4.10 Noise

This section evaluates potential impacts on ambient noise levels from construction and operation of the proposed Specific Plan. The analysis presented below is based on ambient noise measurements taken in the Specific Plan area and local noise ordinances and regulations set by the City of Menlo Park. This section identifies any potentially significant noise impacts and, if necessary, appropriate mitigation measures.

4.10.1 Noise Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, community noise varies continuously with time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) makes community noise constantly variable throughout a day.

These successive additions of sound to the community noise environment vary the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The noise descriptors used in this analysis are summarized below.

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level measured during the measurement period of interest.

L_{dn}: The energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 PM and 7:00 AM is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels that one has adapted, which is referred to as the "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of one dBA cannot be perceived;
- Outside of the laboratory, a three dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change in level of at least five dBA is required before any noticeable change in human response would be expected; and

- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a *linear* scale: it has marks on it corresponding to equal quantities of distance. One way of expressing this is to say that the ratio of successive intervals is equal to one. A *logarithmic* scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather they combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate (lessen) at a rate of 6.0 to 7.5 dBA per doubling of distance from the source, depending upon the type of ground surface. Widely distributed noises such as a large industrial facility spread over many acres or a street with moving vehicles (a "line" source) would typically attenuate at a lower rate of approximately 3.0 to 4.5 dBA per doubling distance from the source also dependent upon the type of ground surface.[1]

Vibration

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. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the affect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The decibel notation acts to compress the range of numbers required to describe vibration.[2] Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration.

1 California Department of Transportation (Caltrans). *Technical Noise Supplement*, 1998.
2 Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06)*, May 2006.

4.10.2 Environmental Setting

The main contributors to the noise environment in the El Camino Real/Downtown Specific Plan area include roadway noise and noise associated with the nearby Caltrain line. Six 10-minute average noise measurements were taken within the Specific Plan area on July 21, 2009. **Table 4.10-1** presents the L_{eq} and L_{max} for these 10-minute measurements and **Figure 4.10-1** shows the locations at which these measurements were taken. As shown, ambient L_{eq} noise levels in the Specific Plan area were between 56.2 dBA and 60.9 dBA. The predominant noise source was vehicle traffic on nearby roadways.

TABLE 4.10-1
10-MINUTE AVERAGE AMBIENT NOISE LEVELS IN THE STUDY AREA

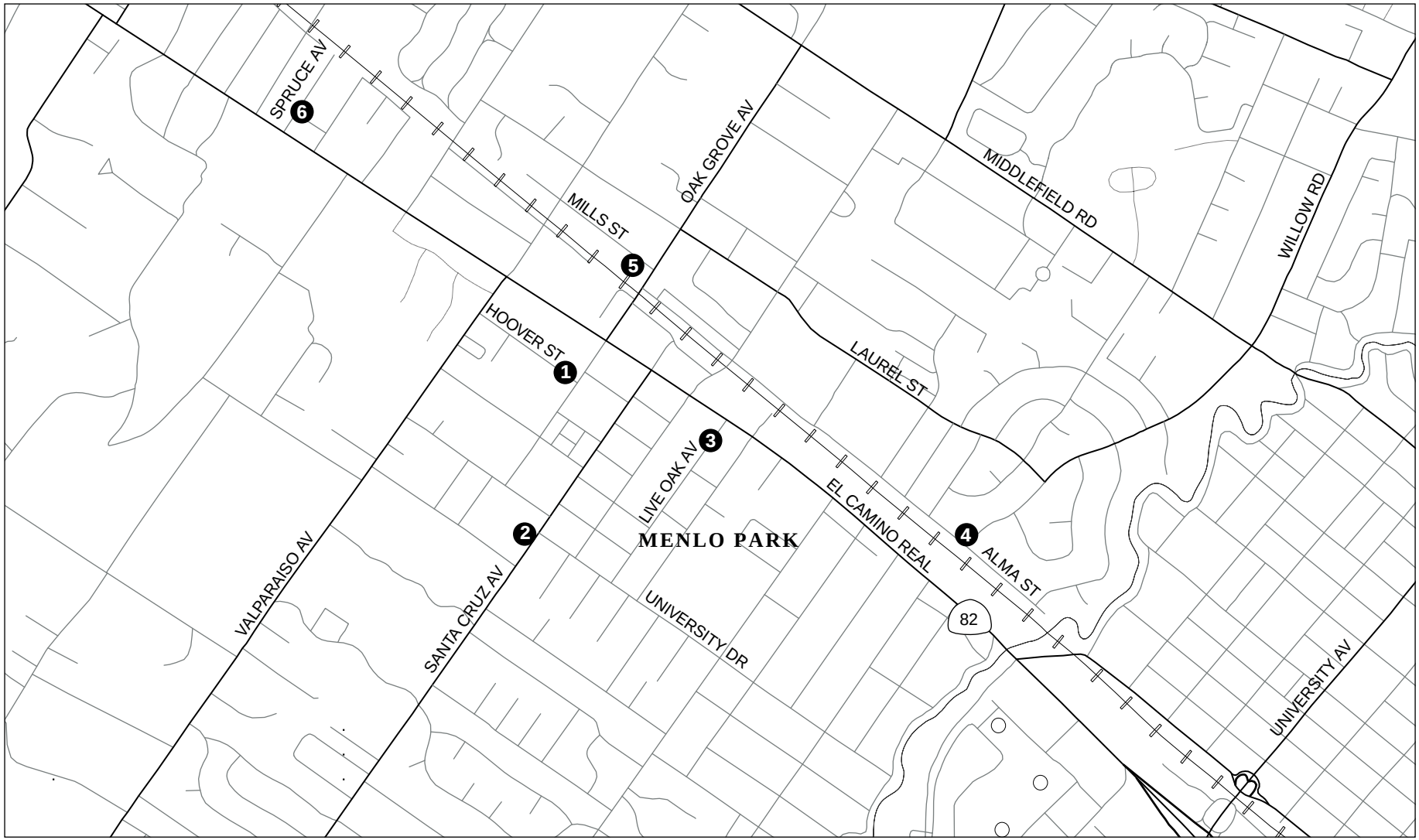
#	Measurement Location	Time	L_{eq}	L_{max}	Description of Noise Sources
1	Hoover Street approximately 100 feet north of Oak Grove Avenue	10:56 AM	59.1	75.1	Vehicle traffic on Oak Grove Avenue and Hoover Street; people talking on the street; trains audible from this location
2	Fremont Park, 50 feet from intersection of Santa Cruz Avenue and University Drive	11:22 AM	59.7	71.8	Vehicle traffic on Santa Cruz Avenue and University Drive; people talking in the distance
3	Live Oak Avenue approximately 100 feet southwest of El Camino Real	11:50 AM	59.0	70.1	Vehicle traffic on El Camino Real primary noise source; people talking in the distance; some vehicle traffic on Live Oak Avenue; trains audible from this location
4	Willow Road approximately 50 feet northeast of Alma Street	12:31 PM	57.6	76.7	Moderate vehicle traffic on Alma Street; helicopter flying overhead; siren in the distance; landscaping equipment in the distance; a few heavy trucks
5	Mills Street approximately 100 feet northwest of Oak Grove Avenue	12:55 PM	56.2	68.9	Vehicle traffic on Oak Grove Avenue; light traffic on Mills Street; trains audible (horn, wheels squealing, crossing gate bell)
6	Spruce Avenue approximately 75 feet northeast of El Camino Real	1:19 PM	60.9	74.5	Traffic on El Camino Real and train noise

NOTE: Short-term (10-minute) measurements were collected on July 21, 2009.

Additionally, noise associated with Caltrain operation was observed at four of the six noise measurement locations. In addition, the following noise sources were observed: pedestrian traffic, birds, wind, people talking/yelling, landscaping equipment and emergency sirens.

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hotels, hospitals, and nursing homes are considered to be the most sensitive to noise. Places such as



SOURCE: ESA

Menlo Park El Camino Real/Downtown Specific Plan EIR . 208581

Figure 4.10-1
Noise Monitoring Locations

churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate are also sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

The proposed Specific Plan area includes and is surrounded by a number of residential receptors. There are also a number of hotels located along El Camino Real in the project vicinity. Furthermore, the Plan includes plans to develop new multi-family residential and mixed uses, which would add new sensitive receptors to the area.

Churches located within half a mile of the Specific Plan area include: Nativity of the Holy Virgin Church on Crane Street; First Church of Christ, Scientist, Menlo Park Reading Room on Chestnut Street; Chabad Israeli Community Church on Chestnut Street; Menlo Park Presbyterian Church on Santa Cruz Avenue; St. Raymond's Catholic Church on Santa Cruz Avenue; and First Church of Christ, Scientist, Menlo Park on Ravenswood Avenue.

Schools within half a mile of the Specific Plan area include: Menlo School on Valparaiso Avenue; Sacred Heart Preparatory School on Valparaiso Avenue; Saint Raymond's Elementary School on Arbor Road; Kirkhouse Preschool on Santa Cruz Avenue; Lydian Academy on El Camino Real; Menlo-Atherton Cooperative Nursery on Middle Avenue; New Beginnings Preschool on Middle Avenue; Nativity Elementary on Laurel Street; Encinal Elementary on Encinal Avenue; and Menlo-Atherton High School on Middlefield Road. Other sensitive receptors in the project vicinity include the Atherton Library (approximately 1,500 feet northwest of the Specific Plan area) and the Menlo Park Public Library (immediately adjacent to the Specific Plan area on Alma Street near Ravenswood Avenue).

4.10.3 Regulatory Setting

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

State of California

State regulations include requirements for the construction of new hotels, motels, apartment houses and dwellings (other than detached single-family dwellings, such as are proposed for development in the Plan area) that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are collectively known as the California Noise Insulation Standards and are found in California Code of Regulations, Title 24 (known as the Building Standards Administrative Code). As noted previously, interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Title 24 standards are enforced through the building permit application process in the City of Menlo Park, as in most jurisdictions.

City of Menlo Park

General Plan

The Noise Element of the City of Menlo Park's General Plan contains goals and policies to help improve the noise environment of Menlo Park. Policies which are applicable to the Plan are listed below.[3]

- 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.

- Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans.

The Noise Element contains land use compatibility guidelines under which the "normally acceptable" noise environment for new residential uses is 60 dBA, L_{dn}. At noise levels between 60 and 70 dBA, L_{dn}, the noise environment is "conditionally acceptable" for residential uses, meaning that new construction should normally be undertaken only following a detailed analysis of noise reduction requirements. Above 70 dBA, L_{dn}, the noise environment is "normally unacceptable" for residences and if new construction does proceed, noise insulation features must be included in the project. The compatibility guidelines contain comparable, but less stringent, standards for development of new commercial uses.[4]

Municipal Code

Chapter 8.06 of the City of Menlo Park Municipal Code sets forth noise standards to protect the peace, health and safety of its citizens from unreasonable noises. According to Section 8.06.030 of this chapter, noise from any source measured at any residential property is considered a noise disturbance if it exceeds noise levels of 50 dBA during nighttime hours or 60 dBA during daytime hours. Furthermore, any and all excessively annoying, loud or unusual noises or vibrations that may offend the peace and quiet of persons of ordinary sensibilities and which interfere with the comfortable enjoyment of life or property shall be considered a noise disturbance.[5]

Construction activities that occur between 8 AM and 6 PM, Monday through Friday are exempt from the noise standards outlined in Section 8.06.030. However, the code does require that a sign be posted at all entrances to the construction site outlining the permitted hours of construction activities. The sign must be placed at least five feet above the ground and must consist of a white background with black letters.[6]

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3 City of Menlo Park, *Noise Element of the Comprehensive General Plan*, prepared by Charles M. Salter Associates, adopted by City Council on November 14, 1978.

4 More recent noise compatibility standards promulgated by the Governor's Office of Planning and Research, in the *State of California General Plan Guidelines* (2003), recommend lower acceptable noise levels for new construction of certain land uses.

5 City of Menlo Park, Municipal Code, Chapter 8.06 Noise, 1999.

6 City of Menlo Park, Municipal Code, Chapter 8.06 Noise, 1999.

Noise from powered equipment used on a temporary, occasional, or infrequent basis operated between the hours of 8 AM and 6 PM, Monday through Friday is also exempt from noise standards set forth in Section 8.06.030. However, the code does prohibit the use of powered equipment that generates noise levels in excess of 85 dBA at 50 feet. Deliveries to food retailers and restaurants are also exempt as are deliveries to other commercial and industrial businesses that occur between the hours of 7 AM and 6 PM, Monday through Friday and 9 AM to 5 PM Saturdays, Sundays, and holidays.[7]

4.10.4 Impacts and Mitigation Measures

Significance Criteria

Implementation of the Plan would be considered to have significant noise impacts if it would:

- Expose people to or generate noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies;
- Expose people to or generate excessive groundborne vibration or groundborne noise levels;
- Cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, a significant impact would occur if it would expose people residing or working in the area to excessive noise levels; and/or
- For a project located in the vicinity of a private airstrip, a significant impact would occur if the project would expose people residing or working in the Specific Plan area to excessive noise levels.

The nearest airport to the Specific Plan area is the Palo Alto Airport of Santa Clara County. This airport is located over three miles east of the Specific Plan area, therefore it can be assumed that the project would not expose people working or residing in the area to excessive noise levels associated with airport operations. Additionally, there are no private airstrips within the vicinity of the Specific Plan and no impact would occur.

7 City of Menlo Park, Municipal Code, Chapter 8.06 Noise, 1999.

Impacts

Impact NOI-1: Construction activities associated with implementation of the Specific Plan would result in substantial temporary or periodic increases in ambient noise levels in the Specific Plan area above levels existing without the Specific Plan and in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. (Potentially Significant)

The Specific Plan would allow for development of up to approximately 330,000 square feet of retail and commercial space, 680 residential units, and 380 hotel rooms over a 30-year timeframe. Furthermore, the Specific Plan would include infrastructure improvements such as sidewalk improvements and new bicycle and pedestrian connections.

Construction, although typically short-term, can be a significant source of noise. Construction is most significant when it takes place near sensitive land uses, occurs at night, or in early morning hours. Local governments typically regulate noise associated with construction equipment and activities through enforcement of noise ordinance standards, implementation of general plan policies and imposition of conditions of approval for building or grading permits. **Table 4.10-2** shows typical exterior noise levels at various phases of commercial construction and **Table 4.10-3** shows typical noise levels associated with various types of construction related machinery.

Construction-related activities would temporarily increase ambient noise levels within the Specific Plan area over the duration of construction. Construction-related noise levels within and adjacent to the Specific Plan area would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment. The effect of construction noise would depend upon the level of construction activity on a given day, the related noise generated by that activity, the distance between construction activities, the nearest noise-sensitive uses, and the existing noise levels at those uses.

The dominant construction equipment noise source is usually a diesel engine without sufficient muffling. Stationary equipment consists of equipment that generates noise from one general area and includes items such as pumps, generators, compressors, etc. These types of equipment operate at a constant noise level under normal operation and are classified as non-impact equipment. Other types of stationary equipment such as pile drivers, jackhammers, and pavement breakers, etc., produce variable and sporadic noise levels and often produce impact-type noises. Impact equipment is equipment that generates impulsive noise, where impulsive noise is defined as noise of short duration (generally less than one second), high intensity, abrupt onset, rapid decay, and often rapidly changing spectral composition. For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time. Mobile equipment such as dozers, scrapers, graders, etc., may operate with power applied in a cyclic fashion in which a period of full power is followed by a period of reduced power. Other equipment such as compressors, although generally considered to be stationary when operating, can be readily relocated to another location for the next operation. Construction-related noise levels generally fluctuate depending on the construction phase, equipment type and duration of use, distance between noise source and receptor, and presence or absence of barriers between the noise source and receptor.

TABLE 4.10-2
TYPICAL CONSTRUCTION NOISE LEVELS

Phase	Noise Level (L_{eq})[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Exterior Finishing	89
Pile Driving	90-105

[a] Estimates correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase and 200 feet from the other equipment associated with that phase.

SOURCE: U.S. Environmental Protection Agency, *Noise from Construction Equipment and Building Operations, Building Equipment and Home Appliances*, December 1971

TABLE 4.10-3
TYPICAL MAXIMUM NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)
Backhoe	80
Rock Drill	98
Air Compressor	81
Dozer	85
Air Compressor	85
Mobile Crane	83
Grader	85
Front End Loader	85
Trucks	88
Cranes	83
Pile Driver (Sonic)	96
Pile Driver (Impact)	101

SOURCE: FTA, 2006.

Noise from construction activity generally attenuates (decreases) at a rate of 6.0 to 7.5 dBA per doubling of distance. Development of new land uses proposed in the Specific Plan could expose nearby residences to noise levels as high as 89 dBA at 50 feet using typical construction methods and up to 105 dBA at 50 feet if pile driving is required. It should be noted that it is unlikely that pile driving would be required to construct new structures within the Specific Plan area, because soils in the Plan area are generally sufficiently competent to support new construction without the need for driven piles.[8] However even without pile driving, noise levels associated with construction would be significantly greater than existing noise levels at nearby receptors.

[8] As indicated in Section 4.5, *Geology, Soils, and Seismicity*, soils subject to liquefaction, which can lose strength when subjected to earthquake-induced groundshaking, are mapped only in the very southerly portion of the Specific Plan area, adjacent to San Francisquito Creek. No substantial new construction is anticipated in this area nearest the creek.

Other than restricting the hours of construction activity, the Menlo Park noise ordinance does not establish any quantitative limits for construction-related noise. Nor are any such limits established in the noise element of the General Plan. In lieu of local regulatory restrictions on construction noise, this analysis uses the general assessment construction noise criteria suggested by the U.S. Department of Transportation.[9] This assessment methodology requires an estimate of the combined noise level from the two noisiest pieces of construction equipment, assuming they both operate at the same time. If this combined noise level exceeds 90 dBA (one-hour L_{eq}) during daytime hours or 80 dBA during nighttime hours at a residential receptor, then it may result in an adverse community reaction. The threshold for commercial and industrial receptors is 100 dBA, regardless of time of day.

Given the variety of land uses in the Specific Plan area, it is reasonable and conservative to assume that construction equipment could be as close as 50 feet to a residence or other sensitive receptor for a given hour. The two noisiest pieces of equipment in Table 4.10-3 likely to be used in standard commercial development project would be an off-road truck (usually used for watering the site) rated at 88 dBA and a front end loader rated at 85 dBA. The combined noise level from these two pieces of equipment would be 90 dBA. This noise level would be considered a significant noise impact during nighttime hours in that it may result in an adverse community reaction.

However, per the City of Menlo Park noise ordinance, construction activities would be limited to less noise sensitive hours of the day (i.e., between 8 AM and 6 PM, Monday through Friday) unless otherwise approved by the City. Additionally, although the estimated noise level does not exceed the daytime standard, it does touch the limit for daytime exposures. Therefore, implementation of Mitigation Measures NOI-1a and NOI-1b are identified to ensure that potential impacts to sensitive receptors within and adjacent to the Specific Plan area would be reduced to less-than-significant levels by requiring implementation of best management practices to reduce noise levels associated with construction equipment.

> **Mitigation Measure NOI-1a:** Construction contractors for subsequent development projects within the Specific Plan area shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically-attenuating shields or shrouds, etc.) when within 400 feet of sensitive receptor locations. Prior to demolition, grading or building permit issuance, a construction noise control plan that identifies the best available noise control techniques to be implemented, shall be prepared by the construction contractor and submitted to the City for review and approval. The plan shall include, but not be limited to, the following noise control elements:
>
> - Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler shall achieve lower noise levels from the exhaust by approximately 10 dBA. External jackets on the tools themselves shall be

[9] U.S Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, p.12-7

used where feasible in order to achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible;

- Stationary noise sources shall be located as far from adjacent receptors as possible and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible; and

- When construction occurs near residents, affected parties within 400 feet of the construction area shall be notified of the construction schedule prior to demolition, grading or building permit issuance. Notices sent to residents shall include a project hotline where residents would be able to call and issue complaints. A Project Construction Complaint and Enforcement Manager shall be designated to receive complaints and notify the appropriate City staff of such complaints. Signs shall be posted at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and day and evening contact numbers, both for the construction contractor and City representative(s), in the event of problems.

Mitigation Measure NOI-1b: Noise Control Measures for Pile Driving: Should pile-driving be necessary for a subsequently proposed development project, the project sponsor would require that the project contractor predrill holes (if feasible based on soils) for piles to the maximum feasible depth to minimize noise and vibration from pile driving. Should pile-driving be necessary for the proposed project, the project sponsor would require that the construction contractor limit pile driving activity to result in the least disturbance to neighboring uses.

Mitigation Measure NOI-1c: The City shall condition approval of projects near receptors sensitive to construction noise, such as residences and schools, such that, in the event of a justified complaint regarding construction noise, the City would have the ability to require changes in the construction control noise plan to address complaints.

Significance after Mitigation: Less than Significant.

Although not absolutely required, implementation of Mitigation Measures NOI-1a and NOI-1b would reduce construction noise to ensure that construction noise would not result in an adverse community reaction.

Impact NOI-2: Increased traffic from implementation of the Specific Plan would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. (Less than Significant)

Most of the noise generated once the project is constructed and occupied would primarily be traffic-generated noise. The project would contribute to an increase in local traffic volumes, resulting in higher noise levels along local roadways. Using a spreadsheet based upon algorithms from the Federal Highway Administration's Highway Traffic Noise Prediction Model (FHWA-RD-77-108), traffic noise levels were analyzed for roadway segments that experienced the greatest percentage increase in project traffic when compared to existing traffic volumes along

those segments. To assess the significance of the increase in traffic noise due to the project, roadside peak-hour noise levels have been estimated for existing, existing plus project, and 2035 cumulative conditions with and without the project. Results of the modeling are presented in **Table 4.10-4**. The segments shown in the table would experience the greatest increase in traffic noise due to project traffic.

As shown in Table 4.10-4, the project, upon build-out, would lead to a less than 1 dBA increase in existing modeled noise levels on all roadway segments except one, where the increase due to the project would be 1.1 dBA. As discussed in the setting, noise increases of less than 1 dBA are not perceptible, and, outside of a laboratory, a 3 dBA change is just barely perceptible to humans and does not cause an adverse response. Therefore, it can be assumed that changes in noise levels due to increased roadway traffic would not result in substantial noise level increases that may impact sensitive receptors. Therefore, this would represent a less-than-significant impact.

The noise levels presented in Table 4.10-4 represent the L_{eq} during the peak traffic hour. However, in areas where the noise environment is dominated by traffic noise, the peak hour L_{eq} is roughly equivalent to the L_{dn}[10], the noise descriptor used in the City's General Plan land use compatibility standards. The noise levels in Table 4.10-4 are the noise levels at the roadside and likely exceed those that would be experienced at sensitive receptors. The setback of existing and proposed sensitive receptors in the area, primarily residences, varies.

Using the peak hour roadside noise levels in Table 4.10-4 as a conservative noise exposure analysis, one roadway would experience a change in noise level from one category to the next as a result of the Specific Plan which would occur on Ravenswood Avenue from Alma Street to El Camino Real. As there are no existing residential or other sensitive receptors located along this segment, an increase of noise levels above 70 dBA, L_{dn} along this segment would not represent a significant noise impact.

Mitigation: None required.

Impact NOI-3: The Specific Plan would introduce sensitive receptors to a noise environment with noise levels in excess of standards considered acceptable under the City of Menlo Park Municipal Code. (Potentially Significant)

The Specific Plan would locate new residences near the Caltrain station and mainline tracks, thereby exposing sensitive receptors to excessive noise levels associated with rail noise. Noise levels at 50 feet from the station and mainline tracks were estimated using the methodology set forth in the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment*. Information on train trip frequencies was derived from Caltrain's timetables.

[10] Caltrans, *Technical Noise Supplement*, November, 2009, p.2-60.

TABLE 4.10-4
TRAFFIC NOISE INCREASES ALONG LOCAL ROADWAYS IN THE PLAN AREA

	Modeled Noise Level at 50 feet from Roadway Centerline (dBA)						
Street Segment	**Existing (2010)**	**Existing + Specific Plan**	**Project Change from Existing**	**Cumulative (2035)**	**Cumulative (2035) + Specific Plan**	**Project Change from Cumulative**	**Plan + Cumulative Change from existing**
Oak Grove Avenue							
Middlefield to Laurel	66.5	66.9	+0.4	67.5	67.8	+0.3	+1.3
Laurel to El Camino	66.2	66.6	+0.4	67.4	67.8	+0.4	+1.6
El Camino to Crane	65.6	66.0	+0.4	66.5	66.9	+0.4	+1.3
Crane to University	64.0	64.6	+0.6	65.0	65.5	+0.5	+1.5
Santa Cruz Avenue							
University to Olive	68.2	68.6	+0.4	69.5	69.8	+0.3	+1.6
Olive to Avy/Orange	68.1	68.6	+0.5	69.4	69.7	+0.3	+1.6
Avy/Orange to Alameda de las Pulgas	66.6	67.1	+0.5	67.7	68.1	+0.4	+1.5
Menlo Avenue							
El Camino to Crane	65.7	66.0	+0.3	68.5	68.6	+0.1	+2.9
Crane to University	64.7	64.8	+0.1	66.1	66.2	+0.1	+1.5
Ravenswood Avenue							
Middlefield to Laurel	68.6	68.9	+0.3	70.2	70.4	+0.2	+1.8
Laurel to Alma	68.9	69.2	+0.3	70.9	71.0	+0.1	+2.2
Alma to El Camino	69.8	70.1	+0.3	71.6	71.8	+0.2	+2.0
University Avenue							
Oak Grove to Santa Cruz	64.6	65.2	+0.6	65.5	66.0	+0.5	+1.4
Santa Cruz to Menlo	65.4	65.7	+0.3	66.8	67.0	+0.2	+1.6
Santa Cruz Avenue							
University to El Camino	64.3	65.0	+0.7	66.0	66.5	+0.5	+2.2
El Camino Real							
Menlo College to Valparaiso	71.0	71.1	+1.1	72.2	72.3	+0.1	+1.3
Cambridge to Sand Hill	71.3	71.9	+0.6	72.5	72.9	+0.4	+1.6
Middlefield Road							
Ringwood to Willow	69.4	69.7	+0.3	70.4	70.7	+0.3	+1.3

SOURCE: Environmental Science Associates, 2010.

Table 4.10-5 presents the estimated daytime and nighttime L_{eq} and L_{dn} at 50 feet from the Caltrain station, the mainline tracks and grade crossings where transit warning horns are sounded, and the mainline tracks without transit warning horns.

TABLE 4.10-5
ESTIMATED NOISE LEVELS FROM CALTRAIN OPERATIONS IN THE PLAN AREA

Source	Daytime Noise L_{eq} at 50 feet	Nighttime Noise L_{eq} at 50 feet	L_{dn} at 50 feet
Caltrain Station	73.5	68.3	76.0
Mainline Track (with horn)	68.8	63.7	71.3
Mainline Track (without horn)	65.6	60.4	68.1

In addition, the Specific Plan would locate new residences near roadways that experience high levels of traffic noise, both under current and projected conditions. Modeled noise levels are shown in Table 4.10-4, estimated at 50 feet from the roadway centerline.

As shown in the tables, both daytime and nighttime noise levels within 50 feet of the Caltrain Station and/or mainline track and local roadway centerlines would exceed the standards set forth in the Menlo Park Municipal Code of 60 dBA L_{eq} and 50 dBA L_{eq}, respectively. Under General Plan land use compatibility standards, noise levels within 50 feet of most roadway centerlines would be considered "conditionally acceptable," while areas within 50 feet of El Camino Real and most areas within 50 feet of the Caltrain Station and/or mainline track would be considered "normally unacceptable."

The Specific Plan would include mixed-use development directly adjacent to the train station. For projects in other parts of the Plan Area, while exact distances to tracks or roadway centerlines would not be determined until specific projects were designed, it can be assumed that residents could be located within 50 feet of the track or roadway centerlines. Mitigation Measure NOI-3 would require detailed acoustical assessments for residential units constructed within the Specific Plan area to ensure that Title 24 interior noise level standards are achieved. Implementation of this measure would reduce impacts to a less-than-significant level. For residential units in noisier locations, noise mitigation can include the use of double-paned, noise-insulating windows and noise-insulating doors; use of acoustically rated walls (containing additional layer(s) of gypsum board, double studs, and/or the use of resilient channels to reduce noise and vibration), and proper use of sealants to ensure no gaps that could permit noise intrusion.

It is important to note that the Caltrain 2025 Project would provide for the conversion of diesel-hauled to electric-hauled trains, using equipment that would resemble BART trains in that no separate locomotive is used. A Final Environmental Assessment/Environmental Impact Report was published in 2009 and the Federal Transit Administration issued a Finding of No Significant Impact (FONSI) under the National Environmental Policy Act in December 2009. However, the Peninsula Corridor Joint Powers Board, operator of Caltrain, has yet to certify the Final EIR, nor has full funding been identified for the electrification project.

In May 2010, the Federal Railroad Administration granted Caltrain a waiver of a rule prohibiting simultaneous operation of standard diesel-locomotive-powered trains and lighter-weight electric trains. This would allow for a phase-in of electric trains over several years.[11] If electrification of Caltrain proceeds, it would substantially reduce noise levels from Caltrain operations and would reduce the likelihood of impacts to new residential receptors. However, sites that are also close to noisy roadways would still potentially have noise impacts that would be mitigated by Mitigation Measure NOI-3 below.

> **Mitigation Measure NOI-3:** Interior noise exposure within homes proposed for the Specific Plan area shall be assessed by a qualified acoustical engineer to determine if sound rated walls and windows would be required to meet the Title 24 interior noise level standard of 45 dBA, L_{dn}. The results of each study shall be submitted to the City showing conceptual window and wall assemblies with Sound Transmission Class (STC) ratings necessary to achieve the noise reductions for the project to satisfy the interior noise criteria within the noise environment of the Plan area.
>
> **Significance after Mitigation:** Less than Significant.

Impact NOI-4: The Specific Plan would expose sensitive receptors to substantial levels of groundborne vibration. (Potentially Significant)

As discussed above, implementation of the Specific Plan would locate sensitive receptors near the existing Caltrain Station and mainline track. The Federal Transit Administration (FTA) has developed screening distances for vibration impacts associated with conventional commuter railroads. According to these distances, residences and buildings where people normally sleep should be located a minimum of 200 feet from the Caltrain right-of-way.

The FTA also provides guidance regarding allowable vibration levels within close proximity to transit facilities in its *Transit Noise and Vibration Impact Assessment* manual. Where there are between 30 and 70 trains a day, the "Occasional Events" vibration assessment criterion is applicable. For residences, this is 75 dB re: 1 micro-inch/sec (denoted 75 VdB). The comparable standard for institutional daytime uses, such as offices, is 78 VdB.[12] While Caltrain currently operates 86 trains per day, the current proposal for operations in FY 2011-2012 is for a 48-train schedule. Because the FTA vibration thresholds decrease with event frequency, application of the Occasional Events standard provides for a conservative analysis, as it is not certain at this time if and when Caltrain will operate a 70+ train schedule.

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11 Peninsula Corridor Joint Powers Board, "Caltrain Passes Key Milestone in Modernization Effort;" News Release, May 28, 2010. Available on the internet at: http://www.caltrain.com/about/News/Caltrain_Passes_Key_Milestone_in_Modernization_Effort.html. Reviewed August 19, 2010.

12 Federal Transit Administration. *Transit Noise and Vibration Impact Assessment,* FTA-VA-90-1003-06, May 2006, p. 8-3.

Therefore, given that the Specific Plan proposes to develop residences within close proximity to the Caltrain Station and mainline track, impacts would be potentially significant. Mitigation Measure NOI-4 would require that all residential developments included in the Specific Plan within 200 feet of the Caltrain Station and mainline track undergo a detailed vibration analysis to determine the potential for vibration impacts. Implementation of this measure would ensure that impacts would be less than significant.

In the event that Caltrain upgrades to electric powered trains, vibration impacts to nearby residences constructed in the Specific Plan and would likely be reduced. Vibration curves published by the Federal Transit Administration indicate that vibration levels from locomotive powered passenger trains are 10 Vdb or more than light-rail vehicles.

> **Mitigation Measure NOI-4:** Prior to project approval for development within 200 feet of the mainline track, a detailed vibration design study shall be completed by a qualified acoustical engineer to confirm the ground vibration levels and frequency content along the Caltrain tracks and to determine appropriate design to limit interior vibration levels to 75 VdB for residences and 78 VdB for other uses. If required, vibration isolation techniques could include supporting the new building foundations on elastomer pads similar to bridge bearing pads.
>
> **Significance after Mitigation:** Less than Significant.

Cumulative Impacts

Impact NOI-5: Implementation of the Specific Plan, together with anticipated future development in the area in general, would result in a significant increase in noise levels in the area. (Significant)

A cumulative impact arises when two or more individual projects, when considered together, are considerable or which compound or increase other environmental impacts. Cumulative impacts can result from individually minor but collectively significant impacts, meaning that the project's incremental effects must be viewed in connection with the effects of past, current, and reasonably foreseeable projects. Notably, any project that would individually have a significant noise impact would also be considered to have a significant cumulative noise impact.

Construction noise is typically a local impact and would affect receptors in the immediate vicinity of the Specific Plan area. Therefore, due to the geographic distribution of the Specific Plan and other approved and foreseeable projects in the area, the same set of receptors are not likely to be affected by construction activities from more than one project. Even if two construction sites are located right next to each other and equidistant from the same set of receptors, the result of two sets of noise sources would be a 3 dBA increase over what would result if there were only one construction site. Noise attenuates rapidly and the construction site nearest to any receptor would have the most impact. Besides, the construction schedules for individual projects constructed under the Specific Plan and other approved projects would vary hence reducing the intensity of the

impact. In addition, all construction that would occur under the Specific Plan would be required to implement Mitigation Measure NOI-1, to reduce individual impact to a less-than-significant level. Therefore, the overall cumulative impact due to construction activities and the Specific Plan's contribution to the cumulative impact would both be considered less than significant.

Noise from cumulative development in the area would primarily occur from increases in motor vehicle traffic. Table 4.10-4 shows that modeled 2035 levels (from both cumulative and project traffic) would increase between 1.3 and 2.9 dBA over existing noise levels. While increases in noise levels of less than 3 dBA are normally imperceptible outside a laboratory setting, the additional noise would occur on streets where noise levels now exceed those permitted by the Menlo Park Municipal Code (60 dBA L_{eq}) and which are considered to be "conditionally acceptable" for residential uses under the land use compatibility standards established in the City's General Plan, meaning that new construction should normally be undertaken only following a detailed analysis of noise reduction requirements. Noise would also increase on properties near El Camino Real, which experiences current noise levels above 70 dBA, L_{dn} and is considered under the General Plan's standards to be "normally unacceptable" for residences. Here, if new residential construction does proceed, noise insulation features must be included in the project.

In addition, using the peak hour roadside noise levels in Table 4.10-4 as a conservative noise exposure analysis, three roadway segments would experience a change in noise level from one category to the next as a result of the Specific Plan and cumulative traffic. This would occur on the three segments of Ravenswood Avenue. This change in noise exposure along these roads would occur with or without the project.

Because the project would cumulatively contribute to increased noise levels on roadways where noise levels are currently in excess of standards established in the local noise ordinance, or where mitigation measures should be undertaken, this is a potentially significant impact on new and existing sensitive receptors. Mitigation Measure NOI-3 would reduce cumulative impacts on new sensitive receptors to a level of insignificance. However, no feasible means have been identified to protect existing receptors along roadways where existing noise levels exceed 60 dBA $L_{eq.}$ Typical mitigations such as sound walls are not feasible along surface streets with frequent driveway access. Consequently, the cumulative impact of increased traffic noise on existing sensitive receptors is significant and unavoidable.

Significance after Mitigation: Significant and Unavoidable

Impact NOI-6: Anticipated future development of California's High Speed Rail Project would have the potential to expose sensitive receptors within the Specific Plan area to excessive noise levels and groundborne vibration. (Potentially Significant)

In addition to noise and vibration from existing Caltrain operations, implementation of California's High Speed Rail Project could further increase noise levels in the Plan area by routing high speed trains (HSTs) through the existing Caltrain corridor. Impacts from HSTs in the

Specific Plan area were evaluated in the *Bay Area to Central Valley HST Final Program EIR/EIS*. This study rated potential noise and vibration impacts as low, medium, or high based on the severity of the impact relative to the number of receptors that would be affected. Given that the HSTs would travel at reduced speeds through the Specific Plan area, noise impacts were rated as medium despite the high density of receptors. However, vibration impacts near the Specific Plan area were rated as high.[13]

On August 8, 2008, the Town of Atherton, the Planning and Conservation League, the City of Menlo Park, the Transportation Solutions Defense and Education Fund, the California Rail Foundation, and the Bay Rail Alliance filed a lawsuit in the Superior Court for Sacramento County challenging the California High-Speed Rail Authority's actions as being in violation of CEQA. The Court concluded that there were deficiencies in the project description and that the Final EIR analysis failed to account for the fact that Union Pacific Railroad would not allow the Authority to use their right-of-way; additionally, the Court held that the Authority's CEQA findings on vibration impacts were not supported by substantial evidence. On March 11, 2010, a Revised Draft Program EIR was circulated in response to this court ruling; however no changes were made to the vibration analysis given that the Court ruling did not find fault in the analysis but rather identified a contradiction between the analysis in the program EIR and the conclusions in the July 2008 CEQA findings.[14]

Based on the findings of the *Bay Area to Central Valley HST Final Program EIR/EIS*, it can be assumed that potential noise and vibration impacts from implementation of the High Speed Rail Project in conjunction with existing noise and vibration levels from Caltrain operations could result in a significant impact to receptors constructed in the Specific Plan area. However, implementation of the High Speed Rail Project would facilitate electrification of the Caltrain system, and would potentially help reduce existing noise levels from Caltrain operations. Furthermore, implementation of Mitigation Measures NOI-3 and NOI-4 would ensure that noise and vibration impacts to new receptors constructed under the Specific Plan would be less than significant.

Significance after Mitigation: Less than Significant.

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[13] California High Speed Rail Authority and USDOT Federal Railroad Administration, *Bay Area to Central Valley High-Speed Train (HST) Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*, May 2008.

[14] California High Speed Rail Authority, *Bay Area to Central Valley High-Speed Train (HST) Revised Draft Environmental Impact Report Materials*, March 2010.