road, entering Menlo Park at Watkins Avenue and exiting to Palo Alto at San Francisquito Creek. Caltrain runs on a double track throughout its entire length through Menlo Park, and its right-of-way is owned and administered by the Peninsula Corridor Joint Powers Board. Menlo Park is served by one Caltrain station along this line, and though there are currently only 65 weekday daily stops at this station (either northbound or southbound), more than 90 trains pass either north or south through Menlo Park on a daily basis during the work week. The sheer number of passings by these diesel-powered commuter trains ensures that the activity along the Caltrain railway contributes significantly to the ambient noise environment of nearby areas of Menlo Park.

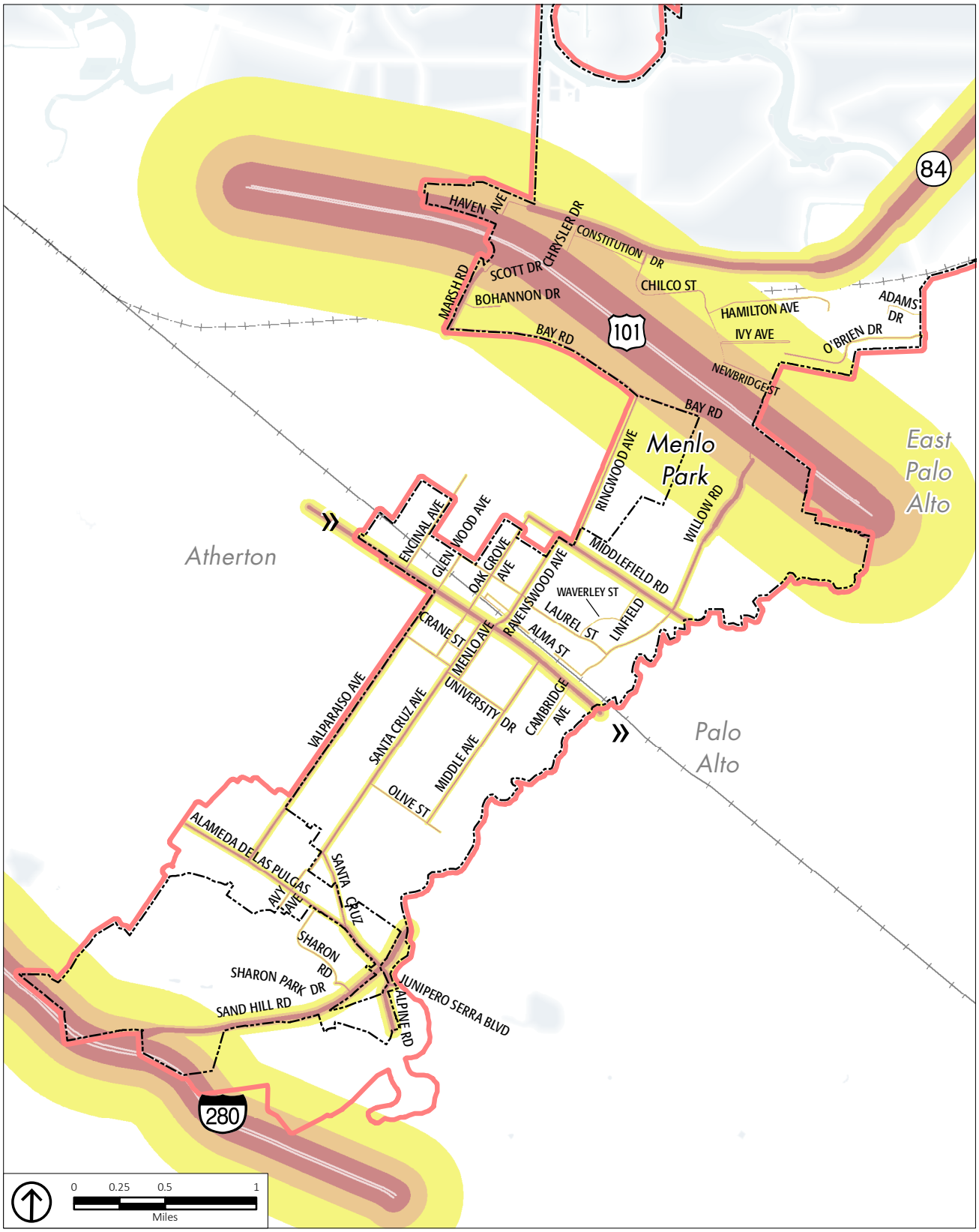
Heliports

There are no heliports located within the City of Menlo Park. The nearest heliport is the Stanford University Hospital heliport, which is located approximately 0.4-mile to the southeast of the border of Menlo Park. There are no other heliports within 10 miles of the City.[1]

Aircraft Noise

Menlo Park is located approximately 6 miles to the northwest of Moffet Federal Airfield, 14 miles to the northwest of the San Jose International Airport, 15 miles to the southeast of San Francisco International Airport, and 18 miles to the south of Oakland International Airport. The project study area is also located in close proximity to two smaller airports; with portions of Menlo Park as near as 2 miles from the Palo Alto Airport and other areas of the project study area as near as approximately 4 miles from the San Carlos Airport. Additional small airports in the vicinity include the Hayward Executive Airport, at 11 miles away, and the Half Moon Bay airport, at 16 miles away. Although Menlo Park does receive some noise from aircraft using these facilities, Menlo Park does not fall within the airport land use planning areas, runway protection zones, or the 55 dBA CNEL noise contours of any of these airports.

[1] www.Airnav.com, accessed on May 4, 2016.



Source: City of Menlo Park; PlaceWorks, 2015; TJKM, 2015

City Limits

Sphere of Influence

60 dBA contour
65 dBA contour
70 dBA contour

Figure 4.10-2
Existing Noise Contours

TABLE 4.10-9 TE CONNECTIVITY SITE MEASUREMENT SUMMARY

		Location 1			Location 2			Location 3		
		Combined Steady	TEC[a] Transient	Other	Combined Steady	TEC[a] Transient	Other	Combined Steady	TEC[a] Transient	Other
1/7/2015 Wednesday	5A – 6A	60	60	60.6	60*	--	61.3	55*	--	56 – 71
	9A – 10A	58	58 – 60	60.8	54 – 57**	--	56 – 63	56 – 58**	--	59 – 76
	3P – 4P	57 – 58	57 – 58	57 – 61	54 – 55	56	56 – 64	53 – 55**	--	54 – 63
	10P – 11P	59 – 60*	59 – 60	60 – 61	56	57	57 – 62	55 – 57	--	57 – 60
1/8/2014 Thursday	5A – 6A	59 – 61	59 – 61	60 – 64	56 – 57*	57 – 60	57 – 60	54 – 56	--	55 – 56
	9A – 10A	58 – 59	58 – 60	59 – 63	55 – 56	--	56 – 65	56**	--	58 – 65
1/15/2014 Thursday	3P – 4P	57 – 58	58.3	61 – 62	55 – 56**	--	57 – 66	55 – 56**	--	57 – 65
	10P – 11P	57 – 59	58 – 61	59 – 63	55 – 56	57 – 58	58 – 68	54 – 56*	--	56 – 63
1/16/2014 Friday	5A – 6A	58 – 59	--	--	56 – 59*	60 – 61*	--	55 – 56*	--	57 – 61*
	9A – 10A	56 – 57	--	59 – 62	55	55*	57 – 61	55 – 56**	--	62 – 74
1/24/2014 Saturday	5A – 6A	56 – 57	57 – 58	58 – 59	55 – 56	56	57	54 – 57	--	56 – 69
	9A – 10A	56	56 – 57	57 – 65	52 – 54	--	57 – 67	52 – 54**	--	54 – 70
	3P – 4P	56	--	58 – 61	51 – 54	--	59 – 61	54 – 56	--	58 – 67
	10P – 11P	56 – 57	57 – 58	62	55	55 – 57	--	54 – 55	--	--
1/25/2014 Sunday	5A – 6A	56	57 – 58	--	54 – 55	--	--	55	--	--
	9A – 10A	55 – 57	56 – 58	56 – 64	53	62	57	52	--	54 – 55
	3P – 4P	56 – 57	56 – 57	56 – 59	52 – 54	54	56 – 77	52 – 54	--	53 – 65
	10P – 11P	56*	56 – 60*	58	55 – 56*	56 – 57	58	55 – 56*	--	57 – 61
1/26/2014 Monday	5A – 6A	58 – 60*	58 – 60*	61	56 – 57*	57 – 59*	60 – 61	56 – 58*	--	60 – 62
	9A – 10A	57	57 – 59	58 – 60	54 – 57	--	55 – 61	54 – 59*	--	58 – 69
	3P – 4P	58 – 60	58 – 61	59 – 60	53 – 57	--	55 – 62	54 – 56**	--	59 – 76
	10P – 11P	58	58 – 60	61	56 – 57	--	--	54 – 57	--	--

a. "Transient" noise levels often include other noise sources such as U.S. 101 and Bayshore Expressway.
*Traffic audible throughout, **Construction audible throughout.

Stationary Source Noise

Stationary sources of noise may occur from all types of land uses. Menlo Park is mostly developed with residential, commercial, institutional, and some light industrial uses. Commercial uses can generate noise from HVAC systems, loading docks, trash compactors, and other sources. Industrial uses may generate noise from HVAC systems, loading docks, and machinery required for manufacturing or other industrial processes. Noise generated by commercial uses is generally short and intermittent. Industrial uses may generate noise on a more continual basis, or intermittently, depending on the processes and types of machinery involved. In addition to on-site mechanical equipment, which generates stationary noise, warehousing and industrial land uses generate substantial truck traffic that results in additional sources of noise on local roadways in the vicinity of industrial operations.

The majority of the Menlo Park's limited industrial operations are located in the far northern reaches of the city, and are usually separated from sensitive uses, such as residences, by either rail lines or by major roads. In both cases, this added distance serves to decrease the noise perceived by these receptors and, in the case of major roads, the noise from the roads was generally observed to exceed that from the industrial uses. Existing residential areas with the greatest potential to be impacted by noise from industrial operations include those along the previously mentioned Union Pacific rail right-of-way (Dumbarton Rail Corridor) and those along the northern end of Willow Road between Ivy Drive and the Bayfront Expressway.

Construction Noise

Construction activity also contributes to the noise environment of Menlo Park; however such activities are typically temporary, occurring in any one location for only a limited period of time. Larger or multi-phase construction projects may contribute to the noise environment of a particular location for a more extended period of time. Public infrastructure that requires ongoing maintenance may also result in ongoing noise impacts, though usually not at a constant location. For example, different sections of road may be repaved at different times, meaning that noise impacts from associated construction activities would, at any given time, only occur along and near the section of roadway undergoing such maintenance.

Public Facility Noise

Outdoor activities that occur on school campuses and in parks throughout the city generate noticeable levels of noise. Noise generated on both the weekdays (from physical education classes and sports programs) and weekends (from use of the fields and stadiums) can elevate community noise levels.

4.10.2 STANDARDS OF SIGNIFICANCE

Implementation of the proposed project would result in a significant impact if it would:

1. Exposure of people to, or generation of, noise levels in excess of standards established in the General Plan or the Municipal Code, and/or the applicable standards of other agencies.
2. Exposure of people to, or generation of, excessive groundborne vibration or groundborne noise levels.

3. Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
5. Exposure of people residing or working in the vicinity of the project site to excessive aircraft noise levels, for a project located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport.
6. Exposure of people residing or working in the project site to excessive noise levels, for a project within the vicinity of a private airstrip.

4.10.3 IMPACT DISCUSSION

This section analyzes potential project-specific and cumulative impacts to noise.

NOISE-1 Implementation of the proposed project would not cause exposure of people to, or generation of, noise levels in excess of standards established in the General Plan or the Municipal Code, and/or the applicable standards of other agencies.

The proposed project includes land use changes in the Bayfront Area that would allow more intense non-residential development and new multi-family residential development in an area that is currently developed with existing non-residential land uses, as well as ongoing development potential allowed under the current General Plan in the remainder of the city.

As described in detail in Section 4.10.1.2, Regulatory Framework, the standards for noise generation and exposure in the City of Menlo Park are determined primarily through the City's existing General Plan and Municipal Code standards, as well as by the interior noise standards set by the Title 24 of the State Building Code.

The proposed Land Use (LU) Element, which would be adopted as part of the proposed project, and Section III, Noise (N), of the existing Open Space/Conservation, Noise and Safety Elements, contain general goals, policies and programs that would require local planning and development decisions to consider noise impacts. The following General Plan goals, policies, and programs would serve to ensure noise levels do not exceed those standards established for Menlo Park:

- Goal LU-2: Maintain and enhance the character, variety and stability of Menlo Park's residential neighborhoods.
  - Policy LU-2.9: Compatible Uses. Promote residential uses in mixed-use arrangements and the clustering of compatible uses such as employment center, shopping areas, open space and parks, within easy walking and bicycling distance of each other and transit stops.
- Goal LU-4: Promote the development and retention of business uses that provide goods or services needed by the community that generate benefits to the City, and avoid or minimize potential environmental and traffic impacts.

NOISE

- Policy LU-4.5: Business Uses and Environmental Impacts. Allow modifications to business operations and structures that promote revenue generating uses for which potential environmental impacts can be mitigated.

- Goal N-1: Achieve acceptable noise levels.
  - Policy N-1.1: Compliance with Noise Standards. Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans. Require new projects to comply with the noise standards of local, regional, and building code regulations, including but not limited to the City's Municipal Code, Title 24 of the California Code of Regulations, and subdivision and zoning codes.
  - Policy N-1.2: Land Use Compatiblity Standards. Protect people in new development from excessive noise by applying the City's Land Use Compatibility Noise Standards for New Development (see Table 4.10.5 above) to the siting and required mitigation for new uses in existing noise environments.
  - Policy N-1.3: Exterior and Interior Noise Standards for Residential Use Areas. Strive to achieve acceptable interior noise levels and exterior noise levels for backyards and/or common usable outdoor areas in new residential development, and reduce outdoor noise levels in existing residential areas where economically and aesthetically feasible.
  - Policy N-1.4: Noise Sensitive Uses. Protect existing residential neighborhoods and noise-sensitive uses from unacceptable noise levels and vibration impacts. Noise sensitive uses include, but are not limited to, hospitals, schools, religious facilities, convalescent homes and businesses with highly sensitive equipment. Discourage the siting of noise-sensitive uses in areas in excess of 65 dBA CNEL without appropriate mitigation and locate noise sensitive uses away from noise sources unless mitigation measures are included in development plans.
  - Policy N-1.5: Planning and Design of New Development to Reduce Noise Impacts. Design residential developments to minimize the transportation-related noise impacts to adjacent residential areas and encourage new development to be site planned and architecturally designed to minimize noise impacts on noise-sensitive spaces. Proper site planning can be effective in reducing noise impacts.
  - Policy N-1.6: Noise Reduction Measures. Encourage the use of construction methods, state-of-the-art noise abating materials and technology and creative site design including, but not limited to, open space, earthen berms, parking, accessory buildings, and landscaping to buffer new and existing development from noise and to reduce potential conflicts between ambient noise levels and noise-sensitive land uses. Use sound walls only when other methods are not practical or when recommended by an acoustical expert.
  - Policy N-1.7: Noise and Vibration from New Non-Residential Development. Design non-residential development to minimize noise impacts on nearby uses. Where vibration impacts may occur, reduce impacts on residences and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration near rail lines and industrial uses.

- Policy N-1.8: Potential Annoying or Harmful Noise. Preclude the generation of annoying or harmful noise on stationary noise sources, such as construction and property maintenance activity and mechanical equipment.
- Policy N-1.9: Transportation Related Noise Attenuation. Strive to minimize traffic noise through land use policies, traffic-calming methods to reduce traffic speed, law enforcement and street improvements, and encourage other agencies to reduce noise levels generated by roadways, railways, rapid transit, and other facilities..
- Policy N-1.10: Nuisance Noise. Minimize impacts from noise levels that exceed community sound levels through enforcement of the City's Noise Ordinance. Control unnecessary, excessive and annoying noises within the City where not preempted by Federal and State control through implementation and updating of the Noise Ordinance.
    - Program N-1.A: Require Acoustical Studies. Require acoustical studies for all new multi-family residential projects within the projected Ldn 60 dB noise contours so that noise mitigation measures can be incorporated into project design and site planning.
    - Program N-1.C: Consider Noise Impacts in Street Design. Employ noise mitigation practices and materials, as necessary, when designing future streets and when improvements occur along existing road segments. Mitigation measures should consider quieter pavements and emphasize the establishment of natural buffers or setbacks between the arterial roadways and adjoining noise-sensitive areas. Strive to maintain smooth street surfaces adjacent to land uses that are sensitive to noise intrusion.
    - Program N-1.D: Minimize Construction Activity Noise. Minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval and enforcement of the City's Noise Ordinance.
    - Program N-1.F: Work with Other Agencies to Reduce Transportation-Related Noise Levels. Work closely with Caltrans, San Mateo County Department of Public Works and other jurisdictions to reduce noise levels along State highways and county roadways through or near the City.
    - Program N-1.G: Monitor Airport Noise. Engage airport authorities and participate in regional planning efforts to ensure future activities and flight patterns at commercial airports do not negatively impact noise levels in the city.
    - Program N-1.H: Work with Railroad Operators to Reduce Noise and Vibration Levels. Work with the railroad operators (e.g., Caltrain, Union Pacific, etc.) to reduce, to the extent possible, the contribution of railroad train noise and vibration to Menlo Park's noise environment.
    - Program N-1.I: Work with Neighboring Communities When Implementing Noise Policies and Programs. Work with neighboring communities to ensure compliance with the land use and noise compatibility policies contained in this Noise Element at Menlo Park's boundaries.
    - Program N-1.J: Evaluate Noise Related Impacts of City Actions as Appropriate. Analyze in detail the potential noise impacts of any actions that the City may take or act upon which could significantly alter noise level in the community.

In addition to the Land Use Compatibility Noise Standards, the City of Menlo Park has adopted noise reception limits for residential uses (Section 8.06.030), and this regulatory approach would continue

under the proposed project. Therefore, there are three subsequent criteria, based on applicable standards and regulations, which may be applied to determine impacts under this significance threshold.

- Development of new residential or other noise-sensitive land uses such that those new uses would experience an indoor L_{dn} exceeding 45 dBA.
- Development of any land use in an area that is characterized by an exterior L_{dn} which indicates that the establishment of that land use in the area would be "clearly unacceptable," pursuant to the Land Use Compatibility Noise Standards continued under the proposed project.
- Development of a new land use that would result in adjacent properties experiencing short- or long-term ambient noise levels that exceed those regarded as compatible, or which exceed levels permitted under Chapter 8.06 of the Menlo Park Municipal Code.

Each of these criteria are discussed in greater detail below.

1) Development of new residential or other noise-sensitive land uses such that those new uses would experience an indoor L_{dn} exceeding 45 dBA.

Multiple components of the proposed project would serve to prevent new residential dwellings, hotels, motels, dormitories, and school classrooms from experiencing interior noise levels in excess of 45 dBA L_{dn}. Prevention of excessive interior noise levels would be achieved both through adherence to the Land Use Noise Compatibility Standards included in the Noise Element (See Table 4.10-5), as well as through the performance of acoustical analysis in noisy areas, which would help determine what, if any, noise attenuating features are necessary to achieve the 45 dBA L_{dn} interior noise standard. As individual projects are proposed under the proposed project, future project applicants would be required to demonstrate compliance with Municipal Code and Title 24 regulations.

Specifically, Policy N-1.1 requires compliance of new projects with all applicable noise standards, Policy N-1.2 would ensure that City land use decisions adhere to the established Land Use Noise Compatibility Standards, and Policy N-1.3 encourages new and existing residential uses to strive for acceptable interior and exterior noise levels. All the Noise Element policies listed above regarding noise-sensitive development are consistent with the California Building Code. Additionally Chapter 8.06, Noise, of the Menlo Park Municipal Code contains provisions to limit the generation and reception of excessive noise. Such provisions include, but are not limited to, restrictions on construction activity and limitations on noise generation as measured on receiving residential properties.

Under the proposed project, in areas where noise levels exceed those that are normally acceptable for a particular land use, development projects would continue to be required to demonstrate—through acoustical studies, as necessary, that interior noise environments would comply with the 45 dBA L_{dn} State standard.

Future development under the proposed project, as part of the City's project approval process, would be required to comply with existing federal, State and local regulations discussed above, including General Plan policies and Zoning regulations that have been prepared to minimize impacts related to noise-related impacts. The City, throughout the 2040 buildout horizon, would implement the General Plan programs that require the preparation of acoustical studies, reduce vehicular noise, consider noise impacts in street design, and minimize construction activity noise. Together, these General Plan policies and Municipal

Code regulations would serve to ensure that land use and development decisions consider and seek to prevent potential noise impacts. Accordingly, the adoption of the proposed project would result in *less-than-significant* impacts with respect to compliance with local and State standards for interior noise.

2) Development of any land use in an area that is characterized by an exterior L_{dn} which indicates that the establishment of that land use in the area would be "clearly unacceptable," pursuant to the Land Use Noise Compatibility Guidelines continued under the proposed project.

Through adherence to the Land Use Noise Compatibility Standards, the City would prohibit the development of particular land uses in areas where the ambient noise level would indicate those land uses would be clearly unacceptable (such as Low Density Residential uses in areas with noise levels of 75 CNEL or higher). Noise Element Policy N-1.2 would ensure that City land use decisions adhere to the established Land Use Noise Compatibility Noise Standards. As stated above, because future development is required to comply with the City's regulatory procedures, and through continued implementation of these requirements as part of implementation of the proposed project, the City would ensure compliance with local and State standards for land use compatibility, and the impact would be *less than significant*.

3) Development of a new land use that would result in adjacent properties experiencing short- or long-term ambient noise levels that exceed those regarded as compatible, or which exceed levels permitted under Chapter 8.06 of the Menlo Park Municipal Code.

Under the proposed project, the policies of the General Plan and provisions of the Menlo Park Municipal Code listed above would ensure that new land uses do not contribute to excessive noise at existing sensitive receptors. Specifically, Policy N1.1 requires new projects to comply with local, regional, and State noise regulations, Policy N1.5 encourages that new residential developments be designed to minimize transportation-related noise impacts to adjacent residential areas, Policy N1.7 requires that new non-residential development implement measures to minimize noise and vibration impacts on nearby uses, and Policy N1.10 protects the community from unnecessary, excessive, and annoying noises through enforcement of the City's Noise Ordinance, as well as State and federal standards. Furthermore, implementation of Policy N1.6 and Program N1.D would minimize the impacts of construction noise at nearby properties.

Additionally, the maintenance and continued enforcement of the Menlo Park Municipal Code would work in tandem with and reinforce the existing goals, policies and programs within the Noise Element. Therefore, as stated above, adoption of the proposed project would result in *less-than-significant* comments with respect to a violation of applicable local noise standards.

In summary, the proposed is a planning level document and does not propose any project-specific development; therefore, it would not in and of itself result in the generation of noise levels in excess of standards established in the General Plan or the Municipal Code, and/or the applicable standards of other agencies. However, future projects would be required to demonstrate compliance with the City's required standards and in this respect, impacts are considered *potentially significant*.

Applicable Regulations

- California Code of Regulations, Title 24, Building Standards
- Title 21, Subchapter 6, of the California Code of Regulations

NOISE

- Menlo Park Noise Element, 2013
- Menlo Park Municipal Code:
  - Title 8: Peace, Safety, and Morals, Chapter 8.06: Noise

Impact NOISE-1: Future projects in Menlo Park could result in development that exceed noise limits required under Title 24 and the City's regulations.

Mitigation Measure NOISE-1a: To meet the requirements of Title 24 and General Plan Program N-1.A, project applicants shall perform acoustical studies prior to issuance of building permits for development of new noise-sensitive uses. New residential dwellings, hotels, motels, dormitories, and school classrooms must meet an interior noise limit of 45 dBA CNEL or L_{dn}. Developments in areas exposed to more than 60 dBA CNEL must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. Where exterior noise levels are projected to exceed 60 dBA CNEL or L_{dn} at the façade of a building, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the 45 dBA noise limit. Project applicants must perform acoustical studies for all new multi-family residential projects within the projected Ldn 60 dB noise contours, so that noise mitigation measures can be incorporated into project design and site planning.

Mitigation Measure NOISE-1b: Stationary noise sources, and landscaping and maintenance activities shall comply with Chapter 8.06, Noise, of the Menlo Park Municipal Code.

Mitigation Measure NOISE-1c: Project applicants shall minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval and/or enforcement of the City's Noise Ordinance. Prior to issuance of demolition, grading, and/or building permits for development projects, a note shall be provided on development plans indicating that during on-going grading, demolition, and construction, the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related noise:

- Construction activity is limited to the daytime hours between 8:00 a.m. to 6:00 p.m. on Monday through Friday, as prescribed in the City's municipal code.
- All internal combustion engines on construction equipment and trucks are fitted with properly maintained mufflers, air intake silencers, and/or engine shrouds that are no less effective than as originally equipped by the manufacturer.
- Stationary equipment such as generators and air compressors shall be located as far as feasible from nearby noise-sensitive uses.
- Stockpiling is located as far as feasible from nearby noise-sensitive receptors.
- Limit unnecessary engine idling to the extent feasible.
- Limit the use of public address systems.
- Construction traffic shall be limited to the haul routes established by the City of Menlo Park.

Significance With Mitigation: Less than significant.

NOISE-2 Implementation of the proposed project would not cause exposure of people to, or generation of, excessive groundborne vibration or groundborne noise levels.

CEQA does not specify quantitative thresholds for what is considered "excessive" vibration or groundborne noise. The City of Menlo Park Municipal Code, Section 16.78.020, requires that the potential for damage or nuisance from vibration be considered when determining whether to issue permits, but does not establish quantitative thresholds. Therefore, based on criteria from the Federal Transit Administration (FTA), which are regarded as standard practice, a significant impact would occur if:

- Implementation of the proposed project would result in ongoing exceedance of the criteria for annoyance presented in Table 4.10-3.
- Implementation of the proposed project would result in vibration exceeding the criteria presented in Table 4.10-4 that could cause buildings architectural damage.

The following discusses potential vibration impacts generated by short-term construction and long-term operations that may occur under implementation of the proposed project.

Short-Term Construction-Related Vibration Impacts

The effect on buildings in the vicinity of a construction site varies depending on soil type, ground strata, and receptor-building construction. Groundbourne vibration is almost never annoying to people who are outdoors, so it is usually evaluated in terms of indoor receivers.[2] The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures, but groundborne vibration and groundborne noise can reach perceptible and audible levels in buildings that are close to the construction site. Table 4.10-10 lists vibration levels for construction equipment.

As shown in Table 4.10-10, vibration generated by construction equipment has the potential to be substantial. Significant vibration impacts may occur from construction activities associated with new development under the proposed project. Implementation of the proposed project anticipates an increase in development intensity in certain areas. Therefore, significant vibration impacts may occur from construction activities associated with new development under the proposed project. However, without specific development details, it is not possible to quantify potential construction vibration impacts. In construction projects, grading and demolition activity typically generate the highest vibration levels during construction.

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

TABLE 4.10-10 GROUNDBORNE VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT

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

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

For construction projects generally, with the exception of pile driving, maximum vibration levels measured at a distance of 25 feet from an individual piece of typical construction equipment do not exceed the thresholds for human annoyance for industrial uses, nor the thresholds for architectural damage, as defined in Table 4.10-3, which is shown above in Section 4.10.1, Background.

Methods to reduce vibration during construction would include the use of smaller equipment, use of well-maintained equipment, use of static rollers instead of vibratory rollers, and drilling of piles as opposed to pile driving. Methods to reduce human impacts of vibration from construction include limitations on construction hours and/or guidelines for the positioning of vibration-generating construction equipment. These methods for reducing vibration and human impacts of vibration during construction are outlined in Mitigation Measure NOISE-4 below.

Overall, vibration impacts related to construction would be short-term, temporary, and generally restricted to the areas in the immediate vicinity of active construction equipment. Construction would be localized and would occur intermittently for varying periods of time. Because specific, project-level information is not available at this time, it is not possible to quantify the construction vibration impacts at specific sensitive receptors.

Policies N-1.4, N-1.7, and Program N-1.D listed under NOISE-1, would promote the use of best available technology by construction contractors to minimize excessive noise and vibration from construction equipment. These policies and program would thereby serve to ensure that construction activities do not result in sustained levels of vibration that could result in architectural damage or ongoing annoyance.

Long-Term Vibration Impacts

Development under the proposed project could result in long-term, operations-related vibration impacts to sensitive receptors if sensitive land uses such as residential, educational facilities, hospitals, or places of worship were to be located in close proximity to industrial land uses that could have equipment with the potential to generate significant vibration levels. High levels of vibration are usually associated with heavy industrial uses. The light industrial uses of the sort that would continue to be permitted in Menlo Park under the proposed project are very rarely associated with vibration that is sufficiently intense or sustained so as to cause either human discomfort or architectural/structural damage. Therefore, the potential for sensitive land uses adjacent to uses that would generate significant vibration is limited. Nevertheless, any potential impacts from the juxtaposition of sensitive land uses and land uses with the potential to generate vibration can largely be eliminated through appropriate setbacks, buffers, use restrictions and/or other measures.

As described above, there are Municipal Code provisions for special uses that require the employment of strategies to prevent vibration impacts. These would continue to apply to the proposed project. Specifically, Section 16.78.020 of the Municipal Code contains the general restriction that certain land uses shall be considered unreasonably incompatible if they result in damage or nuisance from vibration in surrounding areas. These include heliports, mining, other excavation, recreational vehicle storage, recycling centers, recreational services, and emergency services. A use permit for these types of uses would not be granted if the operation would cause damage or nuisance from noise and vibration. The current 2013 Noise Element offers generalized direction for the City to consider noise (and vibration) impact during development decisions and provides specific policies in respect to these considerations. Policies N-1.4, N-1.7, and Program N-1.H would provide strategies to minimize long-term vibration impacts of new developments on existing uses. By ensuring general land use compatibility and by requiring, where necessary, approaches to reduce the generation or transmission of vibration, these policies and ordinances would serve to ensure sufficient attenuation of vibration to preclude impacts at sensitive receptors.

Together, these regulations, policies, and actions would ensure that buildout of land uses under the proposed project would not result in perception of excessive noise and vibration by sensitive receptors in new developments. These policies and actions would also serve to ensure that new uses developed under the proposed project would not result in the perception of excessive vibration by individuals living or working in areas of existing sensitive land uses. Through consideration of land use compatibility, project-level review, and requirements for mitigation of noise and vibration, the amended policies of the General Plan would prevent or reduce exposure to long-term, operations-related vibration.

Applicable Regulations:

- California Code of Regulations, Title 24, Building Standards
- Menlo Park Noise Element, 2013
- Menlo Park Municipal Code:

NOISE

- Title 16: Zoning, Section 16.78.020.

Future development under the proposed project, as part of the City's project approval process, would be required to comply with existing federal, State and local regulations discussed above, including General Plan policies and Zoning regulations that have been prepared to minimize impacts related to noise-related impacts. The City, throughout the 2040 buildout horizon, would implement the General Plan programs that require construction activity noise to be minimized. Together, these General Plan policies and Municipal Code regulations would serve to ensure that land use and development decisions consider and seek to prevent potential noise impacts. Accordingly, the adoption of the proposed project would result in *less-than-significant* impacts with respect to exposing people to excessive groundbourne vibration and noise level.

In summary, the proposed is a planning level document and does not propose any project-specific development; therefore, it would not in and of itself cause exposure of people to, or generation of, excessive groundborne vibration or groundborne noise levels. However, future projects would be required to demonstrate compliance with the City's required standards, and impacts in this respect are considered *potentially significant*.

Impact NOISE-2: Future projects in Menlo Park could cause exposure of people to, or generation of, excessive groundborne vibration or groundborne noise levels.

Mitigation Measure NOISE-2a: To prevent architectural damage as a result of construction-generated vibration:

- Prior to issuance of a building permit for any development project requiring pile driving or blasting, the project applicant/developer shall prepare a noise and vibration analysis to assess and mitigate potential noise and vibration impacts related to these activities. The maximum levels shall not exceed 0.2 inch/second, which is the level that can cause architectural damage for typical residential construction. If maximum levels would exceed these thresholds, alternative methods such static rollers, non-explosive blasting, and drilling piles as opposed to pile driving shall be used.

To prevent vibration-induced annoyance as a result of construction-generated vibration:

- Individual projects that involve vibration-intensive construction activities, such as blasting, pile drivers, jack hammers, and vibratory rollers, within 200 feet of sensitive receptors shall be evaluated for potential vibration impacts. A vibration study shall be conducted for individual projects where vibration-intensive impacts may occur. The study shall be prepared during the project's approval process and by an acoustical or vibration engineer holding a degree in engineering, physics, or allied discipline and who is able to demonstrate a minimum of two years of experience in preparing technical assessments in acoustics and/or groundborne vibrations. The study shall be submitted to and approved by the City prior to issuance of building permits.

Vibration impacts to nearby receptors shall not exceed the vibration annoyance levels (in RMS inches/second) as follows:

- Workshop = 0.126
- Office = 0.063

- Residential Daytime (7AM–10PM)= 0.032
- Residential Nighttime (10PM to 7 AM) = 0.016

If construction-related vibration is determined to be perceptible at vibration-sensitive uses, additional requirements, such as use of less-vibration-intensive equipment or construction techniques, shall be implemented during construction (e.g., nonexplosive blasting methods, drilled piles as opposed to pile driving, preclusion for using vibratory rollers, use of small- or medium-sized bulldozers, etc.). Vibration reduction measures shall be identified as mitigation measures in the environmental document and/or incorporated into the site development plan as a component of the project.

Mitigation Measure NOISE-2b: To reduce long-term vibration impacts at existing or potential future sensitive uses, the City shall implement the following best management practices as part of the project approval process:

- Locate sensitive uses away from vibration sources.
- Ensure that industrial development has been designed to minimize vibration impacts on nearby uses. Where vibration impacts may occur, reduce impacts on residences and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration near rail lines and industrial uses. A vibration study shall be conducted for individual projects where vibration-intensive impacts may occur. The study shall be prepared during the project's approval process and by an acoustical or vibration engineer holding a degree in engineering, physics, or allied discipline and who is able to demonstrate a minimum of two years of experience in preparing technical assessments in acoustics and/or groundborne vibrations. The study shall be submitted to and approved by the City prior to issuance of building permits.
- Work with the railroad operators (e.g., Caltrain, Union Pacific, etc.) to reduce, to the extent possible, the contribution of railroad train noise and vibration to Menlo Park's noise environment.

Significance With Mitigation: Less than significant.

NOISE-3 Implementation of the proposed project would not cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the proposed project.

Implementation of the proposed project would have a significant impact if it would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the proposed project. The City has not adopted a specific, quantitative threshold for what constitutes a significant permanent increase in ambient noise levels. The smallest increase in loudness perceptible by the human ear is 3 dBA and increases of 5 dBA or greater are easily noticed.[3] Therefore, in the absence of quantitative ambient noise level increase thresholds adopted by the City, a substantial increase in ambient noise levels would be defined as either: a 5 dB increase, if after the increase the ambient noise level

[3] Bies, David and Hansen, Colin, 2009, *Engineering Noise Control: Theory and Practice, Fourth Edition*, New York: Spon Press.

remains in the range of what would be "normally acceptable" at the sensitive land use where the noise is being received; or a 3 dB increase, if after the increase the ambient noise level exceeds the range of what would be "normally acceptable" at the land use where the noise is being received.[4]

Long-Term Operational Noise

A portion of the substantial permanent increases to ambient noise levels that could result from implementation of the proposed project would be attributable to ongoing operations. Residential, open space, and most passive recreational land uses (i.e., trails, rests areas, picnic areas) are generally not associated with substantial permanent increases in ambient noise. In the case of these land uses, very specific sources of noise, such as lawn equipment or social gatherings, would be the most likely source of excessive noise. Addressing impacts from these noise sources would be handled via the pertinent sections of Menlo Park's Municipal Code. Noise sources associated with residential, open space, and passive recreational land uses are generally not sufficiently frequent or sustained so as to result in permanent substantial increases to ambient noise levels. Instead, substantial permanent increases in ambient noise levels would be most likely to result from development of commercial, industrial, mixed-use, and certain institutional or active recreational land uses (i.e., sports fields, skate-parks, dog parks).

As listed under NOISE-1, the Noise Element contains multiple policies and programs that would serve to prevent or mitigate substantial permanent increases to ambient noise levels from long-term operations. All of the Noise Element policies and programs discussed under NOISE-1 and NOISE-2 would likewise serve to prevent substantial permanent increases to ambient noise levels. Key provisions of these previously discussed policies include, among others: land use compatibility, placement of noise-sensitive uses, site design, and open space buffers. For these reasons, ongoing implementation of the proposed project would serve to ensure that the development of new land uses under the proposed project would not result in substantial permanent increases in the ambient noise level in the project vicinity, and the impact in this regard would be *less than significant*.

Transportation-Related Noise

As a result of implementation of the proposed project and ongoing regional growth, it is anticipated that there would be substantial permanent increases to the ambient noise levels throughout Menlo Park, and that these increases would primarily result from increases to transportation-related noise, especially that of automobile traffic. Because Menlo Park has only one railway with limited service, does not host any airports or heliports, and is not located within the 55 dBA CNEL contour of any airports or heliports, increases in ambient noise levels from rail and air traffic are not anticipated. Nevertheless, increases to ambient noise from car traffic would result in a substantial permanent increase in ambient noise levels. Development of land uses under implementation of the proposed project, as well as development in adjacent communities, would result in increases in traffic that would cause substantial permanent

[4] Note that for industrial land uses only, ambient noise increases would be significant if the resulting noise levels exceed the City's 'normally acceptable' standards. In such cases, therefore, increases larger than 5 dB are allowable in industrial zones wherein there are no sensitive receptors that would experience said increase.

increases in ambient noise levels in the city. Table 4.10-10 shows major roadway segments in Menlo Park with estimated increases in the ambient noise level at a distance of 50 feet from the roadway centerline.

TABLE 4.10-10 INCREASES TO AMBIENT NOISE LEVELS ALONG MAJOR ROADWAY SEGMENTS

			Ambient Noise Level at 50 feet from Roadway Centerline CNEL dBA		
No.	Street	Roadway Segment	2014 Existing Conditions	2040 Forecast Conditions	Increase (dBA)
1	Alameda De Las Pulgas	Avy Avenue to Santa Cruz Avenue	65.2	66.0	0.8
2	Alameda De Las Pulgas	Valparaiso Aveneto Avy Avenue	65.8	66.6	0.7
3	Alameda De Las Pulgas	City Limit Valparaiso Avenue	66.1	66.8	0.8
4	Alma Street	Ravenswood Avenue to Oak Grove Avenue	54.2	54.7	0.5
5	Alma Street	Willow Road to Ravenswood Avenue	57.2	59.1	1.9
6	Alpine Road	City Limit to Junipero Serra	70.5	71.0	0.5
7	Avy Avenue	City Limit to Alameda de las Pulgas	58.7	58.8	0.1
8	Avy Avenue	Alameda de las Pulgas to Santa Cruz Avenue	59.8	60.0	0.2
9	Bay Road	Greenwood Drive to Marsh Road	61.3	63.9	2.6
10	Bay Road	Ringwood Avenue to Greenwood Drive	61.4	63.9	2.5
11	Bay Road	Willlow Road to Ringwood Avenue	62.6	63.7	1.1
12	Bohannon Drive	Campbell Avenue to Marsh Road	59.8	59.8	0.0
13	Chilco Street	Constitution Drive to Bayfront Expressway	65.4	66.7	1.2
14	Chrysler Drive	Constitution Drive to Bayfront Expressway	59.9	59.9	0.0
15	Constitution Drive	Chilco Street to Chrysler Drive	57.6	61.1	3.5[a]
16	Crane Street	Oak Grove Avenue to Santa Cruz Avenue	56.3	57.2	0.9
17	Crane Street	Santa Cruz Avenue to Menlo Avenue	55.9	56.0	0.1
18	Encinal Avenue	El Camino Real to Laurel Street	59.6	60.2	0.6
19	Encinal Avenue	Laurel Street to Middlefield Road	59.0	60.1	1.0
20	Glenwood Avenue	El Camino Real to Laurel Street	59.9	60.2	0.4
21	Hamilton Avenue	Willlow Road to Chilco Street	58.3	59.2	1.0
22	Haven Avenue	Bayfront Expressway to City Limit	60.8	64.5	3.7[a]
23	Junipero Serra Boulevard	City Limit to Alpine Road	67.9	68.5	0.6
24	Laurel Street	Oak Grove Avenue to Glenwood Avenue	58.2	59.5	1.4
25	Laurel Street	Ravenswood Avenue to Oak Grove Avenue	58.5	59.7	1.2
26	Laurel Street	Willlow Road to Ravenswood Avenue	58.6	59.6	1.0
27	Marsh Road	City Limit to Bay Road	69.0	69.6	0.6
28	Marsh Road	Bay Road to Bohannon Drive	70.3	71.5	1.2
29	Marsh Road	Bohannon Drive to Scott Drive	71.3	72.6	1.3
30	Menlo Avenue	University Drive to Crane Street	60.8	60.9	0.1
31	Menlo Avenue	Crane Street to El Camino Real	61.5	61.4	0.0

TABLE 4.10-10 INCREASES TO AMBIENT NOISE LEVELS ALONG MAJOR ROADWAY SEGMENTS

			Ambient Noise Level at 50 feet from Roadway Centerline CNEL dBA		
No.	Street	Roadway Segment	2014 Existing Conditions	2040 Forecast Conditions	Increase (dBA)
32	Middle Avenue	Olive Street to University Drive	62.4	62.7	0.3
33	Middle Avenue	University Drive to El Camino Real	63.3	63.5	0.2
34	Middlefield Road	Ravenswood to Oak Grove Avenue	67.1	67.6	0.5
35	Middlefield Road	Willlow Road to Ravenswood Avenue	69.2	69.6	0.4
36	Middlefield Road	City Limit to Willlow Road	68.9	69.7	0.8
37	Newbridge Street	Willlow Road to Chilco Street	60.6	61.1	0.5
38	Oak Grove Avenue	University Drive to Crane Street	60.1	60.8	0.7
39	Oak Grove Avenue	Crane to El Camino Real	60.9	62.3	1.4
40	Oak Grove Avenue	El Camino Real to Laurel Street	61.9	62.7	0.8
41	Oak Grove Avenue	Laurel Street to Middlefield	61.5	61.5	0.1
42	O'Brien Drive	Kavanaugh Drive to Willlow Road	61.9	65.2	3.3[1]
43	O'Brien Drive	University Drive to Kavanaugh Drive	59.0	61.3	2.3
44	Ravenswood Avenue	El Camino Real to Alma Street	66.7	67.0	0.3
45	Ravenswood Avenue	Alma Street to Laurel Street	64.8	64.9	0.1
46	Ravenswood Avenue	Laurel Street to Middlefield Road	64.3	64.5	0.2
47	Ringwood Avenue	Middlefield Road to Bay Road	62.5	63.2	0.7
48	Sand Hill Road	I-280 to Sharon Park Drive	72.1	72.4	0.3
49	Sand Hill Road	Santa Cruz Avenue to Sharon Park Drivee	72.5	72.9	0.4
50	Sand Hill Road	Santa Cruz Avenue to City Limit	72.8	73.1	0.3
51	Santa Cruz Avenue	Junipero Serra Boulevard to Sand Hill Road	70.4	71.1	0.7
52	Santa Cruz Avenue	Sand Hill Road to Alameda de las Pulgas	69.9	70.5	0.6
53	Santa Cruz Avenue	Alameda de las Pulgas to Avy/Orange	64.2	64.6	0.4
54	Santa Cruz Avenue	Avy/Orange to Olive Street	65.5	65.9	0.4
55	Santa Cruz Avenue	Olive Street to University Drive	65.8	66.1	0.3
56	Santa Cruz Avenue	University Drive to Crane Street	62.8	63.1	0.3
57	Santa Cruz Avenue	Crane Street to El Camino Real	62.7	62.3	-0.4
58	Scott Drive	Marsh Road to Campbell Avenue	60.7	60.7	0.0
59	Sharon Park Drive	Sand Hill Road to Sharon Park Drive	62.2	62.4	0.2
60	Sharon Road	Sharon Park Drive to Alameda de las Pulgas	57.9	58.0	0.1
61	University Drive	Middle Avenue to Menlo Avenue	59.7	59.7	-0.1
62	University Drive	Menlo Avenue to Santa Cruz Avenue	61.8	61.7	0.0
63	University Drive	Santa Cruz Avenue to Oak Grove Avenue	60.6	60.8	0.1
64	University Drive	Oak Grove Avenue to Valparaiso Avenue	59.2	60.2	1.0
65	Valparaiso Avenue	Alameda de las Pulgas to Cotton Street	66.2	66.4	0.2

TABLE 4.10-10 INCREASES TO AMBIENT NOISE LEVELS ALONG MAJOR ROADWAY SEGMENTS

			Ambient Noise Level at 50 feet from Roadway Centerline CNEL dBA		
No.	Street	Roadway Segment	2014 Existing Conditions	2040 Forecast Conditions	Increase (dBA)
66	Valparaiso Avenue	Cotton Street to University Drive	67.0	67.2	0.2
67	Valparaiso Avenue	University Drive to El Camino Real	66.6	66.9	0.3
68	Willow Road	Alma Street to Laurel Street	57.5	59.4	1.9
69	Willow Road	Laurel Street to Middlefield	59.4	61.2	1.7
70	Willow Road	Middlefield Road to Gilbert Avenue	66.1	66.1	0.0
71	Chilco Street	Hamilton Avenue to Terminal Avenue	58.9	61.3	2.4
72	Chilco Street	Ivy Drive to Terminal Avenue	56.3	59.9	3.5[1]
73	Chilco Street	Newbridge to Ivy Drive	55.3	58.1	2.8
74	Hamilton Avenue	Willlow Road to Hamilton Court	56.3	56.3	0.0
75	Willow Road	Gilbert Avenue to Coleman Avenue	69.4	69.7	0.3
76	Willow Road	Coleman Avenue to Durham Street	71.7	71.9	0.2
77	Willow Road	Durham Street to Bay	71.5	72.0	0.4
78	Chilco Street	Terminal Avenue to Constitution	59.2	61.4	2.2
79	Chrysler Drive	Constitution Driveto Independence	57.2	57.2	0.0
80	Chrysler Drive	Independence to Commonwealth	52.5	52.5	0.0
81	Adams Drive	University Drive to Adams Court	53.1	61.0	7.9[b]
82	Olive Street	Santa Cruz Avenue to Middle Avenue	57.7	57.9	0.2
83	Olive Street	Middle Avenue to Oak Avenue	58.7	59.0	0.3
84	Cambridge Avenue	University Drive to El Camino Real	54.1	54.0	-0.1
85	Linfield Drive	Middlefield Road to Waverley Street	54.7	54.8	0.1
86	Waverley Street	Laurel Street to Linfield Drive	54.3	54.9	0.6
87	Ivy Drive	Chilco Street to Willlow Road	57.3	59.2	1.9

Notes:
a. 2040 Forecast Conditions noise level does not exceed the range of what would be "normally acceptable" for the land use along the segment and, therefore, does not constitute a substantial permanent increase despite an increase of 3 dB or greater.
b. 2040 Forecast Conditions noise level does not exceed the range of what would be "normally acceptable" for the land use along the segment and there are no sensitive receptors nearby. Thus, this noise level change does not constitute a substantial permanent increase despite an increase of greater than 5 dB.
Source: TJKM, 2016; PlaceWorks, 2016.

Table 4.10-11 shows highway and freeway segments in Menlo Park with estimated increases in the ambient noise level at a distance of 100 feet from the roadway centerline.

TABLE 4.10-11 INCREASES TO AMBIENT NOISE LEVELS ALONG HIGHWAY AND FREEWAY SEGMENTS

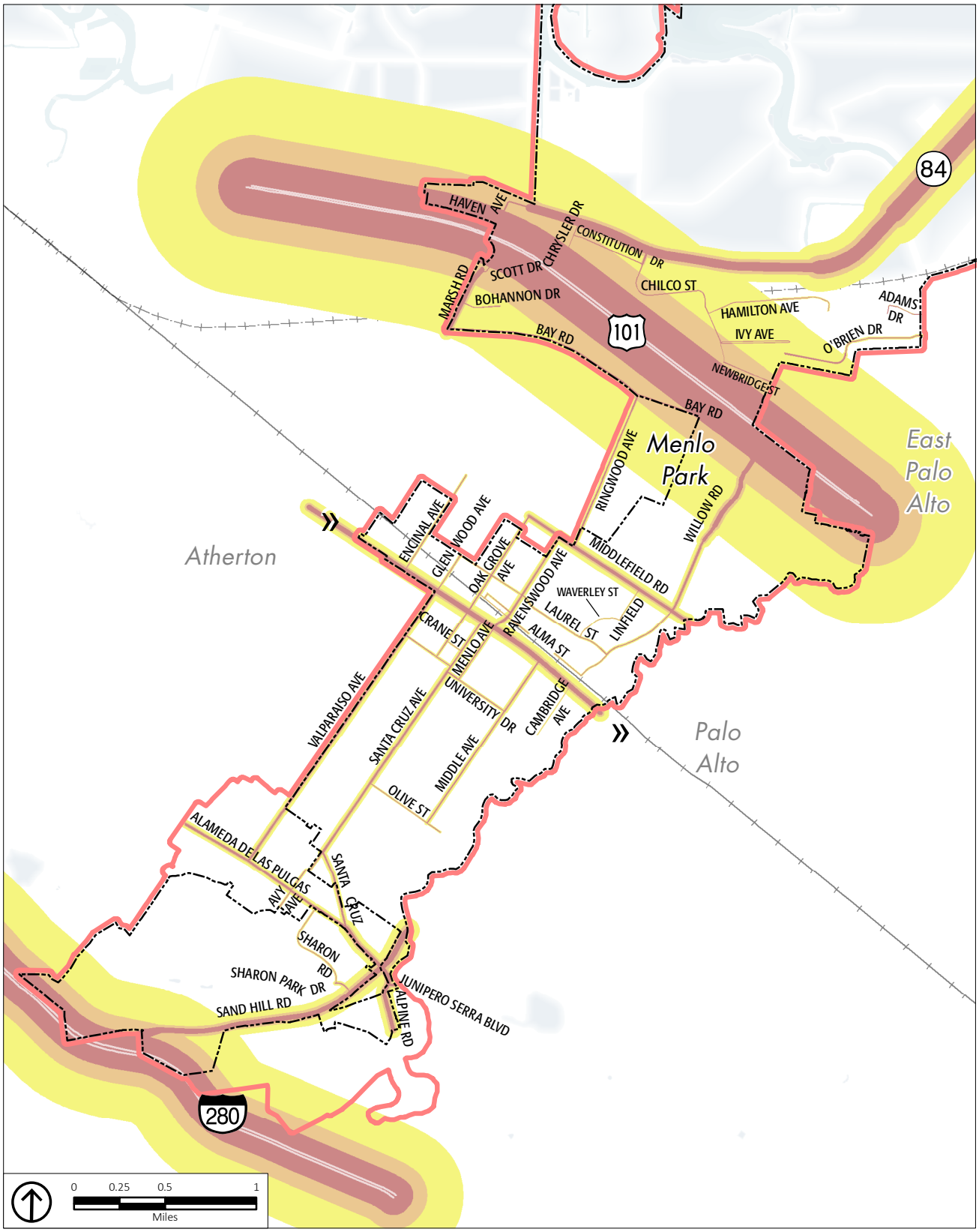
		Ambient Noise Level at 100 feet from Roadway Centerline CNEL dBA		
Roadway	Segment	Existing Conditions	Forecast Conditions	Increase (dBA)
SR 82 / El Camino Real	San Mateo County Line to Atherton Avenue	66.2	67.5	1.3
Highway 101	Route 114 to Marsh Road	82.5	83.6	1.1
Interstate 280	Sand Hill Road to Route 84	79.4	80.5	1.1
SR 84 / Bayfront Expressway	Highway 101/ Marsh Road to Route 114 / Willlow Road	69.3	70.5	1.1
SR 84 / Bayfront Expressway	Route 114 / Willlow Road to Route 109 / University Drive	72.6	73.7	1.1
SR 84 / Bayfront Expressway	Route 109 / University Drive to Dumbarton Bridge	74.2	75.3	1.1

Notes: **Bold** numbers indicate increases in CNEL which would constitute substantial permanent increase in ambient noise level. Negative numbers indicate a decrease in ADT.
Source: CalTrans, 2014; PlaceWorks, 2016.

The ambient noise level increases shown in Tables 4.10-10 and 4.10-11 and the Forecast Noise Contours on Figure 4.10-3 demonstrate that there would be no roadway segments that would experience a substantial permanent increase in ambient noise levels, per the criteria defined above.[5]

Noise Element Policies N-1.6 and N-1.9 and Programs N-1.B and N-1.C are intended to prevent or reduce traffic noise impacts on surrounding land uses. Implementation of these policies and programs would serve to reduce noise from vehicles at the source and to otherwise shield uses from excessive noise. These General Plan considerations, coupled with the intent to keep receptor land uses within the 'normally acceptable' land use compatibility category (even with expected growth facilitated by the Plan), indicates that neither adjacent industrial uses, nor nearby residential uses (either presently or in the future) would be exposed to excessive noise levels above the City of Menlo Park's land use compatibility criteria. Therefore, the impact to ambient noise levels would be *less than significant*.

[5] Note that the following segments, although predicted to have greater than 3 dB (or, in one case, greater than 5 dB) increases would not experience substantial permanent increases; given the adjoining land use types and that the resulting, build-out noise levels would still be within the 'normally acceptable' compatibility category:
Segment 15, Constitution Drive (from Chilco Street to Chrysler Drive)
Segment 22, Haven Avenue (from Bayfront Expressway to City Limit)
Segment 42, O'Brien Drive (from Kavanaugh Drive to Willlow Road)
Segment 72, Chilco Street (from Ivy Drive to Terminal Avenue)
Segment 81, Adams Drive (from University Drive to Adams Court)



Source: City of Menlo Park; PlaceWorks, 2015; TJKM, 2015

Figure 4.10-3
Forecasted Noise Contours

NOISE

Applicable Regulations:

- California Code of Regulations, Title 24, Building Standards
- Menlo Park Noise Element, 2013
- Menlo Park Municipal Code:
  - Title 8: Peace, Safety, and Morals, Chapter 8.06: Noise

Significance Without Mitigation: Less than significant.

NOISE-4 Implementation of the proposed project would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Implementation of the proposed project would have a significant impact if it results in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the proposed project. Noise from construction equipment and various construction-related activities is frequently a cause of temporary or periodic increases in ambient noise levels. Table 4.10-12, below, shows typical noise levels generated by commonly used construction equipment. Although the current or amended policies of the General Plan and the provisions of the noise ordinance would serve to prevent or reduce noise generation from construction equipment, it is likely that in certain cases these and other available methods to reduce noise would be inadequate to prevent a significant impact.

By restricting hours of construction and directing the City to review project noise impacts as part of the planning and permitting processes, the noise ordinance and policies of the Noise Element would serve to reduce temporary or periodic increases to ambient noise. Specifically, Policies N1.6 and N1.8, and Programs N1.D and N1.E would promote the use of best available technology noise-reduction measures to minimize excessive noise from construction equipment.

Menlo Park Municipal Code Section 8.06.040, Subsections A and B, serve to regulate noise from construction and related activities in Menlo Park. The ordinance allows construction between the hours of 8:00 a.m. and 6:00 p.m., Monday through Friday. Equipment must not generate noise in excess of 85 dBA at 50 feet. Although it is possible that certain construction activities may in some cases lead to substantial temporary or periodic increases to ambient noise levels, the current and proposed policies and regulations included under the proposed project and the Municipal Code would serve to reduce these impacts. With appropriate noise reduction and shielding measures, temporary or periodic increases to the ambient noise level could be substantially reduced. The policies of the Noise Element and regulations of the Municipal Code would thereby reduce the impacts from temporary or periodic increases to ambient noise levels.

In summary, the proposed is a planning level document and does not propose any project-specific development; therefore, it would not in and of itself result in the generation of construction noise levels in excess of standards established in the General Plan or the Municipal Code, and/or the applicable standards of other agencies. However, future projects would be required to demonstrate compliance with the City's required standards and in this respect, impacts are considered *potentially significant*.

TABLE 4.10-12 CONSTRUCTION EQUIPMENT NOISE EMISSION LEVELS

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

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

Applicable Regulations:

- California Code of Regulations, Title 24, Building Standards
- Menlo Park Noise Element, 2013.
- Menlo Park Municipal Code:
  - Chapter 8.06.040 A: Construction Activities.
  - Chapter 8.06.040 B: Powered Equipment.

Impact NOISE-4: Future projects in Menlo Park could result in construction-related noise that exceeds noise limits required under the City's regulations.

Mitigation Measure NOISE-4: Implement Mitigation Measure NOISE-1c.

Significance With Mitigation: Less than significant.

NOISE-5 **Implementation of the proposed project would not cause exposure of people residing or working in the vicinity of the study area to excessive aircraft noise levels, for a project located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport.**

There are no areas of Menlo Park which fall within an airport land use plan for any of the airports located in close proximity to the study area. Although a small portion of Menlo Park falls within 2 miles of the Palo Alto Airport, this area is not covered by the airport's influence area,[6] nor is it within the airport's 55 dB noise contour. All other airports are located 4 or more miles away from the study area. Implementation of the proposed project would therefore not result in exposure to excessive aircraft noise levels and the impact would be *less than significant*.

Significance Without Mitigation: Less than significant.

NOISE-6 **Implementation of the proposed project would not cause exposure of people residing or working in the project site to excessive noise levels, for a project within the vicinity of a private airstrip.**

There are no private airstrips located within Menlo Park. The Stanford University Hospital does operate one heliport, which is located approximately 0.4-mile to the southeast of the border of Menlo Park. Due to limited and sporadic heliport use for medical emergencies, and distance to the nearest housing sites, there would be *no impact* related to excessive noise levels related to private airstrips.

Significance Without Mitigation: No impact.

4.10.4 CUMULATIVE IMPACT DISCUSSION

NOISE-7 **Implementation of the proposed project, in combination with past, present, and reasonably foreseeable projects, would result in significant cumulative impacts with respect to noise.**

The analysis of the proposed project, discussed above, addresses cumulative impacts with regard to noise, as well as groundborne noise and vibration. Although multiple simultaneous nearby noise sources may, in combination, result in higher overall noise levels, this effect is captured and accounted for by the ambient noise level metrics which form the basis of the Thresholds of Significance for noise analysis. Any measurement of sound or ambient noise, whether for the purpose of evaluating land use compatibility, establishing compliance with exterior and interior noise standards, or determining point-source violations of a noise ordinance, necessarily will incorporate noise from all other nearby perceptible sources.

[6] Santa Clara County Airport Land Use Commission, 2008. *Palo Alto Airport Comprehensive Land Use Plan*, Figure 8, https://www.sccgov.org/sites/dpd/DocsForms/Documents/ALUC_20081119_PAO_CLUP.pdf, accessed on February 27, 2015.

Additionally, although noise attenuation is influenced by a variety of topographical, meteorological, and other factors, noise levels decrease relatively rapidly with distance, and vibration impacts decrease even more rapidly. Therefore, site-level cumulative noise or vibration impacts across city boundaries occur only infrequently. The City of Menlo Park shares borders with other incorporated communities and similarly urbanized areas, which makes cross-border cumulative noise and vibration impacts possible. Nevertheless, given the Noise Element policies and Municipal Code requirements discussed above, it is unlikely that operations-related noise would, in combination with noise sources from adjacent cities, result in cumulative noise impacts. Additionally, because any noise measurements taken in conjunction with Noise Element policies or Municipal Code requirements would necessarily account for noises received from outside the boundaries of the City of Menlo Park, the ongoing implementation of these policies and regulations under the proposed project would serve to prevent site-based cumulative noise impacts.

Similarly, the noise contours and traffic-related noise levels developed for the proposed project include and account for regional travel patterns as they affect traffic levels in Menlo Park. Noise contours were based upon both existing and projected future traffic volumes that incorporate cumulative regional effects and trends. Existing noise contours were derived from traffic volumes based on counts of current traffic, and these traffic counts inherently include cumulative traffic, as generated by regional trips. With regard to future noise, projected noise contours were determined using projected 2040 traffic volumes; these data account for growth both within Menlo Park under the proposed project, as well as anticipated regional growth. The future noise modeling which served as the foundation for the overall Project analysis was therefore based on future, cumulative conditions. Additionally, the proposed Circulation (CIRC) element, which would be adopted as part of the proposed project, contains general policies, and programs that would require local planning and development decisions to consider reductions in vehicle trips by providing for a circulation system that accommodates alternative modes of transportation. Additionally, the proposed project includes an update to the City's Zoning Ordinance for the Bayfront Area, resulting in three new zoning districts that would promote the creation of an employment district with travel patterns that are oriented toward pedestrian, transit, and bicycle use. Under the Zoning Ordinance update, new construction and building additions of 10,000 square feet or more are required to develop a Transportation Demand Management (TDM) Plan to reduce trip generation by 20 percent below standard use rates.

NOISE-1, NOISE-3, and NOISE-4 therefore encompass and address cumulative noise impacts from implementation of the proposed project. Therefore, in combination with past, present, and reasonably foreseeable projects elsewhere within the city, the proposed project, even with implementation of applicable regulations, would result in a *significant* cumulative impact with respect to noise.

Impact NOISE-7: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable projects, could result in a significant cumulative impact with respect to noise.

> Mitigation Measure NOISE-7: Implement Mitigation Measure Measures NOISE-1a through NOISE-1c, NOISE-2a, NOISE-2b, and NOISE-4.

Significance With Mitigation: Less than significant.

NOISE

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