4.10 NOISE

This chapter describes the regulatory framework and existing conditions in the vicinity of the Project related to noise, as well as the potential impacts of the Project on the noise environment. The chapter beings with a discussion of the fundamentals of sound and vibration, and an examination of relevant federal, State, and local guidelines, policies, and standards regarding noise and vibration. The remainder of the chapter provides an evaluation of the potential noise- and vibration-related environmental consequences of future development that could occur by adopting and implementing the Project. The supporting analysis considers noise levels at existing receptor locations; evaluates potential noise impacts associated with the Project; and provides mitigation to reduce noise impacts at noise-sensitive locations. Noise calculations on which this analysis is based are included in Appendix G, Noise Monitoring and Modeling Data.

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 unit-less measure of sound on a logarithmic scale.
- A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- 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}). The mean of the noise level (or energy) averaged over the measurement period.
- 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.

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, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less-developed areas. 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.

TABLE 4.10-2 TYPICAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at 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 and Hansen, 2009.

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 the City of San Leandro 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 which 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, since noise- and vibration-sensitive activities are less likely to be undertaken in these areas, and because these uses often themselves generate noise in excess of what they receive from other 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 the vicinity of the Project site.

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. These same State land use noise compatibility standards remain in place today.

State of California Building Code

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, California Building Code. These noise standards are applied to new construction in California for the purpose of 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.

City of San Leandro Noise Standards

San Leandro Noise Element

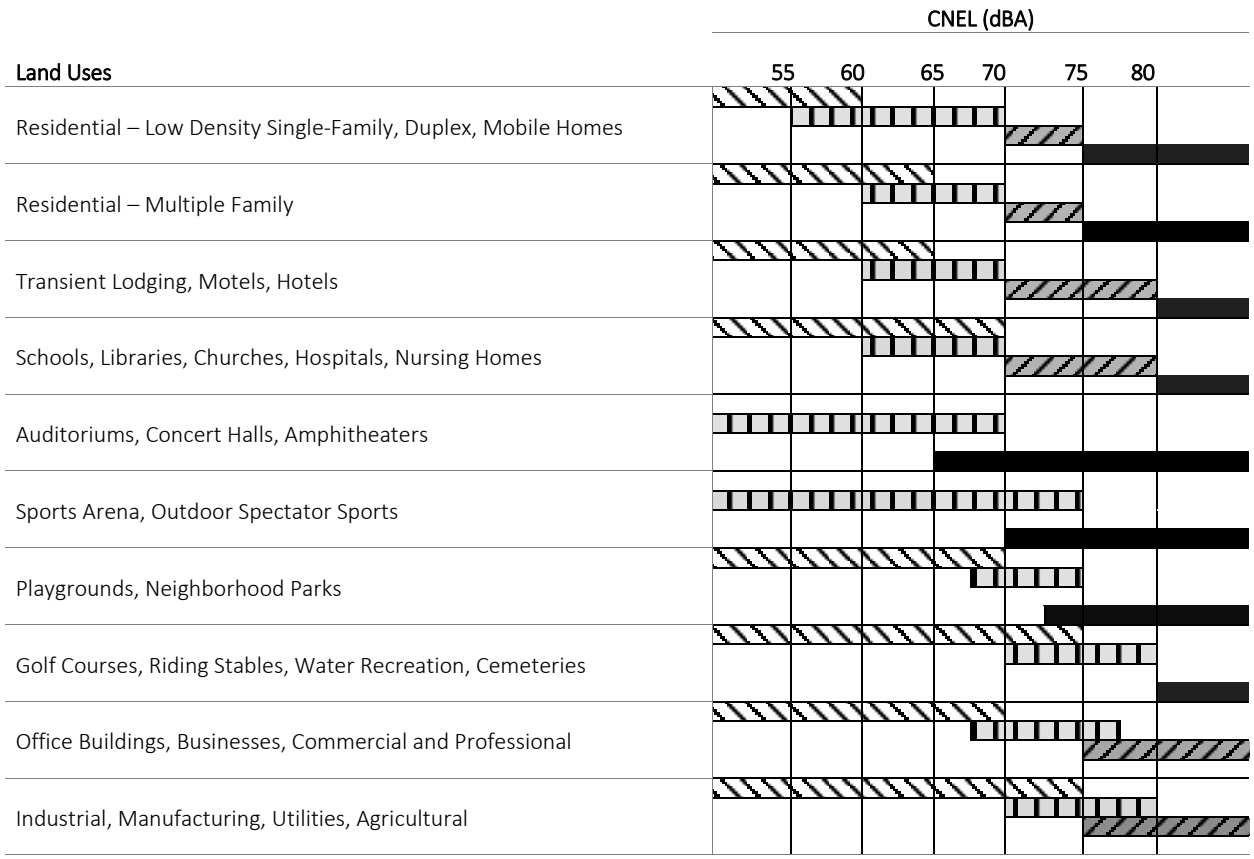
The City of San Leandro General Plan, which was adopted in May 2002, contains policies related to noise in its Environmental Hazards Chapter. The relevant goal and policies are listed in Table 4.10-6.

San Leandro Municipal Code

Chapter 4-1 of the City's Municipal Code provides additional provision for restrictions and regulations for noise within the City of San Leandro. The following regulations are provided in the City's Municipal Code which addresses construction and stationary operational noise.

> 4-1-1115 Prohibited Acts.
> *(b) Construction-related Noise Near Residential Uses.* Construction work or related activity which is adjacent to or across a street or right of way from a residential use, except between the hours of 7 a.m. and 7 p.m. on weekdays, or between 8 a.m. and 7 p.m. on Sunday and Saturday. No such construction is permitted on Federal holidays. As used in this Article, "construction" shall mean any site preparation, assembly, erection, substantial repair, alteration, demolition or similar action, for or on any private property, public or private right-of-way, streets, structures, utilities, facilities, or other similar property. Construction activities carried on in violation of this Article may be enforced as provided in Section 4-11-1130, and may also be enforced by issuance of a stop work order and/or revocation of any or all permits issued for such construction activity.

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.

TABLE 4.10-6 SAN LEANDRO GENERAL PLAN GOAL AND POLICIES

Goal/Policy Number	Goal/Policy Text
Chapter 6 Environmental Hazards	
Goal 35	**Noise Compatibility:** Ensure that noise associated with the day-to-day activities of San Leandro residents and businesses does not impede the peace and quiet of the community.
Policy 35.01	**Noise Compatibility Table :** Ensure that potential noise impacts are considered when new development is proposed. Projects that could significantly increase noise levels should incorporate mitigation measures to reduce such impacts. Apply the standards shown in Table 6-1 of the Noise Element of the San Leandro General Plan (refer to Table 4.10-7 of this Draft EIR) when evaluating applications for future development. Table 6-1 (Table 4.10-7 of this Draft EIR) specifies the maximum noise levels that are normally acceptable, conditionally acceptable, and normally unacceptable for new development.
Policy 35.02	**Residential Interior Noise Standard:** As required by the State of California, ensure that interior noise levels in new residential construction do not exceed 45 dB L_{dn}. For non-residential construction, the acceptable interior noise levels should be determined on a case by case basis, depending on the type of activity proposed.
Policy 35.03	**Residential Exterior Noise Standard:** Strive to maintain an exterior noise level of no more than 60 dB L_{dn} in residential areas. Recognizing that some San Leandro neighborhoods already exceed this noise level, encourage a variety of noise abatement measures that benefit these areas.
Policy 35.04	**Degradation of Ambient Noise Levels:** If a neighborhood is well within acceptable noise standards, do not automatically allow noise levels to degrade to the maximum tolerable levels shown in Table 6-1 (Table 4.10-7 of this Draft EIR). A project's noise impacts should be evaluated based on the potential for adverse community response, as well as its conformance to the adopted standards. For CEQA purposes, an increase of 3 dB L_{dn} should generally be considered a significant adverse impact.
Policy 35.05	**Noise-Sensitive Uses:** Discourage noise-sensitive uses such as hospitals, schools, and residential units from locating in areas with very high noise levels. Conversely, discourage new uses likely to produce high levels of noise from locating in areas where noise-sensitive uses would be impacted.
Policy 35.06	**Minimizing Noise in New Housing Areas:** In the event that new housing is constructed in areas that exceed normally acceptable noise levels, require project design and construction measures that minimize noise intrusion.
Policy 35.07	**Noise Reduction Measures:** Encourage local businesses to reduce noise impacts on the community by replacing excessively noisy equipment and machinery, applying noise-reduction technology, and following operating procedures that limit the potential for conflicts.
Policy 35.08	**Responding to Noise Problems:** Continue to respond promptly and effectively to local noise complaints and noise problems, enforcing City codes and ordinances as necessary to ensure that a peaceful environment is maintained.
Policy 36.03	**Site Planning and Building Design:** Require new development or redevelopment near freeways, arterials, BART, and major bus routes to incorporate site planning and architectural design measures that reduce the exposure of future building occupants to traffic noise.

Source: San Leandro General Plan, 2002, Chapter 6, Environmental Hazards.

(c) Conflicts with Residential Uses. Subject to the restrictions on constructions contained in subdivision (b), the sustained operation or use between the hours of 9 p.m. and 8 a.m. of any electric or gasoline powered motor or engine or the repair, modification, reconstruction, testing or operation of any automobile, motorcycle, sweeper, vacuum, public address system, whistle muffler, motorized scooter, machine or mechanical device or other contrivance or facility unless such motor, engine, automobile, motorcycle, sweeper, vacuum, public address system, whistle muffler, motorized scooter, machine or mechanical device is enclosed within a sound insulated structure so as to prevent noise and sound from being plainly audible from any residential property line.

TABLE 4.10-7 NOISE COMPATIBILITY STANDARDS FOR SAN LEANDRO LAND USES

Land Use Type	Exterior Noise Exposure (Ldn or CNEL, dB)						
	>55	55-60	60-65	65-70	70-75	75-80	>80
Single- and Multi-Family Residential, and Mobile Homes							
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds							
Schools, Libraries, Museums, Hospitals, Personal Care							
Offices, Retail/Service Commercial, Restaurants, Hotels/Motels							
Auditoriums, Concert Halls, and Amphitheaters							
Industrial and Manufacturing within 500 feet of a residentially zoned area							
Other Industrial and Manufacturing							

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

Conditionally Acceptable
Specified land use may be permitted only after detailed analysis of noise reduction and insulation requirements
.

Normally Unacceptable
New development should generally not be undertaken because mitigation is usually not feasible.

Source: San Leandro General Plan, 2002, Chapter 6, Environmental Hazards.

(d) *Loud Music in Parks*. The use of electronic equipment, including but not limited to amplifiers, radio loudspeakers, phonographs, tape amplifiers, electronically operated or acoustic musical instruments or other device of like design used for producing sound in or upon any public street, park or grounds, or any other open area to which the public has access, whether publicly or privately owned, between the hours of 10 p.m. and 9 a.m. is unlawful. At any other time of day, such equipment may not be used in a manner which disturbs the peace, quiet and comfort of neighboring residents or persons of normal sensitivity who are using such areas. This subsection shall not apply to events for which a permit has been obtained pursuant to Chapter 4-20.

Vibration Standards

Neither the City of San Leandro nor the County of Alameda have specific and/or quantitative regulatory standards for construction or operational vibration sources. San Leandro Zoning Code Part IV, Article 16, Division 3, Provision 4-1670B, Vibration, requires that no use, activity, or process produce vibrations that are perceptible without instruments by a reasonable person at the property lines of a site. This performance standard applies to all land use classifications in all zoning districts.

4.10.1.2 EXISTING CONDITIONS

This section describes the existing noise environment in the vicinity of the project site. Mobile sources of noise, especially cars and trucks, are the most common and significant sources of noise in most communities. Additional sources of noise in the vicinity of the project site include aircraft noise from Oakland International Airport and the Hayward Executive Airport, as well as industrial operations.

On-Road Vehicles

On-road vehicles, including cars, trucks, and buses, contribute substantially to the noise environment of the project site. The major roadways in the vicinity of the project site include Fairway Drive, Marina Boulevard, and Monarch Bay Drive. Marina Boulevard is a two- to-six-lane arterial road with a posted speed limit of 30 to 40 miles per hour. Within the project site, Marina Boulevard currently carries a daily traffic volume of approximately 5,000 vehicles on a typical weekday and 6,650 on a weekend. Fairway Drive is a two- to four-lane arterial road with a posted speed limit of 30 to 40 miles per hour. Within the project site, it currently carries a daily traffic volume of less than 2,500 vehicles on a typical weekday and weekend. Monarch Bay Drive is a two-lane collector road that extends between Marina Boulevard and the Estudillo Canal.

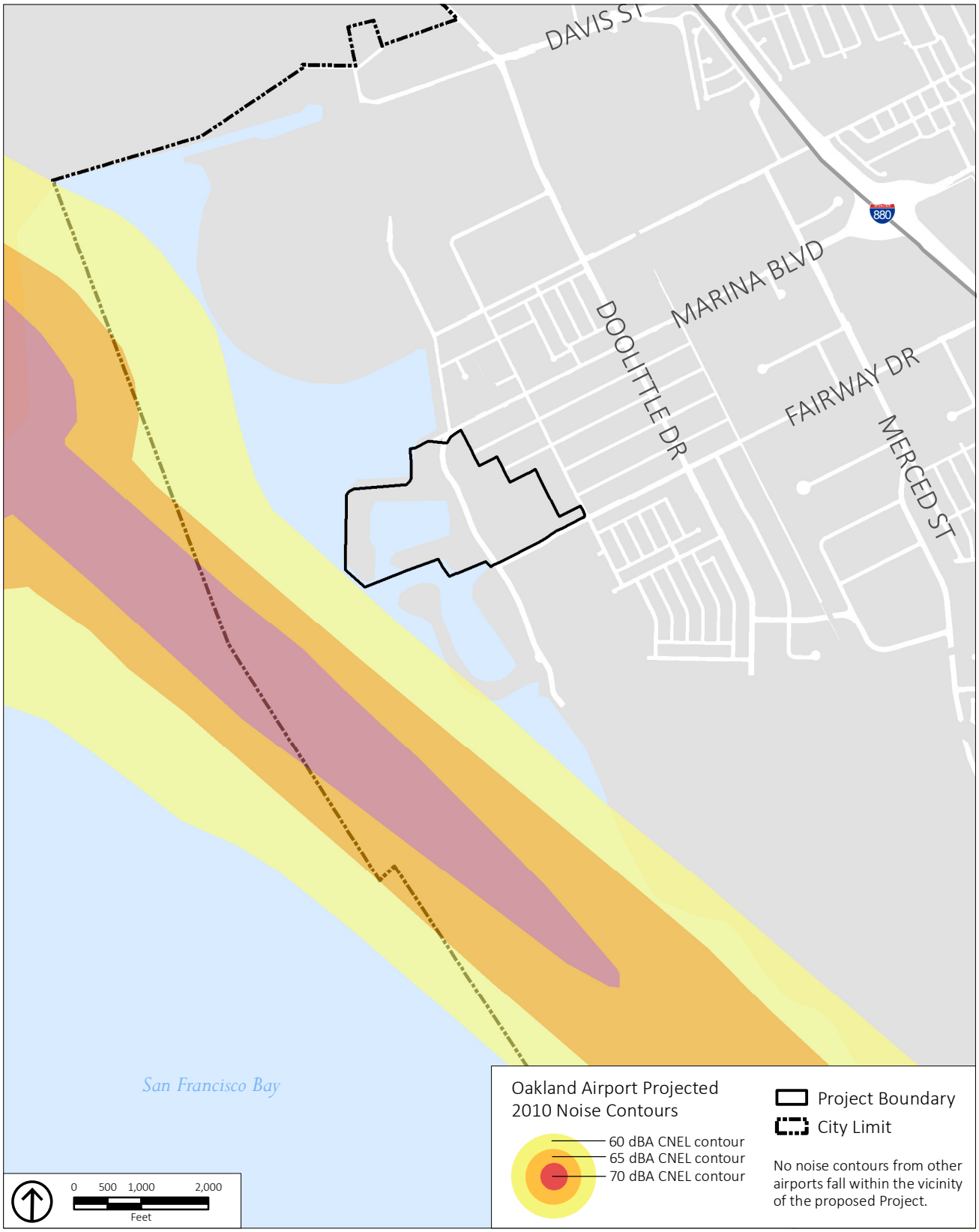
Aircraft Noise

The nearest airports to the project site are Oakland International Airport, which is located approximately one mile to the northwest, and the Hayward Executive Airport located approximately 3.5 miles to the southeast. The Project site is located outside the Hayward Executive Airport airport influence area, but it is located within the airport influence area of Oakland International Airport.

Figure 4.10-1 shows the project site boundaries, the San Leandro City Limit, and the noise contours for Oakland International Airport. As seen in Figure 4.10-1 only a small portion of the project site is located within the 60 dBA CNEL of the Oakland International Airport. The portion within the 60 dBA CNEL noise level contour would be located at the southwestern tip of the project site known as the end of Mulford Point, where the proposed 8,000-square-foot restaurant would be located. Impact Statement NOISE-3 discusses potential noise impacts with the proposed uses at the project site.

Other Sources of Noise

Stationary sources of noise typically emanate from commercial and industrial activities and equipment. Whereas mobile-source noise affects many receptors along an entire length of roadway, stationary noise sources typically affect areas adjacent to the uses. The nearest uses with the potential to generate audible noise levels are the industrial uses located 1,400 feet north of the Project site. These industrial uses include, but are not limited to, manufacturing, trucking, and metal works. Industrial noise is generated from heating, ventilation and air conditioning (HVAC) systems, loading dock activity, and processing machinery. Noise from industrial uses can be generated on a continual basis, or intermittently, depending on the processes and types of machinery involved. Based on measurements and audible observations taken at the site, industrial noise is not audible at the Project site due to distance and the intervening structures.



Source: Port of Oakland, 2006; City of San Leandro, 2014; PlaceWorks, 2014.

Figure 4.10-1
Airport Noise Level Contours

Noise Measurements

Existing ambient noise levels were measured at seven locations in the vicinity of the project site to document representative noise levels at a variety of locations. Short-term (ST) noise level measurements were taken at six locations for a minimum period of 15 minutes during the daytime on Wednesday, July 16, 2014, all between the hours of 10:00 a.m. and 2:00 p.m. A long-term (LT) noise level measurement was taken at one location for a period of 24 hours beginning on Wednesday, July 16, 2014, and ending on Thursday, July 17, 2014. These dates were chosen to represent a typical weekday condition with fair weather that is representative of midweek ambient noise conditions, consistent with industry standard practice. The noise levels during both the short- and long-term measurements were measured using Larson-Davis Model 820 sound level meters, which satisfies the American National Standards Institute for Type 1 general environmental noise measurement instrumentation. The sound level meters and microphones were mounted on a tripod 5 feet above the ground and equipped with a windscreen during all short-term measurements. For the long-term measurement, the microphone and windscreen were attached to a tree and hidden from sight. The noise level measurement locations are shown on Figure 4.10-2 and the results are summarized in Table 4.10-8.

Long-Term Site 1

Site LT-1 represents the noise environment in the vicinity of the planned development sites in the northern portion of the Project, and captured noise generated by traffic and other activity along Monarch Bay Drive, activity in the El Torito Restaurant parking lot, pedestrian and bicycle activity, golf course activity, and flights landing at Oakland International Airport. Noise level data over a 24-hour period were acquired, beginning at 9:43 a.m. on Wednesday, July 16, 2014. At the start of the 24-hour measurement period, winds were from the southwest at 3 to 10 mph, and the air temperature was approximately 66.3°F. The 24-hour Day Night Noise Level (L_{dn}) at this location was 61.9 dBA. The highest and lowest hourly L_{eq} levels observed at this location were, respectively, 67.2 dBA during the period of 4:00 p.m. to 5:00 p.m., and 49.8 dBA during the 12:00 a.m. to 1:00 a.m. hour. A time history chart of the hourly data for Long-Term Location 1 is included in Appendix G.

Short-Term Site 1

Site ST-1 is located on the northwestern edge of Mulford Point, near the location of the proposed hotel. The existing land use at this short-term location is recreational. This location is also the closest of all short and long-term location sites to the arriving flight path at Oakland International Airport. This site was located on the west side of a parking lot adjacent to Mulford Point Drive, approximately 1,500 feet from the main traffic on Monarch Bay Drive.

The noise environment of Site ST-1 is characterized primarily by the sound of close traffic in the parking lot and along Mulford Point Drive, cyclists, pedestrians, idling airplanes at Oakland International Airport, and birds. Intermittent noise from airplanes landing at Oakland International Airport also contributed heavily to the sound profile. The 15-minute equivalent noise level at this location (L_{eq}) was 57.4 dBA.

Source: PlaceWorks, 2014; Esri, 2014.

Figure 4.10-2
Noise Monitoring Locations

TABLE 4.10-8 NOISE LEVEL MEASUREMENTS

Monitoring Site	Location	Start Time	Wind Speed (mph)	Wind Dir.	Temp. (° F)	Lmin (dBA)	Leq (dBA)	Lmax (dBA)	CNEL (dB)
LT-1	El Torito Restaurant Parking Lot	9:43 a.m.	3-10	SW	66.3	—	—	—	62.2
ST-1	Northwestern Edge of Mulford Point	12:18 p.m.	1-2.5	W	76.5	42.5	57.4	72.5	—
ST-2	South of Pescador Point Drive	11:50 a.m.	1-2.5	NW	76.5	44.1	50.7	60.9	—
ST-3	South Golf Course Residential Development on Fairway Drive	1:00 p.m.	3-6	W	78.0	41.2	54.2	67.1	—
ST-4	Marina Boulevard Residential Area	10:20 a.m.	3.5-7	W	69.0	41.2	63.2	73.8	—
ST-5	Mulford Marina Branch Library	11:15 a.m.	1-2	SW	71.0	39.7	55.0	68.9	—
ST-6	Avenue 134th Residential Area	10:50 a.m.	1-2	SW	69.7	37.3	47.5	67.7	—

Note: CNEL is used to express the average sound level over a 24-hour period. Therefore, it is not used in the 15-minute short-term measurements. Each measurement interval for the long-term measurement has a different L_{min}, L_{max}, and L_{EQ}, which are used to calculate the CNEL. Therefore, these values are not listed in this table for the long-term measurement.
Source: Noise monitoring conducted by PlaceWorks between 10:20 a.m. and 1:15 p.m. on July 16, 2014, and between 9:27 a.m. July 16, 2014 and 10:00 a.m. on July 17, 2014.

Short-Term Site 2

Site ST-2 is located in the southwest area of the site, south of Pescador Point Drive. The site is used as a parking lot and boat launch, is adjacent to a scrap yard, and is in close proximity to the golf course and the Marina Inn. The microphone and sound meter were positioned approximately 150 feet from the centerline of Pescador Point Drive and approximately 270 feet from the centerline of Monarch Bay Drive, 150 feet north of the proposed development.

The noise environment of Site ST-2 is primarily characterized by the sound of passing traffic along Monarch Bay Drive and Pescador Point Drive, and golf course and boat launch activity. The noise environment was also punctuated by planes landing at Oakland International Airport. The 15-minute equivalent noise level at this location (L_{eq}) was 50.7 dBA.

Short-Term Site 3

Site ST-3 is representative of noise that could potentially be received by residents living in the South Golf Course Residential Development on Fairway Drive. The microphone and sound meter were positioned approximately 110 feet southwest of the intersection of Monarch Bay Drive and Fairway Drive. Measurements were taken at this location, just outside of the Project site boundary to avoid noise from heavy foot traffic in the immediate vicinity of the microphone and sound meter. The location southwest of the intended site was chosen because it was approximately equidistant from busy streets, was situated behind light trees and a small hill that mimicked the noise barrier caused by the tree line between the golf course and Fairway Drive, and because of a higher level of ambient noise similar to what could be expected by residents living within the golf course.

The noise environment of Site ST-3 is primarily characterized by the sound of traffic along Monarch Bay Drive, vehicles pulling into the parking lot, pedestrian activity, children in the nearby playground, and the

golf course driving range. Intermittent noise from airplanes landing at Oakland International Airport was also audible. The 15-minute equivalent noise level (L_{eq}) at this location was 54.2 dBA.

Short-Term Site 4

Site ST-4 is representative of noise as received by the residential area immediately to the north of the Project site. This location was on Marina Boulevard approximately 25 feet from centerline, as well as 170 feet from Neptune Drive. The noise environment of Site ST-4 is primarily characterized by the sound of traffic along Marina Boulevard; the noise environment was also punctuated by airplanes landing at Oakland International Airport. The 15-minute equivalent noise level (L_{eq}) at this location was 63.2 dBA.

Short-Term Site 5

Site ST-5 is representative of noise as received by residential sites east of the Project site. Existing land uses in the vicinity of the location were single-family residential and commercial recreation. This location was on the northwest corner of Fairway Drive and Aurora Drive, approximately 30 feet from centerline of Aurora Drive, and 100 feet from the centerline of Fairway Drive. This location is on the eastern edge of the Project site, adjacent to the Mulford Marina Branch Library, which will be demolished and re-built as part of the Project.

Site ST-5 is primarily characterized by the sound of traffic along Fairway Drive and, to a lesser extent, Aurora Drive; temporary construction on Aurora Drive; light landscaping equipment from residences and the golf course maintenance building; and patrons entering and leaving the library. The 15-minute equivalent noise level (L_{eq}) at this location was 55.0 dBA.

Short-Term Site 6

Site ST-6 is representative of noise as received by residential uses east of the Project site. Site ST-6 was located front of 2620 West Avenue 134th, on the south side of the street, approximately 20 feet from centerline of West Avenue 134th, and approximately 60 feet from the borderline of the golf course.

The noise environment of Site ST-6 was characterized primarily by the sound of light winds, distant aircraft and traffic, light residential traffic on the street, nearby dogs, residents inside the houses, and occasional noise from people on the golf course. The 15-minute equivalent noise level (L_{eq}) at this location was 47.5 dBA.

4.10.2 STANDARDS OF SIGNIFICANCE

The Project would have a significant impact with regard to noise if it would result in any of the following:

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 discusses the impacts of the project on the noise environment and on the perception of noise by sensitive receptors within and in the vicinity of the project site. This discussion is organized by and responds to each of the potential impacts identified in the Standards of Significance.

NOISE-1 The project would expose people to or generate noise levels in excess of standards established in the General Plan and/or the applicable standards of other agencies.

The Project would result in a significant impact if it would result in significant new noise sources to existing and future off-site receptors, or if it would develop sensitive noise uses that would expose persons to excessive noise.

Land Use Compatibility

Standards for noise generation and exposure in the Project site are determined primarily through the Land Use Noise Compatibility Guidelines shown in Table 4.10-5, as well as by the 60 dBA L_{dn} exterior, and the 45 dBA L_{dn} interior noise standards set by Policies 35.01, 35.02, and 35.03 of the City of San Leandro Noise Element. For the purpose of this analysis, the CNEL is the descriptor used as the airport and traffic data provided are based on this metric. It shall be noted that CNEL is actually is a stricter criteria.The Project components include a variety of uses, including residential dwellings, recreation, hotels, a conference center, offices, and restaurants. Placement of noise-sensitive uses (homes, the hotel) in close proximity to high-volume roadways and major airports could result in exposure of sensitive receptors to excessive levels of noise. None of the Project components would be located within close proximity to major roadways, and would not be located within the 65 dBA CNEL noise contour of the Oakland International Airport, which threshold is included in the Land Use Plan for the Oakland International Airport. As discussed in Section 4.10.1.3, traffic volumes along the major roads adjacent to and within the Project site have relatively low average daily traffic volumes and speeds. As discussed in Impact NOISE-3 below, the existing and future noise levels at the street adjacent to roadways in the study area segments of Marina Boulevard and Fairway Drive would range from 60.4 to 64.7 CNEL, which is greater than the 60 dBA CNEL General Plan standard. Therefore, as proposed noise-sensitive land uses would be located in proximity to roadways exposed to traffic noise levels greater than 60 dBA CNEL or Ldn, there would be the potential for exterior areas to be exposed to noise levels in exceedance of Policy 35.03 which strives to maintain exterior noise levels of no more than 60 dBA in residential areas. Due to the Project site's close proximity to roadway traffic, and Oakland International Airport, this is considered a *significant* impact.

NOISE

Impact NOISE-1: The Project would expose people to or generate noise levels in excess of standards established in the General Plan , and/or the applicable standards of other agencies.

Mitigation Measure NOISE-1A: The project applicant shall submit an acoustic study to the satisfaction of the City's Chief Building Official with the applications for site plan review and/or Tentative Map, whichever is earlier. The study shall demonstrate that all development meets applicable exterior noise standards and all new residences meet an interior noise level due to exterior noise of 45 dBA CNEL consistent with State and local noise standards. The acceptable interior noise levels for all non-residential construction will be determined based on a case-by-case basis according to the type of activity proposed. This is in accordance with General Plan Policy 35.02, Residential Interior Noise Standard. The study shall be based on precise grading and architectural plans including specific construction method details and materials to calculate the necessary exterior to interior noise reduction of approximately 20 dBA to achieve 45 dBA CNEL for residential construction. The precise exterior to interior reduction would be determined in the acoustical study when precise grading plans with building elevations, footprints and architectural plans are available. The applicant shall incorporate into the Project design all required noise insulation features and techniques necessary to reduce interior noise levels to achieve the interior noise standard. To achieve the required interior noise levels, features such as upgraded exterior wall and roof assemblies, upgraded windows, and exterior doors may be required.

Mitigation Measure NOISE-1B: All residential units of the Project shall include an alternative form of ventilation, such as noise-baffled passive air ventilation systems or mechanical air conditioning systems, that would allow windows to remain closed for prolonged periods of time to meet the interior noise standard of 45 dBA Ldn established by the City and the Uniform Building Code Requirements.

Significance After Mitigation: Less than significant.

Stationary Noise Impacts

Implementation of the Project would result in new residential, recreational and commercial development. The primary noise sources from these land uses are landscaping, maintenance activities, and air conditioning (HVAC) systems. In addition, the proposed hotels will have outdoor areas which may allow for outdoor activities and events, as will the waterside public amenities. Ball fields and an aquatic center would be located on the south side of Pescador Point, approximately 300 feet from the nearest future mixed use residential area and approximately ½-mile from the existing nearby homes. There would be no uses that have the potential to generate excessive noise levels such as soccer/baseball/football fields with bleachers for spectators, concert venues for outdoor music and performances, industrial equipment or processes and such. Noise generated by the Project uses would be normal and customary for the proposed uses and generally typical of noise from existing similar uses in the area. The Project uses would not be expected to exceed the General Plan noise exposure standards. This is a *less than significant* impact.

Once the Project is developed, sporadic noise from outdoor activities such as loud music at restaurants, boat engine noise near boat launches would be controlled by enforcement of the Municipal Code. Noise

complaints that may arise from persons generating noise within the site would be resolved through enforcement of Chapter 4-1 of the City's Municipal Code This is a *less than significant* impact.

NOISE-2 The Project would have the potential to expose people to or generate excessive groundborne vibration or groundborne noise levels.

CEQA does not specify quantitative thresholds for what is considered "excessive" vibration or groundborne noise. Neither the City of San Leandro nor the County of Alameda establishes such thresholds. For the purpose of this analysis, a significant impact would occur if:

- Implementation of the Project would exceed PPV 0.1 inches/second, the criteria for being distinctly perceptible by humans as presented in Table 4.10-3, at off-site sensitive receptors.
- Implementation of the Project would result in vibration exceeding the criteria presented in Table 4.10-4 that could cause buildings architectural damage. For instance, for non-engineered timber and masonry buildings the criteria is 0.2 in/sec and for engineered concrete and masonry buildings the criteria is 0.3 in/sec.

There are no major sources of vibration in the vicinity of the project, nor would the project have equipment that could generate substantial levels of long-term groundborne vibration levels. The following discusses short-term construction vibration impacts from implementation of the Project.

Short-Term Construction Vibration Impacts

The anticipated construction phasing would depend on market conditions. At this time it is anticipated that the Project would be constructed in three phases as summarized in Section 3.4.2, Construction Phasing, of the Project Description. Construction vibration would vary temporally and geographically depending on the specific location and type of construction activity within the Project site. Construction activities will include demolition of existing structures and parking lots, site preparation work, foundation work, and building construction. Site preparation, excavation, and foundation work for individual sites within the Project site may last several weeks to months and, at times, may produce substantial vibration. The Project would require the removal of the several structures and features within the Project site such as the existing El Torito Restaurant building, the existing Mulford Branch Library, restrooms, and the San Leandro Yacht Club, among others. Pile driving could be required during construction to support building foundations.

The effect on buildings in the vicinity of a construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches levels that can damage structures, but groundborne vibration and groundborne noise can reach perceptible and audible levels in buildings that are very close to the construction site (such as for already-completed structures from previous phases in the project's development). This is especially true for grading activities, including bulldozers, that could cause a potential impact depending on their proximity to existing buildings.

NOISE

As shown in Table 4.10-9, which lists vibration levels for construction equipment, pile driving has the potential to generate the highest ground vibration levels and is of primary concern in regard to structural damage, particularly when it occurs within 100 feet of structures. Vibration levels generated by pile driving activities would vary depending on site-specific conditions, such as soil characteristics, construction methods, and equipment used. Other construction activities, such as caisson drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and the use of rolling stock equipment (tracked vehicles, compactors, etc.) may also potentially generate substantial vibration in the immediate vicinity.

TABLE 4.10-9 GROUNDBORNE VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate PPV 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
Vibratory Rollers	94	0.210
Large Bulldozer	87	0.089
Caisson Drilling	87	0.089
Jackhammer	79	0.035
Small Bulldozer	58	0.003
Loaded Trucks	86	0.076

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

Based on available information, vibration impacts would be as follows: Grading and demolition activities typically generate the highest vibration levels during construction activities. Except for pile driving, maximum vibration levels measured at a distance of 25 feet from an individual piece of typical construction equipment rarely exceed the levels where they become strongly perceptible (0.1 PPV in inches per second) or the thresholds for architectural damage at typical building structures (i.e., 0.2 to 0.5 PPV in inches per second) . Additionally, it is important to note that groundborne vibration is almost never annoying to people who are outdoors, so it is usually evaluated in terms of indoor receivers.

In general, construction would be localized, would occur intermittently and variably, and would only occur for relatively short periods of time. Vibration-intense activities such as pile driving, rock blasting, and the use of vibratory rollers occurring in proximity of existing sensitive receptors such as residences and hotels would have the potential to cause annoyance to persons in these buildings, or to cause architectural damage in nearby buildings. The Project will be constructed in three phases as described in Section 3.4.2 of the Draft EIR. As shown above in table 4.10-9, typical construction equipment such as bulldozers, jackhammers, loaded trucks do not generate vibration levels above the applicable thresholds for vibration

annoyance (0.1 in/sec) and damage (0.2 in/sec). However, pile driving, rock blasting, and vibratory rollers would have the potential to generate vibration levels above the thresholds of annoyance and damage to existing and future buildings.

The City of San Leandro's Municipal Code prohibits construction activities adjacent to or across a street or right of way from a residential use, except between the hours of 7:00 a.m. and 7:00 p.m. on weekdays, or between 8:00 a.m. and 7:00 p.m. on Sunday and Saturday. Nevertheless, this restriction alone would be insufficient to prevent potentially significant vibration impacts if pile driving, rock blasting, or the use of vibratory rollers occur. Therefore, the Project could result in a *significant* impact with respect to both annoyance and architectural damage.

IMPACT NOISE-2: Implementation of the Project could result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Mitigation Measure NOISE-2: For construction, grading, and demolition activities that would use vibration-intense equipment such as pile driving, rock blasting and vibratory rollers that would occur within 250 feet of existing residential, commercial, libraries, and hotel buildings, the following mitigation measures shall be implemented in close coordination with City of San Leandro staff so that alternative construction techniques or scheduling approaches are undertaken.

For projects where vibration-intense equipment would be utilized within 250 feet of existing residential, commercial, libraries, and hotel buildings the following controls to reduce potential vibration impacts shall be implemented during construction, as practical:

- Prior to the issuance of building permits, City staff shall coordinate with the applicant and/or construction contractor to discuss alternative methods of construction for vibration-intense activities in close proximity to sensitive uses or existing structures. As part of this coordination, the applicant and/or construction contractor shall identify construction methods not involving vibration-intensive equipment or activities. For example, drilled foundation caisson holes that would produce less vibration than pile driving methods, or the use of non-explosive rock breaking methods.
- The project applicant or constructor contractor shall implement reduced-vibration alternative methods identified during project review during subsequent excavation, grading, and construction for work conducted in close proximity to sensitive structures or uses.
- If possible, vibration-intense construction activities should take place during times when nearby sensitive receptors, such as libraries and hotel rooms are at their lowest utilization/occupancy.
- Prior to the issuance of building permits the applicant and/or construction contractor shall inspect and report on the current structural condition of the existing buildings within 200 feet from where pile driving, rock blasting, or within 30 feet from where vibratory rollers would be used.
- During construction, if any vibration levels cause cosmetic or structural damage to existing buildings in close proximity to a project site, the applicant shall immediately issue "stop-work" orders to the construction contractor to prevent further damage. Work shall not restart until the building is stabilized and/or preventive measures are implemented to relieve further damage to the building(s).

With implementation of the mitigation measures listed above, the project would reduce potential vibration impacts. It is not known at this point if implementation of these measures would be feasible and if they would provide enough reduction to mitigate levels below thresholds. Even with implementation of the mitigation measures above, the project could result in substantial vibration levels to uses in the vicinity of the project site. This impact would be *significant and unavoidable.*

Significance After Mitigation: Significant and unavoidable.

NOISE-3 Implementation of the Project would result in a substantial permanent increase in ambient noise levels in the vicinity of the project site above levels existing without the Project.

The San Leandro Environmental Hazards Element establishes thresholds for substantial noise increases in Policy 35.04, *Degradation of Ambient Noise Levels*. Specifically, the policy identifies 3 dB L_{dn} increase in ambient noise due to a project as a significant noise increase, and if the noise levels would degrade to the maximum tolerable levels shown in Table 6-1 (Table 4.10-7 of this Draft EIR).

Transportation-Related Noise

Development of land uses under implementation of the Project would result in increased levels of traffic in the project vicinity. The City's General Plan has the following policies that are related to noise increases from traffic along roadways:

- *Policy 35.04 Degradation of Ambient Noise Levels: If a neighborhood is well within acceptable noise standards, do not automatically allow noise levels to degrade to the maximum tolerable levels shown in Table 6-1 (Table 4.10-7 of this Draft EIR). A project's noise impacts should be evaluated based on the potential for adverse community response, as well as its conformance to the adopted standards. For CEQA purposes, an increase of 3 dB L_{dn} should generally be considered a significant adverse impact*
- *Policy 35.03 Residential Exterior Noise Standard: Strive to maintain an exterior noise level of no more than 60 dB Ldn in residential areas. Recognizing that some San Leandro neighborhoods already exceed this noise level, encourage a variety of noise abatement measures that benefit these areas.*

As discussed above, project-related increases greater than 3.0 dBA that would result in an exterior ambient noise level greater than 60 dBA L_{dn} at a residential use would constitute a significant adverse impact. To estimate traffic noise impacts, noise level contours were calculated using the FHWA Highway Traffic Noise Prediction Model (RD-77-108). The FHWA model determines a predicted noise level through a series of adjustments to a reference sound level. These adjustments account for traffic flows, speed, truck mix, varying distances from the roadway, length of exposed roadway, and noise shielding. Vehicle speeds on each roadway were assumed to be the posted speed limit, and no reduction in speed was assigned due to congested traffic flows. Current roadway characteristics, such as the number of lanes and posted speed limits, were determined from field observations and descriptions of roadways in the Project Transportation Impact Study, included as Appendix H of this Draft EIR. The distances to the 70, 65, and 60 CNEL contours for selected roadway segments with adjacent noise-sensitive uses in the vicinity of Project for Existing, Near Term and Long Term scenarios are included in Appendix G. The projected noise level increases for existing, near term, and long term scenarios at a distance of 50 feet from the roadway are presented in Tables 4.10-10 through 4.10-12.

TABLE 4.10-10 AMBIENT NOISE LEVELS ALONG MAJOR ROADWAYS – EXISTING CONDITIONS WITH AND WITHOUT PROJECT

		Noise Levels for Existing Conditions		
Roadway	Segment	Without Project (dBA CNEL)	With Project (dBA CNEL)	Project Contribution
Doolittle Dr	south of Marina Blvd	68.4	68.5	0.1
Doolittle Dr	north of Marina Blvd	68.6	69.7	1.1
Davis St	west of Warden Av/Timothy Dr	69.1	69.6	0.5
Marina Blvd	**west of Aurora Dr**	**60.4**	**64.7**	**4.3**
Marina Blvd	west of Merced St	68.6	69.8	1.2
Fairway Dr	west of Aurora Dr	61.6	64.3	2.7
Fairway Dr	west of Merced St	65.6	66.4	0.8

Note: **Bold** shows roadway segments where a potentially significant impact may occur. Traffic noise model outputs are included in Appendix H of this Draft EIR.

TABLE 4.10-11 AMBIENT NOISE LEVELS ALONG MAJOR ROADWAYS – NEAR TERM CONDITIONS WITH AND WITHOUT PROJECT

		Noise Levels for Existing Conditions		
Roadway	Segment	Without Project (dBA CNEL)	With Project (dBA CNEL)	Project Contribution
Doolittle Dr	south of Marina Blvd	68.7	68.8	0.1
Doolittle Dr	north of Marina Blvd	69.1	69.8	0.7
Davis St	west of Warden Av/Timothy Dr	70.2	70.3	0.1
Marina Blvd	**west of Aurora Dr**	**60.6**	**64.7**	**4.1**
Marina Blvd	west of Merced St	69.0	69.9	0.9
Fairway Dr	west of Aurora Dr	62.1	64.6	2.5
Fairway Dr	west of Merced St	67.3	67.7	0.4

Note: **Bold** shows roadway segments where a potentially significant impact may occur. Traffic noise model outputs are included in Appendix G.

The right-most column of this table shows the project's contribution to the future ambient conditions is calculated to be greater than 3 dBA at the segment of Marina Boulevard west of Aurora Drive, and less than 3 dBA at all other segments. The uses along Marina Boulevard west of Aurora Drive are single-family and multi-family residential. The existing and resulting noise level at uses along this segment would be greater than 60 dBA L_{dn}, which is the exterior noise level that the City strives to achieve for residential exterior uses. According to the City's General Plan Policies 35.03 and 35.04 listed above, the noise level increase exceeding 3 dBA at residential uses along this segment would be considered a significant impact. Therefore, on-road vehicle noise due to the project would result in substantial permanent increases in ambient noise levels along Marina Boulevard west of Aurora Drive under all three scenarios, this impact would be *significant*.

TABLE 4.10-12 AMBIENT NOISE LEVELS ALONG MAJOR ROADWAYS – LONG TERM CONDITIONS WITH AND WITHOUT PROJECT

		Noise Levels for Existing Conditions		
Roadway	Segment	Without Project (dBA CNEL)	With Project (dBA CNEL)	Project Contribution
Doolittle Dr	south of Marina Blvd	69.4	69.4	0.0
Doolittle Dr	north of Marina Blvd	69.8	70.2	0.4
Davis St	west of Warden Av/Timothy Dr	70.8	70.9	0.1
Marina Blvd	**west of Aurora Dr**	**60.6**	**64.7**	**4.1**
Marina Blvd	west of Merced St	69.2	70.2	1.0
Fairway Dr	west of Aurora Dr	62.0	64.6	2.6
Fairway Dr	west of Merced St	68.2	68.6	0.4

Note: **Bold** shows roadway segments where a potentially significant impact may occur. Traffic noise model outputs are included in Appendix G.

IMPACT NOISE-3: Implementation of the Project would result in a substantial permanent increase in ambient noise levels in the vicinity of the project site above levels existing without the Project.

Mitigation Measure NOISE-3: The existing single-family and multi-family residential uses along Marina Boulevard west of Aurora Drive would experience a noise increase of 4.1 dBA for all three scenarios due to project-related traffic. The resulting noise level at uses along this segment would be greater than 60 dBA L_{dn}, which is the exterior noise level that the City strives to achieve for residential exterior uses. According to the City's General Plan Policies 35.03 and 35.04 listed above, the noise level increase greater than 3 dBA and resulting in an ambient noise level greater than 60 dBA L_{dn} at noise-sensitive residential uses along this segment would be considered a significant impact. Potential mitigation measures to be considered would be the construction of noise barriers along this road, or resurfacing this segment with rubberized asphalt. However, the construction of noise barriers are not feasible as the residential areas front and access Marina Boulevard; in addition, rubberized asphalt is only effective at roads in which cars travel at high speeds, as it only reduces tire-asphalt noise, but the speed limit in that segment is low, making this solution not effective. Therefore, no feasible mitigation measures are available to reduce these impacts. Therefore, on-road vehicle noise due to the project would result in substantial permanent increases in ambient noise levels along Marina Boulevard west of Aurora Drive, and this impact would be *significant and unavoidable.*

Significance After Mitigation: Significant and unavoidable.

NOISE-4 Construction activities associated with buildout of the Project would result in substantial temporary or periodic increases in ambient noise levels in the vicinity of the Project site above existing levels.

Implementation of the Project would have a significant impact if it would result in a substantial temporary or periodic increase in ambient noise levels in the Project site or vicinity above levels existing without implementation of the Project. Such temporary or periodic increases are typically associated with

construction activity, and construction activity could occur at various times throughout implementation of the Project.

Temporary or periodic increases in ambient noise levels under implementation of the Project would chiefly result from construction activities associated with demolition, excavation, and construction associated with buildout of the Project. Table 4.10-13 below shows typical noise levels generated by commonly used pieces of construction equipment. Typical equipment used for demolition and site preparation of individual projects could include excavators, skid steer loaders, graders, dozers, scrapers, and trucks.

TABLE 4.10-13 CONSTRUCTION EQUIPMENT NOISE EMISSION LEVELS

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

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

Typical equipment to be used for construction phases of projects includes backhoes, cranes, aerial lifts, generators, pumps, dumpers, rollers, and pavers. In some limited instances, individual projects may use rock blasters or pile drivers. As shown, construction equipment generates high levels of noise with maximums ranging from 71 dBA to 101 dBA. Noise from sources such as construction equipment

dissipates rapidly with distance at a rate of 6 dBA per doubling distance. The loudest activities generally occur at demolition and site preparation where heavy earthmoving equipment is employed. Demolition and site preparation occurring in proximity of existing sensitive receptors such as residential and hotels would have the potential to cause high levels of noise at nearby uses. The only portions of the site located immediately adjacent to existing residential areas are on the northern portion of the site where two to three-story townhomes are planned, and at the southeast corner of the site where the public library would be constructed. Both of these elements of the Project are approximately 140 feet away from their respective nearest residences.

Construction of individual developments associated with buildout of the Project would temporarily increase the ambient noise environment and would have the potential to affect noise-sensitive land uses in the vicinity of a construction site. Significant noise impacts may occur from operation of heavy earthmoving equipment and truck haul that would occur with buildout of the Project. Construction noise levels are dependent upon the specific locations, site plans, and construction details of individual construction activities, which have not yet been developed, as construction of the Project would be implemented depending on market demands. It is anticipated that construction would occur in 3 phases as described in Section 3.4.2 of the Draft EIR.In general, construction would be localized, would occur intermittently and variably, and would only occur for relatively short periods of time.

Construction noise impacts typically occur when construction activities take place during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), when construction activities occur immediately adjacent to noise sensitive land uses, or when construction durations last over extended periods of time. Although construction activities may briefly or occasionally serve to elevate ambient noise levels at adjoining sensitive receptors, these impacts would generally be limited to the temporary demolition and site preparation and grading periods. Construction at each project feature at each site would be localized and would occur intermittently for varying periods of time.

The Municipal Code contains provisions which would serve to reduce the impact from construction noise. As discussed previously, the City of San Leandro's Municipal Code prohibits construction activities adjacent to or across a street or right of way from a residential use, except between the hours of 7:00 a.m. and 7:00 p.m. on weekdays, or between 8:00 a.m. and 7:00 p.m. on Sunday and Saturday.

Limiting construction activities to daytime hours is often a simple method to reduce the potential for construction noise impacts. Construction of individual developments associated with implementation of the Project would temporarily increase the ambient noise environment in the vicinity of each individual site. Because construction activities associated with any individual development may occur near noise-sensitive receptors and depending on the project type noise disturbances may occur for prolonged periods of time, construction noise impacts associated with implementation of the Project would result in a *significant* impact.

Impact NOISE-4: Construction activities associated with buildout of the Project would result in substantial temporary or periodic increases in ambient noise levels in the vicinity of the Project site above existing levels.

Mitigation Measure NOISE-4: The Project shall implement the following measures.

- Construction equipment shall be well maintained and used judiciously to be as quiet as practical. Equipment and trucks used for project construction 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), wherever feasible;
- Utilize "quiet" models of air compressors and other stationary noise sources where such technology exists. Select hydraulically- or electrically-powered equipment and avoid pneumatically powered equipment where feasible. Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project demolition or 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. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures;
- Locate stationary noise-generating equipment as far as possible from sensitive receptors that adjoin construction sites. Construct temporary noise barriers or partial enclosures to acoustically shield such equipment where feasible;
- Prohibit unnecessary idling of internal combustion engines;
- Prior to initiation of on-site construction-related demolition or earthwork activities, a minimum 6-foot-high temporary sound barrier shall be erected along the project property line abutting adjacent operational businesses, residences or other noise-sensitive land uses. These temporary sound barriers shall be constructed with a minimum surface weight of four pounds per square foot and shall be constructed so that vertical or horizontal gaps are eliminated. These temporary barriers shall remain in place through the construction phase in which heavy construction equipment, such as excavators, dozers, scrapers, loaders, rollers, pavers, and dump trucks, are operating within 150 feet of the edge of the construction site by adjacent sensitive land uses. This measure could lower construction noise levels at adjacent ground floor residential units by up to 8 dBA, depending on topography and site conditions;
- Erect temporary noise control blanket barriers, if necessary, along building façades facing construction sites to prevent sleep disturbance. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling;
- To the maximum extent feasible, route construction-related traffic along major roadways and away from sensitive receptors;
- Notify all businesses, residences or other noise-sensitive land uses within 500 feet of the perimeter of the construction site of the construction schedule in writing prior to the beginning of construction and prior to each construction phase change that could potentially result in a temporary increase in ambient noise levels in the project vicinity;
- 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 a day and evening contact number for the on-site complaint and enforcement manager, and the City's Chief Building Official, in the event of problems;

- An on-site complaint and enforcement manager shall be available to respond to and track complaints. The manager will be responsible for responding to any complaints regarding construction noise and for coordinating with the adjacent land uses. The manager will determine the cause of any complaints (e.g., starting too early, bad muffler, etc.) and coordinate with the construction team to implement effective measures (considered technically and economically feasible) warranted to correct the problem. The telephone number of the coordinator shall be posted at the construction site and provided to neighbors in a notification letter. The manager shall notify the City's Chief Building Official of all complaints within 24 hours. The manager will be trained to use a sound level meter and should be available during all construction hours to respond to complaints; and
- A preconstruction meeting shall be held with the Chief Building Official and the general contractor/on-site project manager to confirm that noise measures and practices (including construction hours, neighborhood notification, posted signs, etc.) are fully operational.

The above mitigation measures shall be identified in construction contracts and acknowledged by the contractor.

Significance After Mitigation: Less than significant.

NOISE-5 The Project would not result in 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.

The Airport Land Use Plan (ALUC) for the Oakland International Airport includes policies to evaluate proposed land uses within the airport's influence area. The airport's land use compatibility plan establishes criteria to indicate maximum acceptable noise levels based on a long-range timeframe for a range of land uses. The airport's noise compatibility criteria establishes three levels of compatibility (Compatible, Conditional, and Incompatible) for various land use types. Land uses that are classified as "compatible" could be developed with standard construction methods to sufficiently attenuate exterior noise to an acceptable indoor community noise level, and outdoor activities would be carried out with essentially no interference from aircraft noise. Land uses classified as "conditional" would need to be designed so the 45 dBA CNEL indoor noise level can be achieved. Standard construction methods normally suffice. The noise levels may be acceptable for outdoor areas, although interference may occur. Land uses classified as "incompatible" may require extensive mitigation techniques to make the indoor environment acceptable and severe noise levels may cause outdoor activities to be unacceptable.

Although the project site is within Oakland International Airport's influence area and is exposed to noise from aircraft using this facility, no portions of the project site are located within the airport's 65 dBA CNEL noise contours. According to the conceptual master plan for the Project shown in Figure 3-3, the only area within the 60 dBA CNEL noise contour is a proposed restaurant and parking lot areas. These uses are not noise sensitive uses and would be "normally compatible" (see Table 4.10-7) with noise levels from transportation noise per Policy 35.01 of the General Plan. In addition, these uses would be compatible under the ALUC for the Oakland Airport, which means the land uses could be developed with standard

construction methods to provide an acceptable exterior and interior noise levels due to aircraft noise at the affected land uses. Therefore, implementation of the Project would not result in exposure to excessive aircraft noise levels and the impact would be *less than significant*.

Applicable Regulations:

- None

Significance Before Mitigation: Less than significant.

NOISE-6	**The Project would not result in 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 in proximity of the Project site. Therefore, there would be *no impact* from excessive noise levels related to private airstrips.

Applicable Regulations:

- None

Significance Before Mitigation: No Impact.

4.10.4 CUMULATIVE IMPACT DISCUSSION

NOISE-7	**This Project, in combination with past, present, and reasonably foreseeable projects, would result in less than significant impacts with respect to noise.**

Most of the potential for noise impacts is site and area specific, not cumulative, except for traffic noise. As such, because there are no vacant, developable lots in the immediate vicinity of the Project site nor are there any reasonably foreseeable projects proposed, overall cumulative impacts regarding noise would be considered *less than significant*.

As discussed above, traffic related noise is the only potential source of cumulative noise impacts. The analysis to evaluate potential traffic noise impacts in NOISE-3 above addresses both project-level and cumulative impacts because it is based on traffic modeling that accounts for traffic related to the Project and cumulative projects. Construction and vibration impacts are localized and would result if construction would occur simultaneously at two nearby sites. There are no nearby off-site construction projects planned that would occur concurrent with the project in close proximity that, combined with project construction, would result in substantial impacts greater than discussed in Section 4.10.3. The Project would therefore not contribute to cumulatively considerable noise and vibration, and the impact would be *less than significant*.

NOISE

Applicable Regulations:

- None

Significance Without Mitigation: Less than significant.