3H. Noise

3H.1 Introduction

This section provides an overview of the existing noise environment at the proposed project site and surrounding area, the regulatory framework, an analysis of potential noise impacts that would result from implementation of the proposed project, and mitigation measures where appropriate. Analysis is based upon baseline noise measurements taken at the site by ESA.

3H.2 Environmental Setting

Noise Principles and Descriptors

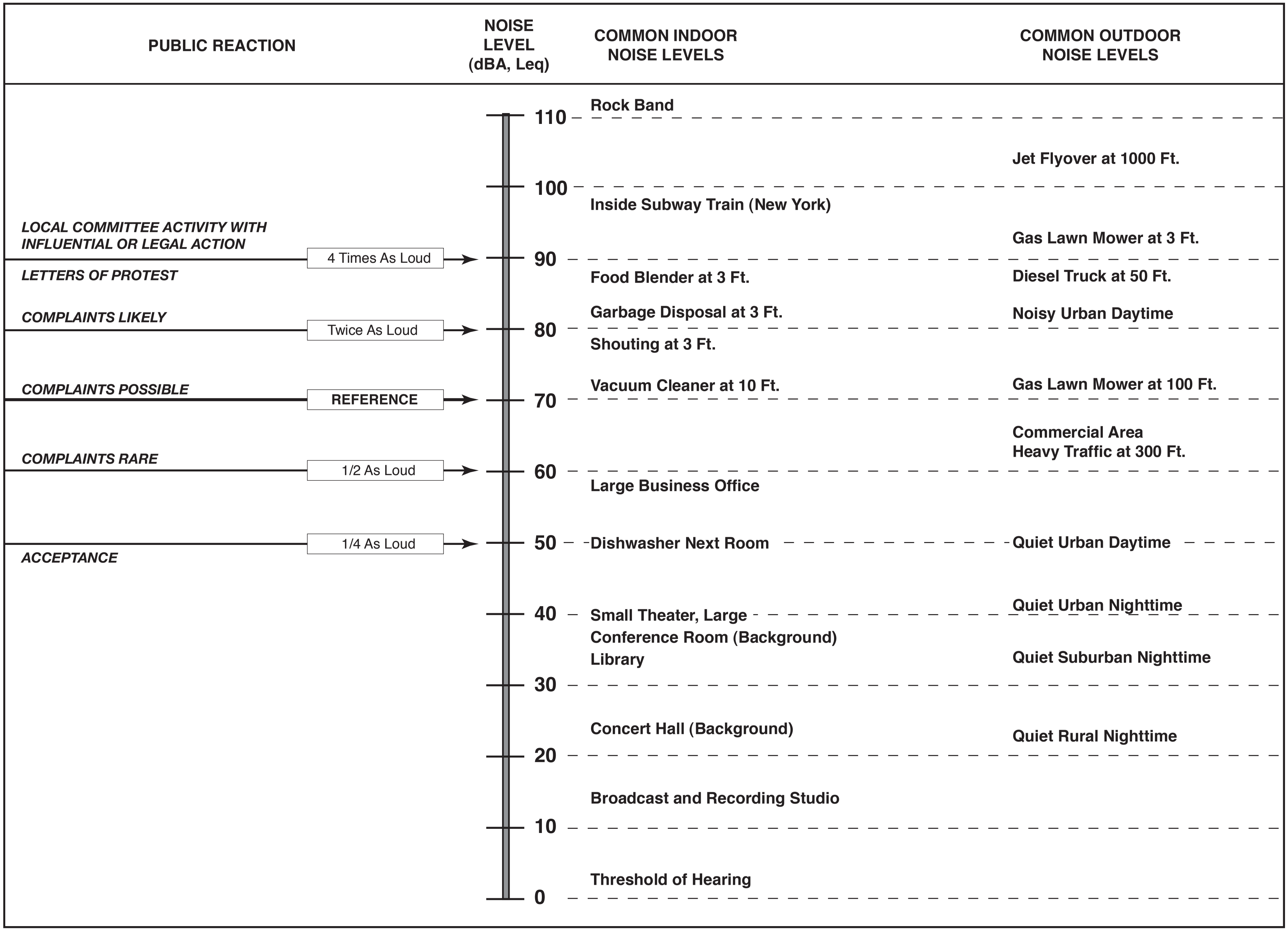
Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

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 ears 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). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 3H-1**.

Noise Exposure and Community Noise

An individual’s noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Figure 3H-1 are representative of measured noise at a given instant in time, however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of 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



SOURCE: Caltrans Transportation Laboratory Noise Manual, 1982; and modification by ESA

Pasadena Art Center . 207278

Figure 3.H-1
Effects of Noise on People

background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

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

L_{eq}: the equivalent sound level is used to describe noise over a specified period of time, typically one hour, 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 for a specified period of time.

L50: the noise level that is equaled or exceeded 50 percent of the specified time period. The L50 represents the median sound level.

L90: the noise level that is equaled or exceeded 90 percent of the specified time period. The L90 is sometimes used to represent the background sound level.

DNL: Also referred to as Ldn, a 24-hour day and night A-weighted noise exposure level 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 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

CNEL: similar to the DNL the Community Noise Equivalent Level (CNEL) adds a 5-dBA “penalty” for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

As a general rule, under normal traffic conditions, the L_{eq} during the peak-hour is generally equivalent (+/-1-2 decibels) to the DNL or CNEL at that location (Caltrans, 1998).

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 in industrial plants can experience noise in the last category. There is no complete satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, 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 it compares to the existing environment to which one has adapted: the so called "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 1 dBA cannot be perceived;
- outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- a change in level of at least 5 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 adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. 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 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

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver such as parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such at traffic noise from vehicles along a roadway) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans, 1998).

Fundamentals of Vibration

As described in the Federal Transit Administration's Transit Noise and Vibration Impact Assessment (FTA, 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is less common as an environmental problem. Some common sources of ground-borne vibration are trains, buses, heavy trucks on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment.

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 in inches per second (in/sec). 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. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly and sick), and vibration sensitive equipment.

The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. Examples of vibration inducing elements are jackhammers, pile drivers, and blasting. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 in/sec PPV and the FTA threshold of human annoyance to ground-borne vibration is 80 RMS (FTA, 2006).

Existing Noise Environment

The noise environment surrounding the proposed project site is influenced primarily by traffic on local roadways. Noise levels away from these noise sources can be quite low depending on the amount of nearby human activity.

Metrosonics Model db3080 sound level meters were used to measure the ambient noise level measurements. The meters were calibrated to ensure the accuracy of the measurements. Seven short-term noise level measurements were taken around the Pasadena Art Center. The noise measurement results are presented below in **Table 3H-1**.

TABLE 3H-1
EXISTING NOISE ENVIRONMENTS AT PROJECT LOCATION

Location of short-term noise measurements	Time Period	Leq (dB)	Noise Sources
Location 1: North side of Guest Parking lot approximately 50 ft from building, and about 100 ft from drive.	5 Minutes 8/01/07 9:06 – 9:11 a.m.	52	Air Conditioning System Traffic: 56 – 60 dB Lowest noise level in 5 minutes: 51
Location 2: Between buildings approximately 80 ft from drive, and about 80 ft from parking lot.	5 Minutes 8/01/07 9:18 – 9:23 a.m.	48	People talking: 52 dB Car: 52 dB Rake: 48 – 56 dB Lowest noise level in 5 minutes: 44 dB
Location 3: End of South Parking Lot in the center, approximately 520 ft from nearest sensitive receptor.	5 Minutes 8/01/07 9:31 – 9:36 a.m.	48	2 cars in parking lot: 59 dB Hum of city traffic Helicopter: 59 dB Lowest noise level in 5 minutes: 43 dB
Location 4: Dirt path southeast project site, approximately 130 ft from parking lot, and about 300 ft from nearest sensitive receptor.	5 Minutes 8/01/07 9:40 – 9:45 a.m.	46	Distant Lawn mowing Hum of city traffic Lowest noise level in 5 minutes: 44 dB
Location 5: Dirt path east of project site, approximately 530 ft from existing building, and about 560 ft from nearest sensitive receptor.	5 Minutes 8/01/07 9:58 – 10:03 a.m.	47	Distant Lawn mowing Distant construction Lowest noise level in 5 minutes: 46 dB
Location 6: Center of the east side of school, 20 ft from building.	5 Minutes 8/01/07 10:09 – 10:14 a.m.	52	Air Conditioning System People Talking Airplane: 54 dB Lowest noise level in 5 minutes: 51 dB
Location 7: On the entrance Drive approximately 205 ft behind a sensitive receptor	5 Minutes 8/01/07 10:33 – 10:38 a.m.	59	Traffic: 60 – 77 dB Distant Construction Distant Car alarm Hum of city Lowest noise level in 5 minutes: 47 dB

SOURCE: ESA, 2007

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, hotels, schools, rest homes, and hospitals are generally more sensitive to noise than commercial and industrial land uses. The closest sensitive receptor to construction is a residence approximately 500 feet away to the southeast. Seven houses are located to the southeast within 800 feet of the construction area.

3H.3 Regulatory Framework

Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

State

California Code of Regulations has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials.

The State has also established noise insulation standards for new multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of DNL 45 dBA in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

Local

City of Pasadena General Plan

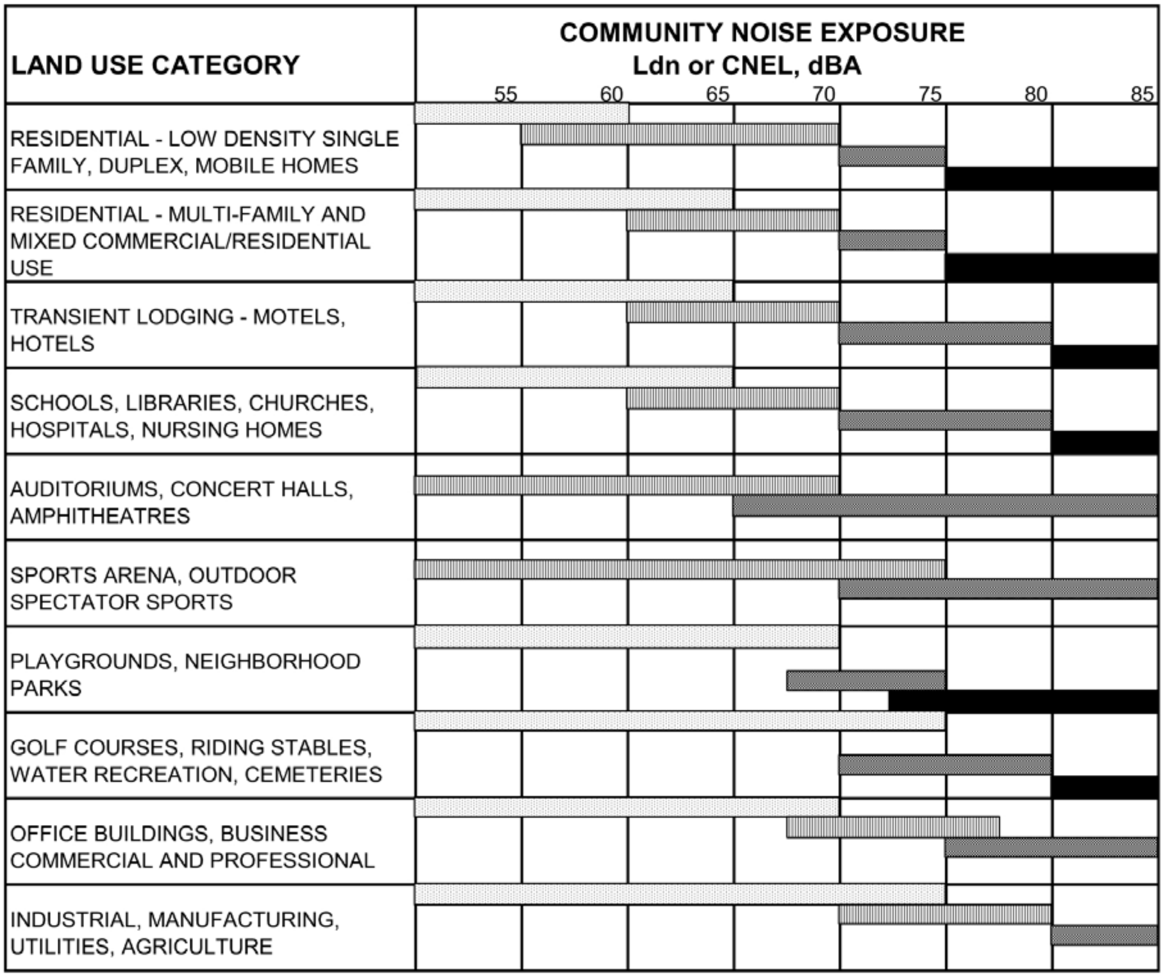
The relevant objective and policies from the Pasadena General Plan Noise Element are shown below.

Objective 7: The City will minimize the effects of nuisance noise on sensitive land uses (see **Figure 3H-2**) to the degree feasible.

Policy 7b: The City will encourage limitations on construction activities adjacent to sensitive noise receptors (see Figure 3H-2**)**.

Policy 7c: The City will encourage construction and landscaping activities that employ techniques to minimize noise.

Policy 7d: The City will enforce noise level restrictions contained in the City of Pasadena Noise Regulations (Chapter 9.36 of the Municipal Code), except during federal, State, or local emergencies (such as power generators required for energy emergencies).



CLEARLY 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
If new construction or development proceeds, an analysis of the noise reduction requirements should be made and needed noise insulation features included in the design.

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

NORMALLY UNACCEPTABLE
New construction or development should generally not be undertaken, unless it can be demonstrated that an interior level of 45 dBA can be achieved.

** Please note that these guidelines are general and may not apply to specific sites.*

SOURCE: California General Plan Guidelines, 1998, as modified by the City of Pasadena, 2002.

Figure 3H-2
Pasadena Guidelines for Noise Compatible Land Use

City of Pasadena Municipal Code

The relevant portions of the Pasadena Municipal Code that are related to noise control are shown below.

§9.36.110 Construction projects.

A. No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment within a residential district or within a radius of 500 feet there from at any time other than as listed below:

- From 7:00 a.m. to 7:00 p.m. Monday through Friday;
- From 8:00 a.m. 5:00 p.m. on Saturday;
- Operation of any of the listed construction equipment is prohibited on Sundays and Holidays.

B. No person shall perform any construction or repair work on buildings, structures or projects within a residential district or within a radius of 500 feet there from in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below:

- From 7:00 a.m. to 7:00 p.m. Monday through Friday;
- From 8:00 a.m. to 5:00 p.m. on Saturday;
- Performance of construction or repair work is prohibited on Sundays and Holidays.

C. The prohibition against construction on Sundays and Holidays as set forth in subsection B of this section shall not apply under either of the following conditions:

- The construction is actually performed by an individual who is the owner or lessor of the premises and who is assisted by not more than two individuals.
- The person performing the construction shall have provided the building official with a petition which indicates the consent of 65% of the households residing within 500 feet of the construction site and the unanimous consent of the households adjacent to the construction site. Said petition shall be on a form promulgated by said building official and shall be accompanied by a fee, the amount of which shall be established by resolution by the city council.

D. The prohibitions of this section shall not apply to the performance of emergency work as defined in Section 9.36.020.

E. For purposes of this section, holidays are New Year’s Day, Martin Luther King Jr. Day, Lincoln’s Birthday, Washington’s Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Day after Thanksgiving, and Christmas. (Ord. 6993 §§ 1--4, 2004; Ord. 6132 § 12, 1986: Ord. 5118 § 3.00, 1973)

§9.36.120 Construction equipment.

It is unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level in excess of 85 dBA when measured within a radius of 100 feet from such equipment. (Ord. 5118 § 3.10, 1973)

§9.36.050 Radios, television sets and similar devices.

B. Prima Facie Violation. Any noise level exceeding the ambient base level at the property line of any property (or, if a condominium or apartment house, within any adjoining apartment) by more than 5 decibels is deemed to be prima facie evidence of a violation of the provisions of this section. (Ord. 5118 § 2.00, 1973)

§9.36.100 Machinery, equipment, fans and air conditioning.

Except for emergency work, as defined in this chapter it is unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient noise level by more than 5 decibels. (Ord. 5118 § 2.50, 1973)

3H.4 Impacts and Mitigation

3H.4.1 Methodology

Noise impacts are assessed based on a comparative analysis of the noise levels resulting from the alternative and the noise levels under existing conditions. Analysis of temporary construction noise effects is based on typical construction phases and equipment noise levels and attenuation of those noise levels due to distances between the construction activity and the sensitive receptors near the sources of construction noise.

Vibration from construction can be evaluated for potential impacts at sensitive receptors. Typical activities evaluated for potential building damage due to construction vibration include demolition, pile driving, and drilling or excavation in close proximity to structures (i.e., within 25 feet of normal building or within 50 – 100 feet of historic buildings, buildings in poor condition or buildings damaged by previous earthquakes). The ground-borne vibration can also be evaluated for perception to eliminate annoyance.

3H.4.2 Significance Criteria

Based on the *CEQA Guidelines*, a project may be deemed to have a significant effect on the environment with respect to noise and/or ground-borne vibration if it would result in:

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

- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels in the proposed project vicinity above levels existing without the proposed project;
- A substantial temporary or periodic increase in ambient noise levels in the proposed project vicinity above levels existing without the proposed project;
- Exposure of people residing or working in the proposed project area to excessive noise levels (for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport); or
- Exposure of people residing or working in the proposed project area to excessive noise levels (for a project within the vicinity of a private airstrip).

The following analysis does not discuss the last two significance criteria because they were found to have no impact in the Initial Study (see Appendix A). Both criteria relate to airports and airstrips, and the project site is not located within an airport land use plan, is not within two miles of a public airport or public use airport, and is not within the vicinity of a private airstrip.

Some guidance as to the significance of changes in ambient noise levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been asserted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the Ldn, as shown in **Table 3H-2**.

TABLE 3H-2
MEASURES OF SUBSTANTIAL INCREASE FOR NOISE EXPOSURE

Ambient Noise Level Without Project (Ldn)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels Permanently By:
<60 dB	+ 5.0 dB or more
60-65 dB	+ 3.0 dB or more
>65 dB	+ 1.5 dB or more

SOURCE: Federal Interagency Committee on Noise (FICON), 1992.

The rationale for the Table 3H-2 criteria is that, as ambient noise levels increases, a smaller increase in decibels can cause significant annoyance.

The proposed project would result in significant noise impacts if it would generate noise or vibration levels in excess of the following thresholds.

Construction Noise. The project would result in a significant construction impact if construction activity would result in a substantial increase in noise .

Vibration. The project would result in a significant vibration impact if buildings would be exposed to the FTA building damage ground-borne vibration threshold level of 0.2 (in./sec.) PPV or if sensitive individuals would be exposed to the FTA human annoyance response ground-borne vibration threshold level of 80 RMS.

Stationary Noise. The project would result in a significant operational noise impact if the ambient noise level at the property line of a sensitive receptor is increased by 5 dBA or more.

Traffic Noise. As described in Table 3.9-2 above, the project would result in a significant traffic noise impact if mobile noise would result in increased noise levels of 1.5 dBA Ldn or more in an ambient noise environment greater than 65 dBA Ldn; or increased noise of 3 dBA Ldn or more in an ambient noise environment between 60 and 65 dBA Ldn; or increased noise of 5 dBA Ldn or more in an ambient environment of less than 60 dBA Ldn.

Impact 3H.1: Project construction could generate short-term noise increases (less than significant with mitigation).

Construction activity noise levels at and near the construction areas would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises (such as pile driving), which can be particularly annoying. Pile driving, however, is not proposed for the proposed project development. **Table 3H-3** shows typical noise levels during different construction stages. **Table 3H-4** shows typical noise levels produced by various types of construction equipment.

TABLE 3H-3
TYPICAL CONSTRUCTION NOISE LEVELS

Construction Phase	Noise Level (dBA, Leq) [a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

NOTE: a. Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

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

Construction of the proposed project would generate a significant amount of noise corresponding to the applicable phase of construction and the noise generating equipment used during those phases. Construction is proposed to be completed in 2011, and have approximately 14 truck trips per day during excavation. The closest sensitive receptor is described in the setting section and the other sensitive receptors in the study area vicinity would be exposed to construction noise at incrementally lower levels. Noise from construction activities generally attenuates at a rate of 4.5 to 7.5 dBA per doubling of distance. For purposes of this analysis construction noise is assumed to attenuate at a rate of 6 dBA, because most of the loudest construction activities will attenuate at a rate similar to a point source. Construction noise at the nearest sensitive receptor (a residence located approximately 500 feet from construction site) would reach a maximum short-term noise level of approximately 67 dBA. Although short-term increases in noise would occur during construction, they would not occur at night and the effect on the 24-hour Ldn would be minimal at this distance and should not change the level of compatibility of nearby receptors with regard to the Guidelines for Noise Compatible Land Uses (Figure 3.I-2). The other residences located in the area are further away and thus would have lower levels of noise. At times, some construction noise could be louder because of the relationship between the active construction areas, terrain, and off-site receptors or because of daily wind directions. However, these temporal factors would change from day to day and can't be more precisely estimated by the noise modeling than the estimated maximum decibel level identified above. Construction noise levels would be less than significant with mitigation.

TABLE 3H-4
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, Leq at 50 feet)
Dump Truck	88
Portable Air Compressor	81
Concrete Mixer (Truck)	85
Scraper	88
Jack Hammer	88
Dozer	87
Paver	89
Generator	76
Pile Driver	101
Backhoe	85

SOURCE: Cunniff, Environmental Noise Pollution, 1977.

Mitigation Measure

Mitigation Measure 3H.1: Avoid Noise Sensitive Hours. In order to avoid noise-sensitive hours of the day and night, construction contractors shall comply with the following: Construction activities shall be limited from 7:00 a.m. to 7:00 p.m. Monday through Friday, from 8:00 a.m. to 5:00 p.m. on Saturday, and is prohibited on Sundays and Holidays.

Significance After Mitigation: Less than significant.

Impact 3H.2: Project operation could generate increased noise levels (less than significant).

Heating, Ventilating, and Air Conditioning (HVAC) Equipment Noise

The HVAC system for maintaining comfortable temperatures within the proposed building would consist of packaged rooftop air conditioning systems. Such rooftop HVAC units typically generate noise levels of approximately 55 dB at a reference distance of 100 feet from the operating units during maximum heating or air conditioning operations. The noise level of the HVAC if on the edge of the building nearest the sensitive receptors (about 630 feet) would be about 40 dBA. This impact would be less-than-significant without mitigation.

Traffic Noise

Most of the noise generated by the on-going implementation of the project would be traffic generated noise. The project would contribute to an increase in local traffic volumes, resulting in slightly higher noise levels along local roadways. Using the traffic impact study for the project (URS, 2008) and the Federal Highway Administration's Highway Traffic Noise Prediction Model (FHWA-RD-77-108), traffic noise levels were analyzed for four roadway segments that would be affected by traffic-generated noise. The results of the modeling are shown in **Table 3H-5.**

TABLE 3H-5
PEAK-HOUR NOISE LEVELS ALONG SELECTED ROADWAYS

	Peak Hour Noise Levels (Leq)[a]				
Modeled Roadway Segment	**Existing Conditions**	**Future No-Project (2011)**	**Future + Project (2011)**	**Increase from Future No-Project to Future + Project**	**Significant (Yes/No)**
Linda Vista Ave North of Lida Street	61.1	61.7	61.7	0	No
Lida Vista Ave South of Lida Street	64.0	64.6	64.9	+0.3	No
Lida Street East of Linda Vista Avenue	53.8	54.5	55.1	+0.6	No
Lida Street West of Linda Vista Avenue	63.2	63.8	64.4	+0.6	No

[a] Noise levels are estimated at a distance of 50 feet from roadway centerline. Data based on Peak Hour.

As shown in Table 3.9-2 criteria for a significant increase is an increase from traffic noise of 3 to 5 dBA (depending on the existing noise level). As shown in Table 3.9-5, the highest dBA increase from the project is shown to be 1 dBA and therefore project traffic noise would be less than significant without mitigation.

Miscellaneous School Noise

As under existing conditions, noise would be generated on site by typical daily students and faculty activities at school, as well as occasional outdoor special events. The type and frequency of these activities would not increase, however, with the increase in enrollment of 400 students (from 1500 to 1900) and ten faculty (from 350 to 360), activity would slightly increase.

Nevertheless, due to the large amount of open space separating the campus activity areas from other uses, noise would dissipate over the long distances between noise generator and receptor. None of these activities (typical daily campus operations, or short term occasional special events) would be expected to g be as loud as the highest construction period noise, which is calculated to be less than significant. Therefore, such activities are not expected to result in noise complaints from off-site receptors or substantially affect 24-hour Ldn noise levels at off-site receptors."

Mitigation: None required.

Impact 3H.3: Project construction could expose persons to or generate excessive ground-borne vibration or ground-borne noise levels (less than significant).

As shown in **Table 3H-6**, use of heavy equipment for project construction generates vibration levels of up to 0.089 (in/sec) PPV or 87 RMS (large bulldozer) at a distance of 25 feet. The nearest sensitive receptor would receive levels of approximately 47 RMS and 0.004 (in/sec) PPV at a distance of 550 feet. Ground-borne vibration levels, at the nearest sensitive receptor would be below the threshold for structural damage of buildings (0.2 (in/sec) PPV) and below the significance threshold for the human annoyance response (80 RMS), and therefore less than significant without mitigation.

Mitigation: None required.

TABLE 3H-6
VIBRATION VELOCITIES FOR CONSTRUCTION EQUIPMENT

Equipment Activity	PPV at 25 Feet (inches/second)[a]	RMS at 25 Feet (VDB)[b]
Large Bulldozer	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79

NOTES:
a. Buildings can be exposed to ground-borne vibration levels of 0.2 PPV without experiencing structural damage.
b. The human annoyance response level is 80 RMS.

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

3H.4.3 Cumulative Impacts

Figure 3H-4: Increases in traffic from the project in combination with other development could result in cumulatively considerable noise increases (less than 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 probable future projects. Notably, any project that would individually have a significant noise impact would also be considered to have a significant cumulative noise impact.

When considered alone, the proposed project would generate noise mainly by adding more traffic to the area. Other anticipated projects would contribute to noise in the area due to increased traffic volumes. As depicted in Table 3H-5, traffic associated with development of the proposed project in the Future plus Project (year 2011) scenario would not result in a cumulatively significant impact along local roadways with nearby sensitive receptors.

Mitigation: None required.