3.9

NOISE

3.9.1 Introduction

This chapter describes the fundamentals of noise, the existing environmental setting for noise, the regulatory setting associated with noise, the potential increase of noise that would result from the proposed Project and cause significant impacts, and the mitigation measures that would reduce these impacts.

3.9.1.1 Noise Fundamentals

Noise may be defined as unwanted sound and is usually objectionable because it is disturbing or annoying. The objectionable nature of noise can be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the amplitude of sound waves combined with the reception characteristics of the ear. Amplitude may be compared with the height of an ocean wave. Technical acoustical terms commonly used in this section are defined in Table 3.9-1.

Table 3.9-1. Definitions of Acoustical Terms

Term	*Definition*
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals in air). Sound pressure level is the

Term	*Definition*
	quantity that is directly measured by a sound level meter.
Frequency (Hertz [Hz])	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level during the measurement period. The hourly L_{eq} used for this report is denoted as dBA $L_{eq[h]}$.
Community Noise Equivalent Level (CNEL)	The average A-weighted noise level during a 24-hour day, obtained after the addition of 5 dB to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level (L_{dn})	The average A-weighted noise level during a 24-hour day, obtained after the addition of 10 dB to levels measured in the night between 10:00 p.m. and 7:00 a.m.
L_1, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1, 10, 50, and 90% of the time during the measurement period.
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.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

3.9.1.1.1 Decibels and Frequency

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise. The *decibel* is a unit of measurement, which indicates the relative amplitude of a sound. Zero on the decibel scale is based on the lowest sound pressure that a healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its level. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness over a wide range of amplitudes. Since decibels are logarithmic units, sound pressure levels are not added arithmetically. When two sounds of equal sound pressure level are added, the result is a sound pressure level that is 3 dB higher. For example, if the sound level were 70 dB when 100 cars pass by, then it would be 73 dB when 200 cars pass the observer. Doubling the amount of energy would result in a 3 dB increase to the sound level. Noise levels will not change much when a quieter noise source is added to relatively louder ambient noise levels. For example, a 60 dB noise source is added to 70 dB ambient noise levels, resulting in noise level equal to 70.4 dB at the location of the new noise source.

Frequency relates to the number of pressure oscillations per second, or *Hertz*. The range of sound frequencies that can be heard by healthy human ears is from about 20 Hz at the low frequency end to 20,000 Hz (20 kilohertz [kHz]) at the high frequency end.

There are several methods for characterizing sound. The most common is the *A-weighted sound level* or *dBA*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Studies have shown that the A-weighted level is closely correlated with annoyance to traffic noise. Other frequency weighting networks, such as *C weighting* or *dBC*, have been devised to describe noise levels for specific types of noise (e.g., explosives). Table 3.9-2 shows typical A-weighted noise levels that occur in human environments.

3.9.1.2 Noise Descriptors

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 is 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. This energy-equivalent sound/noise descriptor is called L_{eq}. A common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration. The scientific instrument used to measure noise is the sound level meter, which can accurately measure environmental noise levels to within approximately plus or minus 1 dBA. Two metrics describe the 24-hour average, L_{dn} and CNEL. Both include penalties for noise during the nighttime, and CNEL also penalizes noise during the evening. CNEL and L_{dn} are normally within 1 dBA of each other and are used interchangeably in this section. L_{dn} and CNEL are approximately equal to the L_{eq} peak hour under normal traffic conditions (Caltrans 1998).

Table 3.9-2. Typical Noise Levels in the Environment

Noise Level dBA	*Extremes*	*Home Appliances*	*Speech at 3 Feet*	*Motor Vehicles at 50 Feet*	*General Type of Community Environment*
120	Jet aircraft at 500 feet				
110					
100		Chain saw			
90		Power lawnmower		Diesel truck (not muffled)	
80		Shop tools	Shout	Diesel truck (muffled)	
70		Blender	Loud voice	Automobile at 70 mph	Major metropolis
60		Dishwasher	Normal voice	Automobile at 40 mph	Urban (daytime)
50					
40		Air-conditioner	Normal voice (back to listener)	Automobile at 20 mph	Suburban (daytime)
30		Refrigerator			Rural (daytime)
20					
10					
0	Threshold of hearing				

Source: Harris Miller Miller & Hanson, Inc. (2003).

3.9.1.3 Human Response to Noise

Noise-sensitive receptors are generally defined as locations where people reside or where the presence of unwanted sound may adversely affect the use of the land. Noise-sensitive receptors typically include residences, hospitals, schools, guest lodging, libraries, and certain types of passive recreational uses. Sensitive land uses in the proposed project area include:

- existing residences;
- existing recreational land uses; and
- planned recreational land uses.

Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In the normal environment, changes in noise level of 3 dBA are considered just noticeable to most people. A change of 5 dBA is readily perceptible and a change of 10 dBA is perceived as being twice as loud.

Biological responses to noise are discussed in greater detail in Section 3.3, "Biological Resources."

3.9.1.3.1 Noise and Health

A number of studies have linked increases in noise with health effects, including hearing impairment, sleep disturbance, cardiovascular effects, psychophysiological effects, and potential impacts on fetal development (Babisch 2005). Potential health effects appear to be caused by both short- and long-term exposure to very loud noises and long-term exposure to lower levels of sound. Acute sounds of LAF[1] > 120 dB can cause mechanical damage to hair cells of the cochlea (the auditory portion of the inner ear) and hearing impairment (Babisch 2005). As discussed in Section 3.9.1.1.1, LAF > 120 dB is equivalent to a rock concert or a plane flying overhead at 984 feet.

The World Health Organization and the EPA consider L_{eq} = 70 dB(A) to be a safe daily average noise level for the ear. However, even this "ear-safe" level may cause disturbance to sleep and concentration and may be linked to chronic health impacts such as hypertension and heart disease (Babisch 2006).

A number of studies have looked at the potential health effects from the sound of chronic lower noise levels, such as traffic, especially as these noise levels affect children. In a study of school children in Germany, blood pressure was found to be 10 mmHg[2] higher in a group of students exposed to road traffic noise from high traffic transit routes (Babisch 2006). A study by Kwanda (2004) showed that in pregnant women, exposure to airplane noise was found to be associated with decreased fetal body weight.

3.9.1.4 Sound Propagation

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise is reduced with distance depends on the following important factors:

Geometric spreading. In the absence of obstructions, sound from a single source (i.e., a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single stationary point source of

[1] LAF = Sound level with 'A' Frequency weighting and Fast Time weighting
[2] mmHG = millimeter of mercury

sound. The movement of vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a "line" source) rather than from a point. This results in cylindrical spreading rather than the spherical spreading resulting from a point source. The change in sound level from a line source is 3 dBA per doubling of distance.

Ground absorption. Usually the noise path between the source and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation because of geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 200 feet, prediction results based on this scheme are sufficiently accurate. For acoustically "hard" sites (i.e., sites with a reflective surface, such as a parking area or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or "soft" sites (i.e., sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

Atmospheric effects. Research by Caltrans and others has shown that atmospheric conditions can have a major effect on noise levels. Wind has been shown to be the single most important meteorological factor within approximately 500 feet, whereas vertical air temperature gradients are more important over longer distances. Other factors, such as air temperature, humidity, and turbulence, also have major effects. Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur because of temperature inversion conditions (i.e., increasing temperature with elevation).

Shielding by natural or human-made features. A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object, proximity to the noise source and receiver, surface weight, solidity, and the frequency content of the noise source. Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

3.9.2 Existing Environment

3.9.2.1 Existing Noise Measurements

Noise measurement locations were initially determined based on aerial photographs of the area surrounding the proposed project site, which showed the location of residential uses, schools, and public facilities. Exact measurement locations were then chosen during site visits on January 31st and June 5th, 2008, based on the potential for noise-related impacts to occur. Short-term noise measurements were taken at measurement locations around the proposed project site and in the surrounding neighborhoods to establish the existing ambient noise profile in the and around the proposed project site. These noise levels from Table 3.9-3 are used for the project baseline unless otherwise stated. A Larson Davis 820 type 1 (Precision-grade) digital sound level meter was used to measure the existing ambient noise levels. The sound meter was mounted on a tripod, and a windscreen covered the sound meter's microphone to diminish the effect of unwanted wind-generated noise; 15-minute measurements were conducted recorded at the measurement locations. Both before and after each set of measurements were taken, a CA 250 calibrator was used to verify the calibration of the sound level meter. Noise metrics recorded consisted of the measured L_{eq}, L_{min}, L_{max}, L_{10}, L_{50}, and L_{90}. Prevailing weather conditions at each site were noted along with other factors that might adversely alter the quality of the noise measurements. The results of those measurements are displayed in Table 3.9-3, and the locations are displayed in Figure 3.9-1.

3.9.2.1.1 ST-1: Water Street and Avalon Boulevard, near the DWP oil tanks

Site ST-1 is located at the site of the proposed land bridge (proposed park site), on the north side of Water Street near an open lot. To the northwest there are several LADWP oils tanks, backup power generating stations, and the Harbor Generation Station, a gas fired power plant (Port of Los Angeles 2007). A rail line runs from the southwest of ST-1 to the northeast. The measured L_{eq} at ST-1 was 62.8 dBA; noise sources included the rail line and traffic.

3.9.2.1.2 ST-2: Corner of Harry Bridges and Avalon Boulevard

Site ST-2 is located at the intersection of Avalon Boulevard and Harry Bridges Boulevard. An open lot is to the east of the site, and commercial developments are to the north and west. ST-1 is south of the site. The measured L_{eq} at the site was 68.7 dBA with the main noise source being traffic along Harry Bridges Boulevard.

Table 3.9-3. Noise Measurement Results (dBA)

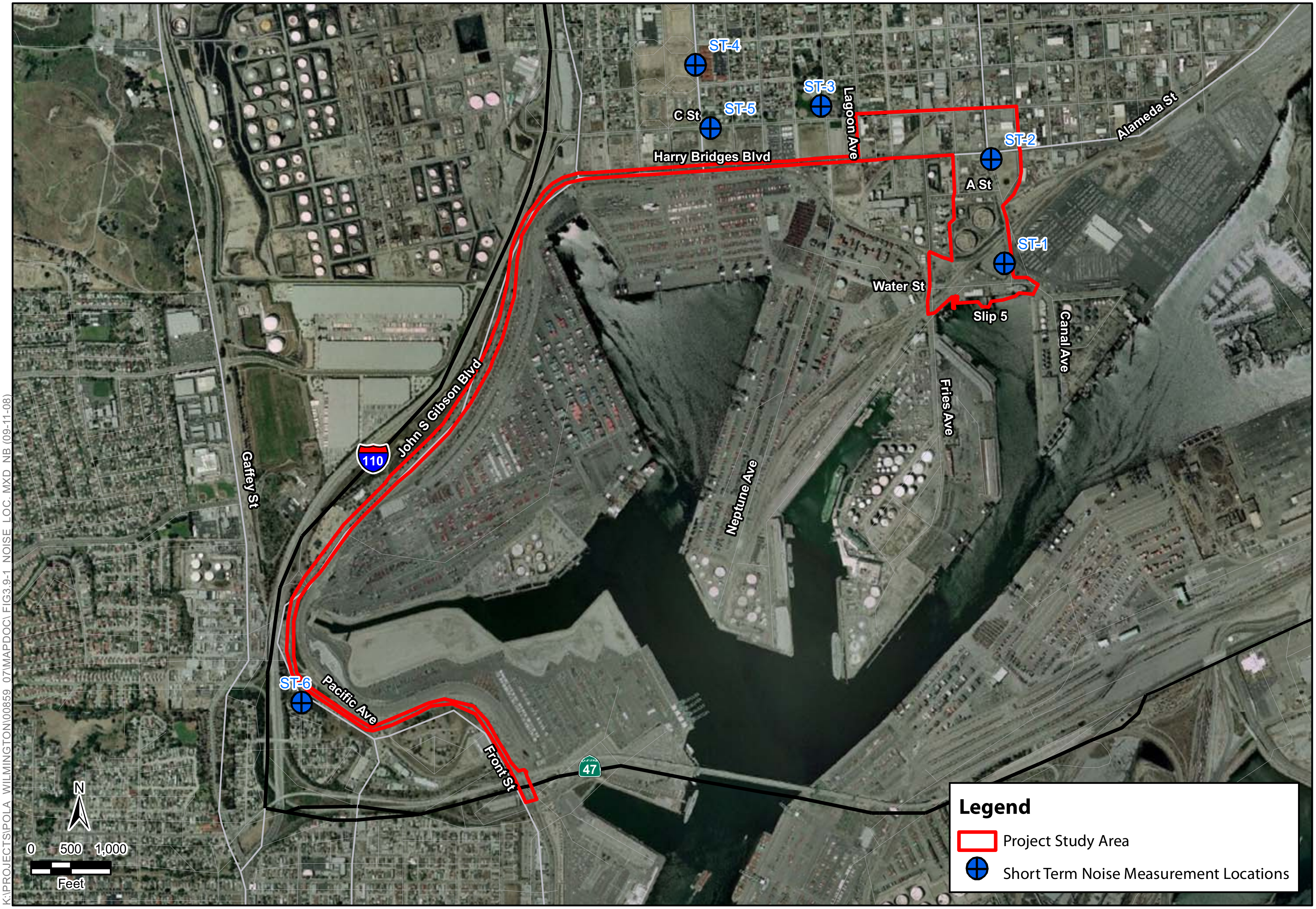
		Measurement Period				Measurement Results (dBA)					
Site ID	Measurement Location	Date	Start Time (a.m.)	Duration (mm:ss)	Noise Sources	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
ST-1	Water Street and Avalon Boulevard, near the DWP oil tanks (proposed Land Bridge)	1/31/2008	9:56	15:00	Traffic, Rail, Industrial, Aircraft	62.8	73.2	50.1	53.5	60.8	66.1
ST-2	Corner of Harry Bridges and Avalon Boulevard (Park)	1/31/2008	10:23	15:00	Traffic	68.7	81.3	53.9	59.0	66.0	72.3
ST-3	Wilmington Recreation Center near Neptune Avenue	1/31/2008	10:50	16:00	Traffic, Rail, Industrial, Distant Construction	54.3	63.9	46.3	49.2	53.1	57.1
ST-4	425 Wilmington Boulevard	1/31/2008	11:14	15:00	Traffic, Aircraft, Residents	62.3	80.0	46.3	50.1	55.3	65.8
ST-5	Corner of North Wilmington Boulevard and West C Street	1/31/2008	11:40	15:00	Traffic, Industrial, Distant Traffic (Trucks) Distant Industrial	59.0	70.4	52.0	53.6	57.1	61.8
ST-6	600 Shields Avenue	6/5/2008	10:12	15:00	Traffic (I-110), Truck Traffic from the Port, Birds	60.7	70.4	56.7	58.4	60.0	62.8

3.9.2.1.3 ST-3: Wilmington Recreation Center

Site ST-3 is located on the southern end of the Wilmington Recreation Center and would represent sensitive receptors using the recreation center. ST-3 would also represent commercial development found to the east and west, residential development to the northeast and northwest, and an open field to the south. The measured L_{eq} at the site was 54.3 dBA with the main noise source being traffic along West C Street.

3.9.2.1.4 ST-4: Adjacent to North Wilmington Boulevard

ST-4 is representative of the multi-family residential units located along Wilmington Boulevard, and residential developments found to the north, east, south, and west of the site. The measured L_{eq} was 62.3 dBA with the main noise source being traffic along North Wilmington Boulevard and workers performing construction-related activities nearby.



SOURCE: ESRI USA Imagery (2006)

ICF Jones & Stokes
an ICF International Company

Figure 3.9-1
Noise Measurement Locations
Wilmington Waterfront Development Project

3.9.2.1.5 ST-5: Corner of North Wilmington Boulevard and C Street

ST-5 is representative of the single-family homes along C Street and the surrounding land uses; including residential to the north and west, with commercial uses located to the east. An undeveloped lot lies to the south. The measured L_{eq} at ST-5 was 59 dBA with the main source of noise being traffic along C street.

3.9.2.1.6 ST-6: Residential location on Shields Avenue above Pacific Avenue

ST-6 is representative of the single-family homes along Shields Drive above Pacific Avenue. The surrounding land uses include residential to the south, with the Port to the north and east. I-110 is to the west and was clearly audible. The measured L_{eq} at ST-6 was 61 dBA with the main source of noise being traffic along on I-110.

3.9.3 Applicable Regulations

3.9.3.1 U.S. Department of Transportation Federal Highway Administration

Table 3.9-4. FHWA Noise Abatement Criteria (NAC) in dBA (Hourly A-weighted Sound Level).

Activity Category	*NAC, Leq(h)*	*Description of Activity Category*
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches libraries, hospitals, and auditoriums.
Source: Caltrans (2008).		

3.9.3.2 City of Los Angeles Municipal Code

Section 41.40 of the City of Los Angeles Municipal Code prohibits construction work during nighttime and early morning hours. The Municipal Code section states the following:

> (a) No person shall between the hours of 9:00 pm and 7:00 am of the following day perform any construction or repair work of any kind upon or any excavating for, any building or structure, where any of the foregoing entails the use of any power-driven drill, driven machine, excavator, or any other machine, tool, device, or equipment which makes loud noises to the disturbance of persons occupying sleeping quarters in any dwelling, hotel, or apartment or other place of residence. In addition, the operation, repair or servicing of construction equipment and the jobsite delivering of construction materials in such areas shall be prohibited during the hours herein specified. Any person who knowingly and willfully violates the foregoing provision shall be deemed guilty of a misdemeanor punishable as elsewhere provided in this code.
>
> (b) No person, other than an individual homeowner engaged in the repair or construction of his single-family dwelling shall perform any construction or repair work of any kind upon, or any earth grading for, any building or structure located on land developed with residential buildings under the provisions of Chapter I of this Code, or perform such work within 500 feet of land so occupied, before 8:00 a.m. or after 6:00 p.m. on any Saturday or national holiday nor at any time on any Sunday. In addition, the operation, repair or servicing of construction equipment and the job-site delivering of construction materials in such areas shall be prohibited on Saturdays and on Sundays during the hours herein specified. The provisions of this subsection shall not apply to persons engaged in the emergency repair of:

The code section then provides certain provisions for exceptions and exemptions.

Chapter 11 of the Municipal Code sets forth noise regulations, including regulations applicable to construction noise impacts. Section 112.05 establishes maximum noise levels for powered equipment or powered hand tools. This section states:

> Between the hours of 7:00 am and 10:00 pm in any residential zone of the City or within 500 feet thereof, no person shall operate or cause to be operated any powered equipment or powered hand tool that produces a maximum noise level exceeding the following noise limits at a distance of 50 feet there from (a) 75 dBA for construction, industrial and agricultural machinery including crawler tractors, dozers, rotary drills and augers, loaders, power shovels, cranes, derricks, motor graders, paving machines, off-highway trucks, ditchers, trenchers, compactors, scrapers, wagons, pavement breakers, depressors, and pneumatic or other powered equipment; (b) 75 dBA for powered equipment of 20 horsepower or less intended for infrequent use in residential areas including chain saws, log chippers, and powered hand tools; and (c) 65 dBA for powered equipment intended for repetitive use in residential areas including lawn mowers, backpack mowers, small lawn and garden tools, and riding tractors.
>
> The noise limits for particular equipment listed above in (a), (b) and (c) shall be deemed to be superseded and replaced by noise limits for such equipment from

and after their establishment by final regulations adopted by the Federal Environmental Protection Agency and published in the Federal Register.

Said noise limitations shall not apply where compliance therewith is technically infeasible. The burden of proving that compliance is technically infeasible shall be upon the person or persons charged with a violation of this section. Technical infeasibility shall mean that said noise limitations cannot be complied with despite the use of mufflers, shields, sound barriers, and/or other noise reduction device and techniques during the operation of the equipment.

3.9.3.3 City of Los Angeles Noise Element

The City of Los Angeles General Plan Noise Element establishes standards for exterior sound levels based on land use categories. The Noise Element states that the maximum acceptable outdoor noise exposure-level for residential, hospital, and school zones is 65 dBA CNEL and that silencers and mufflers on intake and exhaust openings for all construction equipment are required. Table 3.9-5 summarizes the City's noise compatibility guidelines.

Table 3.9-5. City of Los Angeles Guidelines for Noise Compatible Land Use

Land Use Category	Day-Night Average Exterior Sound Level (CNEL dB)						
	50	55	60	65	70	75	80
Residential Single-Family, Duplex, Mobile Home	A	C	C	C	N	U	U
Residential Multi-family	A	A	C	C	N	U	U
Transient Lodging, Motel, Hotel	A	A	C	C	N	U	U
School, Library, Church, Hospital, Nursing Home	A	A	C	C	N	N	U
Auditorium, Concert Hall, Amphitheater	C	C	C	C/N	U	U	U
Sports Arena, Outdoor Spectator Sports	C	C	C	C	C/U	U	U
Playground, Neighborhood Park	A	A	A	A/N	N	N/U	U
Golf Course, Riding Stable, Water Recreation, Cemetery	A	A	A	A	N	A/N	U
Office Building, Business, Commercial, Professional	A	A	A	A/C	C	C/N	N
Agriculture, Industrial, Manufacturing, Utilities	A	A	A	A	A/C	C/N	N

Notes:

A = Normally acceptable. Specified land use is satisfactory, based upon assumption buildings involved are conventional construction, without any special noise insulation.
C = Conditionally acceptable. New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning normally will suffice.
N = Normally unacceptable. New construction or development generally should be discouraged. A detailed analysis of noise reduction requirements must be made and noise insulation features included in the design of a project.
U = Clearly unacceptable. New construction or development generally should not be undertaken.

3.9.3.4 Wilmington-Harbor City Community Plan

Community plans are intended to promote an arrangement of land uses, streets, and services which will encourage and contribute to the economic, social, and physical health, safety, welfare, and convenience of the people who live and work in the community. The plans are also intended to guide development in order to create a healthful and pleasant environment. Goals, objectives, policies, and programs are created to meet the existing and future needs and desires of the community through future years. The CPs are part of the Land Use Element of the City of Los Angeles General Plan, and are intended to coordinate development among the various parts of the City and adjacent municipalities in a fashion both beneficial and desirable to the residents of the community.

The Wilmington-Harbor City CP ensures that sufficient land is designated that provides for the housing, commercial, employment, educational, recreational, cultural, social, and aesthetic needs of the residents of the CP area. The land use designations are designed to help ensure land use compatibility, including noise compatibility based upon the City of Los Angeles General Plan Noise Element.

3.9.4 Impact Analysis

3.9.4.1 Methodology

The potential noise impacts due to construction and operation of the proposed Project were estimated using the methodologies described below.

Hourly average construction noise levels have been estimated based on the types of equipment proposed to be on site to complete the various construction projects. These sources included equipment such as loaders, dozers, pile drivers, and trucks. The noise levels are those that would occur during the noisiest phase of construction. Table 3.9-6 shows the noise level ranges of typical construction equipment. During any construction project, the overall average noise levels vary with the level of construction activity and the types of equipment that are on site and operating at a particular time.

Operational noise impacts were assessed using the Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM®), which is their computer program for highway traffic noise prediction and analysis. The most current TNM version (2.5) was used for this report. The parameters for estimating vehicular traffic noise were the typical distance between roadway centerline and receiver; typical AM/PM peak-hour traffic volumes and posted speed limits; percentages of automobiles, medium trucks, buses, motorcycles, and heavy trucks; roadway grade; and site conditions (terrain or structural shielding and ground propagation characteristics). (Federal Highway Administration 2004)

Potential vibration impacts associated with construction were assessed using the USDOT Transit Noise and Vibration Impact Assessment. Construction vibration thresholds were based on USDOT criteria levels for potential damage to structures surrounding the proposed project site.

Potential noise impacts on the proposed recreational uses from the freight rail line located along the western portion of the proposed project site were assessed using the FTA's rail noise model and Soundplan 6.4. The FTA's rail noise model uses train make-up, locomotive type, number of cars, distance from source to receiver, and other parameters to predict noise levels. Soundplan 6.4 is a computer program for the calculation and assessment of noise levels from industrial facilities and other noise sources. The program allows for input of all pertinent features (such as terrain or structures) that affect noise, resulting in a highly accurate estimate of existing and future noise levels. The resultant noise levels are presented in an easy to understand, graphically oriented format—noise "contours." A model that included the proposed heights of the planned land and pedestrian bridges, the location of the existing rail lines, and the location of planned commercial uses was created to predict the train noise levels.

Furthermore, the noise analysis is based on the assumption that the proposed Project would implement the following project design features:

> PD-N-1: All exterior uses associated with the commercial structures located at the waterfront (e.g., the 12,000-square-foot restaurant) that might incorporate exterior uses (e.g., outside seating for restaurants) will be located more than 100 feet from the heavily used San Pedro Branch Line and TraPac ICTF lead. In addition, all commercial structures would be designed to shield any exterior uses from the existing rail line. This would occur by either locating the building between the exterior use and the rail line or by using barriers (i.e., clear Plexiglas) at any locations that have direct line of sight to the existing rail lines east of Fries Avenue and along Water Street to attenuate rail sound.

3.9.4.2 Thresholds of Significance

3.9.4.2.1 CEQA Criteria

The *L.A. CEQA Thresholds Guide* (City of Los Angeles 2006) contains the following significance thresholds related to construction noise. Quantification of ambient noise levels (existing and projected at the time of construction) is measured in CNEL.

A project would normally have a significant impact on noise levels from construction during the *daytime* if:

NOI-1: Construction activities lasting more than 1 day would exceed existing ambient exterior noise levels by 10 dBA or more at a noise-sensitive use; or if construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use.

A project would normally have a significant impact on noise levels from construction during the *nighttime* if:

NOI-2: Construction activities would exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

NOI-3: Expose persons to or generate excessive groundborne vibration or groundborne noise levels?

The *L.A. CEQA Thresholds Guide* (City of Los Angeles 2006) contains the following significance thresholds for operational noise impacts due to stationary sources, vehicular traffic, or increased railroad operations.

A project would normally have a significant impact on noise levels from project operations if:

NOI-4: Ambient noise level measured at the property line of affected uses increasing by 3 dBA in CNEL to or within the "normally unacceptable" or "clearly unacceptable category," or increasing in any way by 5 dBA or more.

Sensitive receptors in the Port area that could be potentially affected by operational noise from the proposed Project include residential land uses (single- and multi-family housing, boats used as residences) and neighborhood parks. At these land uses, a significant impact would occur if the proposed Project causes CNEL noise levels to increase by (1) 5 dBA or greater where the existing CNEL is less than 70 dBA, or (2) 3 dBA or greater where the existing CNEL exceeds 70 dBA.

NOI-5: Existing land uses surrounding the proposed project area would generate noise levels in excess of a land use compatibility standard, which would substantially inhibit the usability of the proposed project site.

3.9.4.3 Impacts and Mitigation

The potential for noise from construction and operation to affect sensitive receptor locations in the area surrounding the proposed project site is assessed in this section.

3.9.4.3.1 Construction Impacts

Proposed project construction is anticipated to increase noise levels temporarily at noise-sensitive locations near the proposed project site. The magnitude of the increases would depend on the type of construction activity, the noise level generated by various pieces of construction equipment, site geometry (i.e., shielding from intervening terrain or other structures), and the distance between the noise source and receiver.

Noise from construction activity is generated by the broad array of powered, noise-producing mechanical equipment used in the construction process. This equipment ranges from hand-held pneumatic tools to bulldozers, dump trucks, and front loaders. Noisy construction activities could be in progress on more than one part of the proposed project site at a given time. However, the noise levels from construction activity and the representative pieces of construction equipment during various phases of a typical construction project have been evaluated, and their use provides an acceptable prediction of a project's potential noise impacts. Noise levels from typical construction equipment are shown in Table 3.9-6.

Table 3.9-6. Typical Noise Levels from Construction Equipment

Construction Equipment	Typical Noise Level at 50 feet (dBA)
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82

Construction Equipment	Typical Noise Level at 50 feet (dBA)
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88
Source: USDOT (2006)	

In order to assess the potential noise effects of construction, this noise analysis used data from an extensive field study of various types of residential, industrial and commercial construction projects (U.S. Environmental Protection Agency 1971). Noise levels associated with various construction phases where all pertinent equipment is present and operating, at a reference distance of 50 feet, are shown in Table 3.9-7. Because of vehicle technology improvements and stricter noise regulations since the field study was published, this analysis will use the average noise levels shown in Table 3.9-7 for the loudest construction phase (excavation and phase). This information indicates that the overall average noise level generated on a construction site could be 89 dBA L_{eq} at a distance of 50 feet during excavation and finishing phases. The noise levels presented are value ranges; the magnitude of construction noise emission typically varies over time because construction activity is intermittent and the power demands on construction equipment (and the resulting noise output) are cyclical.

Table 3.9-7. Typical Noise Levels from Construction Activities for Public Works Projects

Construction Activity	Average Sound Level* at 50 feet (dBA L_{eq})	Standard Deviation (dB)
Ground Clearing	84	7
Excavation	89	6
Foundations	78	3
Erection	87	6
Finishing	89	7
*Sound level with all pertinent equipment operating.		
Source: EPA 1971.		

Noise levels generated by construction equipment (or by any point source) decrease at a rate of approximately 6 dBA per doubling of distance from the source (Harris 1979). Therefore, if a particular construction activity generated average noise levels of 89 dBA at 50 feet, the L_{eq} would be 83 dBA at 100 feet, 77 dBA at 200 feet, 71 dBA at 400 feet, and so on. This calculated reduction in noise level is based on the loss of energy resulting from the geometric spreading of the sound wave as it leaves the source and travels outward. Intervening structures that block the line of sight, such as buildings, would further decrease the resultant noise level by a minimum of 5 dBA. The effects of molecular air absorption and anomalous excess attenuation would reduce the noise level from construction activities at more distant locations at the rates of 0.7 dBA and 1.0 dBA per 1,000 feet, respectively.

The closest existing noise-sensitive receptors to the portion of the project bounded by the waterfront to the south and C Street to the north are recreational land uses and existing residential land uses to the west across C Street. Construction would take place as near as 600 feet and as far as 2,500 feet or more from the existing Wilmington Recreation Center Park (ST-3). These two distances represent a conservative estimate of construction activities, which could occur as close to the intersection of Lagoon Avenue and C Street and as far away as the intersection of Broad Street and Harry Bridges Boulevard. The closest residences would be approximately 1,200 feet from the "acoustic center"[3] of construction activity. A construction noise level of 89 dBA L_{eq} at 50 feet would attenuate to approximately 61 dBA L_{eq} 1,200 feet from the source (the acoustic center). This noise level would be near or approximately equivalent to the typical ambient daytime noise levels measured in the area, and higher than the ambient daytime noise level measured at the Wilmington Recreation Center. Noise levels from construction would be readily audible and could at times dominate the noise environment at the existing Wilmington Recreation Center Park (ST-3) and surrounding areas. Noise levels at the ST-3 location were measured at 54.3 dBA.

In addition, proposed project operation during Phase 1 and proposed project construction during Phase 2 would overlap at 2015. Proposed project elements such as the waterfront promenade and the first portion of the land bridge would be operational by 2012. Recreational users would be exposed to noise generated from the proposed Project construction. Noise levels at locations operational during phase 2 construction (i.e., locations constructed during Phase 1) would be readily audible and could at times dominate the noise environment within these areas.

Waterfront Development

Waterfront development would include a 6 month time frame in 2011 and 2012 during which pile driving construction associated with the proposed Project would occur. Pile driving construction projects can be expected to generate an L_{eq} of 101 dBA at 50 feet from construction. Assuming that the piles are to be driven north of Water Street, during development of the interim land bridge, the closest sensitive receptor would be measured location ST-3, approximately 1,900 feet to the north of the construction area. A construction noise level of 101 dBA L_{eq} at 50 feet would attenuate to approximately 69 dBA L_{eq} 1,900 feet from the source. This noise

[3] The acoustic center is the idealized point from which the energy sum of all construction activity noise near and far would be centered. The acoustic center takes into account the furthest distance and then nearest distance construction could occur then multiplies them together and takes the square root. This distance is marginally closer than the average of the two distances.

level would be substantially higher than the measured noise level of 54 dBA L_{eq} at location ST-3 (which is the closest sensitive receptor to the proposed pile driving). Noise levels of this magnitude would be readily audible in the area.

Waterfront Red Car Line/CCT

The Waterfront Red Car Line and multi-use pedestrian/bicycle CCT would be extended to connect to the nearby San Pedro Community. The CCT and Waterfront Red Car Line would begin at the intersection of Swinford Street and Harbor Boulevard, proceed along Front Street onto John S. Gibson, and then onto Harry Bridges Boulevard where it would terminate at the intersection with Avalon Boulevard. The precise alignment of the Waterfront Red Car Line is not currently known; therefore for this analysis the closest possible alignment to sensitive receptors was used to represent the worst-case scenario of noise impacts associated with the proposed Project. If determined to be necessary during future environmental review, the effects from the Waterfront Red Car Line will be analyzed in greater detail (at the project level) in a subsequent document when the alignment has been finalized.

Construction of the Waterfront Red Car Line is anticipated to temporarily increase noise levels at residential land uses in the vicinity of the proposed project site. Construction is estimated to last approximately 12 months; however, because the proposed Project is linear in nature, the duration at any particular location would likely be substantially less. In order to assess the potential noise effects from the rail line construction, this noise analysis used data from Table 3.9-7 above to quantify noise levels at the nearest sensitive receptor. The “worst-case” average overall construction noise level would be 89 dBA at a distance of 50 feet from the acoustic center of the construction site during excavation and finishing phases.

Along the proposed project alignment, the nearest noise-sensitive receptors (as represented by ambient noise measurement ST-6) are located approximately 140 feet from the nearest possible alignment along Pacific Avenue. A noise level of 89 dBA L_{eq} at 50 feet from conventional construction activity would attenuate to approximately 80 dBA L_{eq} at 140 feet from the source, using the drop off with distance relation for construction noise as discussed above. This noise level is substantially higher than the typical daytime noise level measured at ST-6 of approximately 61 dBA L_{eq}. Noise level increases of this magnitude would be readily audible and would dominate the noise environment in the area during construction operations.

Impact NOI-1: The proposed Project would last more than 1 day and exceed existing ambient exterior noise levels by 10 dBA or more at a noise-sensitive use; construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use.

Construction activities would typically last more than 10 days in any 3-month period. Based on the thresholds for significance, an impact would be considered significant if noise from these construction activities would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use. Using the acoustic center from construction between Harry Bridges Avenue and C Street bound by Broad Street to the east and Lagoon Avenue to the west would raise the noise level approximately 6 dBA above the existing noise environment. Pile driving from the proposed park area would raise the noise levels approximately 15 dBA at the closest sensitive receptor (ST-3) as well as other noise-sensitive land uses in the area adjacent to ST-3. The construction of the Waterfront Red Car Line would raise noise levels at the closest sensitive receptors along Shields Drive (overlooking Pacific Avenue) by approximately 20 dBA.

Furthermore, the overlap of the Phase 1 operational stage with the Phase 2 construction stage would mean recreational users would be exposed to construction related noise. Proposed project elements such as the waterfront promenade and the first portion of the land bridge would be operational by 2012. Recreational users would be exposed to noise generated from the proposed Project construction. Operational locations located adjacent to Phase 2 construction sites would be exposed to intermittent noise levels that would prevent recreational and leisurely activities within these areas.

Construction would exceed the construction noise standards of more than 5 dB increase in ambient noise levels at the closest sensitive receptor ST-3. Although the City's noise ordinance exempts construction activities from the noise standard (providing that such activities take place between the hours of 7:00 a.m. and 9:00 p.m. Monday through Friday, 8:00 a.m. and 6:00 p.m. on Saturdays, and no time on Sundays), control measures are recommended as mitigation to reduce the noise levels to the extent practicable. However, even with the recommended control measures, the increase in noise levels would be considered a significant impact.

Impact Determination

Construction due to the proposed Project would constitute a significant impact. Although mitigation measure MM NOI-1 would reduce impacts resulting from construction noise, it would not be sufficient to reduce the projected increase in the ambient noise level to a level below significance. Even with implementation of this mitigation measure, construction equipment noise levels would be expected to remain significant. Thus, impacts on sensitive receptors resulting from construction would remain significant even after mitigation.

Mitigation Measures

MM NOI-1: The following procedures will help reduce noise impacts from construction activities:

a) **Temporary Noise Barriers.** When construction occurs within 500 feet of a residence or park, temporary noise barriers (solid fences or curtains) will be located between noise-generating construction activities and sensitive receptors.

b) **Construction Hours.** Construction will be limited to between 7:00 a.m. and 9:00 p.m. on weekdays; between 8:00 a.m. and 6:00 p.m. on Saturdays; and there will be no construction equipment noise anytime on Sundays as prescribed by the City of Los Angeles Municipal Code.

c) **Construction Days.** Noise-generating construction activities will not occur on Sundays or holidays unless critical to a particular activity (e.g., concrete work).

d) **Construction Equipment.** All construction equipment powered by internal combustion engines will be properly muffled and maintained.

e) **Idling Prohibitions.** Unnecessary idling of internal combustion engines near noise-sensitive areas will be prohibited.

f) **Equipment Location.** All stationary noise-generating construction equipment, such as air compressors and portable power generators, will be located as far as practical from existing noise-sensitive land uses.

g) **Quiet Equipment Selection.** Quiet construction equipment will be utilized. Noise limits established in the City of Los Angeles Noise Ordinance will be fully complied with.

h) **Notification.** Sensitive receptors including residences within 2,000 feet of the proposed project site will be notified of the construction schedule in writing prior to the beginning of construction.

Residual Impacts

Impacts would be significant and unavoidable.

Impact NOI-2: Construction activities would not exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

No construction activities would occur between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

Impact Determination

Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

Impact NOI-3: The proposed Project would not expose persons to or generate excessive groundborne vibration or groundborne noise levels.

Construction of the proposed Project would generate groundborne vibration. In general, demolition of structures during construction generates the highest levels of vibration. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible vibration. Heavy trucks can also generate groundborne vibration, which varies depending on vehicle type, weight, and pavement conditions. The FTA has published standard vibration levels and peak particle velocities for construction equipment operations. The root mean square (RMS) velocity level and peak particle velocities for construction equipment are listed in Table 3.9-8 below.

Table 3.9-8. Vibration Velocities for Construction Equipment

Equipment	*Approximate Velocity Level at 25 Feet, VdB*	*Approximate Peak Particle Velocity at 25 Feet (inches/second)*
Large Bulldozers	87	0.089
Loaded Trucks	86	0.076
Jackhammer	79	0.035
Pile Driver	104	0.644
Data reflects typical vibration level. Source: USDOT (2006).		

Vibration levels from construction equipment attenuate as they radiate from the source. The equation to determine vibration levels at a specific distance states that

$$PPV_{equip} = PPV_{ref} \text{ x } (25/D)^{\wedge 1.5}$$

where PPV_{ref} is the Peak Particle Velocity at a reference distance of 25 feet, and D is the distance from the equipment to the sensitive receptor (USDOT 2006).

The closest sensitive receptors are approximately 1,200 feet away from the acoustic center of construction during Phase 1. Phase 1 construction would include construction activities such as pile driving, which experiences the greatest Peak Particle Velocity values from construction equipment. Table 3.9-8 states that pile driving produces Peak Particle Velocities of approximately 0.644 inches per second at a reference distance of 25 feet. This vibration level would attenuate to approximately 0.002 inches per second, which would be undetectable and would be well under the threshold of 0.2 inches per second—the threshold that would cause damage from vibration for masonry and wood timber buildings (USDOT 2006).

The Waterfront Red Car Line would be constructed approximately 140 feet from the closest sensitive receptor. Vibration from construction equipment would be calculated in the same manner as above. Construction of the Waterfront Red Car Line would not require the use of pile drivers during construction. Vibration levels would be associated with earth-moving equipment as well as trucks entering the construction site. Large bulldozers would be utilized for construction of the proposed Waterfront Red Car Line extension, and produce approximately 0.09 inches per second Peak Particle Velocity at a reference distance of 25 feet. This would be well below the threshold of 0.2 to cause damage to engineered structures. At 140 feet (the location of the closest sensitive receptor) vibration levels would be approximately .002 inches per second. These vibration levels would be virtually undetectable at the closest sensitive receptor.

Vibration levels due to construction activities would be below levels that could cause damage to sensitive receptors and would be unnoticeable; thus, construction vibration impacts would be less than significant.

Impact Determination

Impacts would be less than significant.

<u>Mitigation Measures</u>

No mitigation is required.

<u>Residual Impacts</u>

Impacts would be less than significant.

3.9.4.3.1 Operational Impacts

Impact NOI-4: Operations would not result in ambient noise level measured at the property line of affected uses increasing by 3 dBA in CNEL to or within the “normally unacceptable” or “clearly unacceptable category,” or increasing in any way by 5 dBA or more.

Operational Traffic Noise

Predicted traffic noise levels in the proposed project area under existing, Future (2015) and Future (2020) conditions with and without the proposed Project were analyzed using the FHWA’s TNM. TNM is the FHWA’s computer program for highway traffic noise prediction and analysis. The most current version (2.5) was used for this report. The parameters used to estimate vehicular traffic noise were: the typical distance between roadway centerline and receiver; peak-hour traffic volumes and posted speed limits; percentages of automobiles, medium trucks, and heavy trucks; and site conditions (terrain or structural shielding and ground propagation characteristics). (Federal Highway Administration 2004)

Noise from motor vehicle traffic associated with the proposed Project was analyzed using the data from the proposed Project’s traffic study. Existing, Future (2015) PM peak hour volumes plus cumulative with- and without-project scenarios and Future (2020) PM peak hour volumes with and without the proposed project were used to predict the changes in traffic noise at representative noise-sensitive locations. The results of the noise modeling are shown in Table 3.9-9.

As shown in Table 3.9-9, existing traffic noise levels ranged from 48 dBA CNEL (at modeled receptor ST-3) up to 62 dBA CNEL (at modeled receptor ST-2) (when rounded to the nearest whole number). Future (2015) Cumulative Base Peak Hour Projects noise levels would vary from 49 dBA CNEL at ST-3 to 64 dBA CNEL at ST-2. For Modeled Future (2015) Cumulative Base plus Project conditions, noise levels would vary from 49 dBA CNEL at ST-3 to 64 dBA CNEL at ST-2 (when rounded to the nearest whole number). Future (2015) traffic noise levels With Project would increase 0 to 2 dBA CNEL from the existing baseline. Modeled receptor ST-1 would experience no increase over the existing noise levels associated with the vacation of Avalon Boulevard.

The Future (2020) Cumulative Base noise levels would also range between 49 dBA CNEL at ST-3 and 64 dBA CNEL at ST-2 (when rounded to the nearest whole number). With the inclusion of the proposed Project, the Future (2020) noise levels would remain virtually unchanged from the Future (2015) noise levels. Future (2020) traffic noise volumes would increase approximately 0 to 2 dBA CNEL from existing as well. Modeled receptor ST-1 would still experience no increase in noise levels associated with the vacation of Avalon Boulevard. Therefore, traffic-related noise impacts would not result in a significant impact.

Table 3.9-9. Traffic Noise Modeling Results

Receptor[1]	*Relevant Noise Standard (dBA CNEL) (not to exceed)*	*Existing Modeled Peak Hour (dBA CNEL)*	*Future Peak Hour (2015) Cumulative Base (dBA CNEL)*	*Future Peak Hour (2015) Cumulative Base plus Project (dBA CNEL)*	*Proposed Project-related Difference between Existing and Future (2015) With Project (dBA)*	*Future Peak Hour (2020) Cumulative Base (dBA CNEL)*	*Future Peak Hour (2020) Cumulative Base plus Project (dBA CNEL)*	*Proposed Project-related Difference between Existing and Future (2020) With Project (dBA)*	*Relevant Noise Standard Exceeded by the Proposed Project?*	*Increase (Compared to Existing) over 3 dBA and Relevant Standard Exceeded?*
ST-1 Water Street and Avalon Boulevard by the DWP oil tanks (proposed land bridge)	70	56	57	56	0	57	56	0	No	No
ST-2 Corner of Harry Bridges and Avalon Boulevard	70	62	64	64	2	64	64	2	No	No
ST-3 Wilmington Recreation Center off Neptune Avenue	65	48	49	49	1	49	49	1	No	No
ST-5 Corner of North Wilmington Boulevard and C Street	65	56	57	57	1	57	57	1	No	No

[1]Measurement Location ST-4 and ST-6 were not used in the traffic noise analysis because the traffic study for the proposed Project suggested that proposed project traffic would not influence Wilmington Boulevard or Pacific Avenue. Therefore, no traffic data was supplied for these measurement locations.

Operational Waterfront Red Car Noise

Predicted traffic noise levels in the proposed project area from the Waterfront Red Car were analyzed using the FTA's General Transit Noise Assessment Model program for rail line noise prediction. The parameters used to estimate rail noise were: the typical distance between track and receiver, type of vehicle (freight train, commuter train, light rail transit), number of vehicle per hour, number of cars per vehicle, typical speed of the vehicles, condition of the tracks, and whether shielding and/or barriers are present (USDOT 2006).

For the purposes of this analysis, the Light Rail Transit (LRT) model was used as the noise source for the Waterfront Red Car. An average speed of 7 miles per hour with 3 cars per hour was used in the analysis, with two Waterfront Red Car Line cars in tandem. Tracks were assumed to be embedded and jointed. Based on these parameters, the resultant noise associated with the operation of the Waterfront Red Car Line would be approximately 57 dBA L_{eq}, or 53 dBA CNEL at the nearest noise-sensitive receptor.

Measurement location ST-6 was measured and modeled as the closest sensitive receptor to the Waterfront Red Car Line construction. Without the Waterfront Red Car Line extension, the 24-hour noise level would be approximately 65 dBA CNEL, assuming the measured noise level of 61 dBA L_{eq} as the typical noise level. With the addition of the noise from the Waterfront Red Car Line extension, the combined noise levels (65 and 53 dBA CNEL) would be approximately 65 CNEL (when rounded to whole numbers). Thus, the Waterfront Red Car Line would not result in an increase in overall noise levels on a CNEL basis; the increase would also not exceed the 3 dBA threshold set forth in Threshold NOI-4 and therefore would not result in a significant impact.

Impact Determination

Impacts would be less than significant.

Mitigation Measures

No mitigation is necessary.

Residual Impacts

Impacts would be less than significant.

Impact NOI-5: Existing land uses surrounding the proposed project area would generate noise levels in excess of a land use compatibility standard, but would not substantially inhibit the usability of the proposed project site.

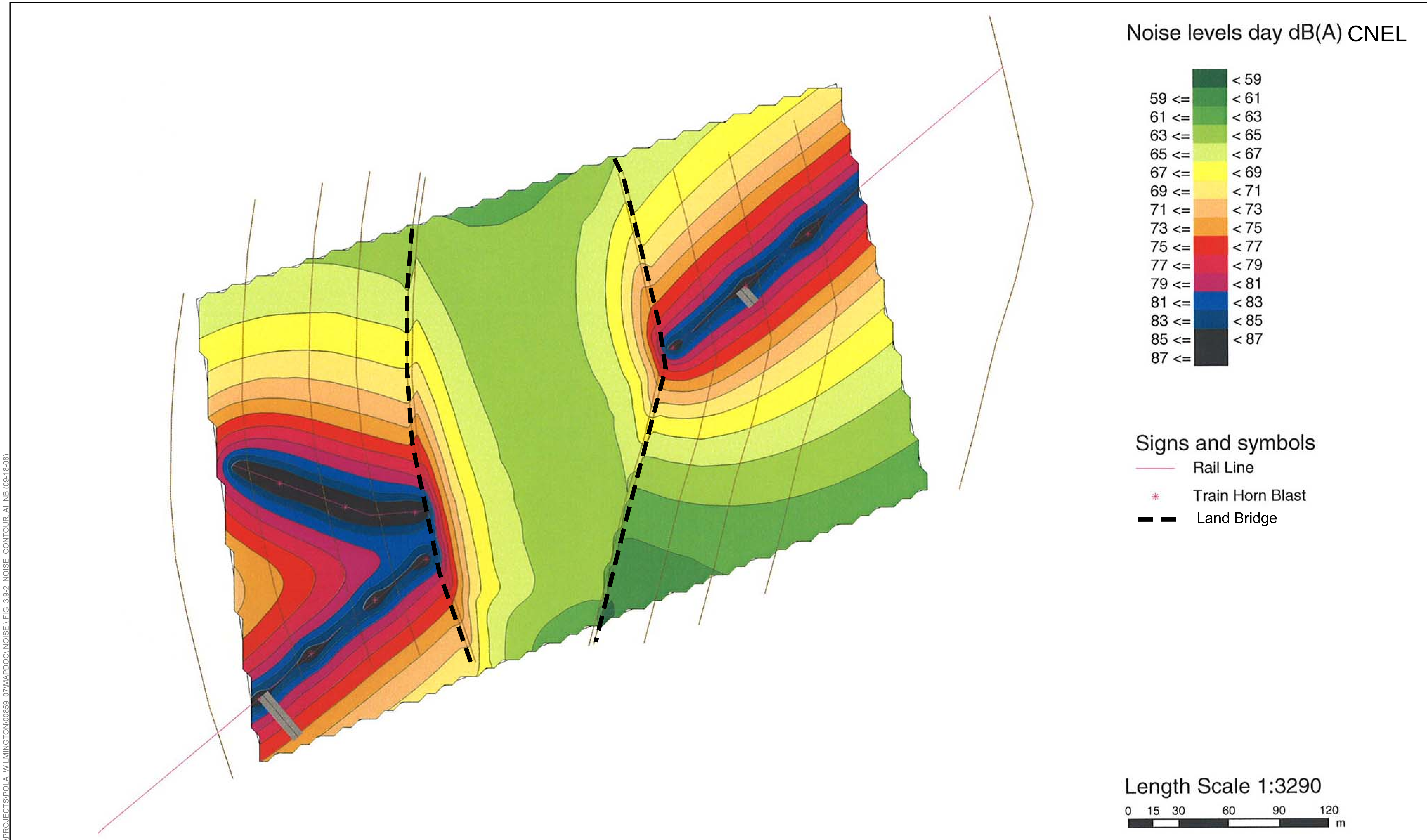
The proposed Project would introduce new noise sensitive land uses to the proposed project area. The proposed Land Bridge/park and pedestrian "water" bridge would be considered noise sensitive land uses. Introduction of the proposed Project would potentially expose people to noise levels in excess of the standard for parks (67 CNEL)[4]. The proposed park would be bordered to the west by the Harbor Generation Station which includes five peaker power units. Peaker units are smaller power units used during times of high energy demand. The proposed land bridge and pedestrian "water" bridge would also be exposed to noise levels in excess of the 67 dBA CNEL standard from rail line traffic and train horn noise associated with the at-grade crossing surrounding the proposed project site. The proposed commercial/restaurant land uses could also be exposed to noise levels in excess of 77 dBA CNEL as stated in the General Plan of the City of Los Angeles Land Use Compatibility Guidelines.

The ST-1 measurement site represents the park location on the eastern side. Noise level at ST-1 was approximately 63 dBA at the time of the measurement when rounded to the nearest whole number. Existing noise sources include freight trains, which must sound horns to provide a minimum 20 seconds of warning prior to entering an at-grade street crossing (Wilson Geosciences 2006), such as occurs at Harry Bridges Boulevard approximately 1,800 feet northeast of the proposed park, at the proposed realignment of Broad Street, and at Fries Avenue approximately 750 feet to the southwest. Horn noise levels from trains are about 104 dBA at 100 feet (Federal Rail Administration). The proposed park would also be impacted by existing noise from the Harbor Generating Station's peaker units, which are located immediately to the west of the proposed park location.

Noise levels associated with the trains were calculated using Soundplan 6.4. The model included the proposed heights of the planned land and pedestrian "water" bridges, the location of the existing rail lines, and the location of planned commercial uses. The model also included the assumptions that 3 trains per hour going 10 miles per hour would pass along the rail lines and that each train would blow its horn for a duration of 1 second at multiple locations prior to entry into the at-grade crossings. Therefore, all 3 trains would cumulatively blow their horns for approximately 3 seconds total at the crossings and at the tunnel portal. The engine and wheel noise from the trains was also modeled. Each train was assumed to have 4 locomotives and an average of 40 cars per train.

Based on calculations made during modeling, noise levels would range from approximately 74 dBA CNEL at the closest point on the raised land and pedestrian "water" bridges to the rail lines to approximately 64 dBA CNEL in the middle of the land bridge. Although the noise levels would exceed the 67 dBA CNEL thresholds at the edge of the land bridge closest to the track, the noise levels would dissipate toward the interior of the park. Noise levels above 67 dBA CNEL would extend approximately the first 80 feet into the park along the eastern front of the land bridge and approximately the first 100 feet on the western front of the land bridge (Figure 3.9-2). Because the land bridge is approximately 500 feet wide, a large majority of the park would be not be exposed to noise levels which exceed the 67 CNEL

[4] A noise threshold of 67 dBA CNEL was used as criteria for determining significance based on the threshold in the General Plan of the City of Los Angeles Guidelines for Noise Compatibility Land Use. Between 65 and 70 dBA CNEL is considered Normally Acceptable/Normally Unacceptable. Also the FHWA Noise Abatement Criteria is listed as approaching 67 dBA CNEL for Activity Category B which includes "picnic areas, recreation areas, playground and sports area" among others.



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SOURCE: Soundplan 6.4 (2008)

ICF Jones & Stokes

Figure 3.9-2
Rail Line Noise Contours across the Proposed Land Bridge
Wilmington Waterfront Development Project

threshold. Park users would be able to avoid these edge locations which exceed the 67 dBA CNEL threshold by moving away from the louder areas and still use a majority of the park space. Therefore, the impact from train noise on the land bridge would be less than significant.

The proposed pedestrian "water" bridge would experience noise levels similar to that from the existing rail lines. Noise levels in excess of the 67 dBA CNEL threshold would extend for approximately 350 feet along the northern section and 180 feet along the southern section when measured from the closest location to the rail lines. Although the proposed pedestrian "water" bridge would experience noise levels in excess of 67 dBA CNEL along certain portions of the alignment, this is not considered a significant impact because users are not anticipated to congregate for long periods of time along the pedestrian "water" bridge as it is intended a mode of transportation to the water's edge and users would only be exposed to noise exceeding 67 dBA CNEL during the moments they pass across the bridge. Therefore, the impact from train noise on the pedestrian "water" bridge is considered less than significant.

The proposed commercial development located along the waterfront would be located in close proximity (100 feet) to the existing San Pedro Branch Line and TraPac ICTF lead. This track parallels the proposed Water Street extension and continues southwest beyond Fries Avenue. This track is heavily traveled throughout the day and night by the San Pedro Branch Line and TraPac ICTF lead and therefore is the primary acoustical source. The Mormon Island rail spur that separates from the track passes closer to the proposed commercial development. However, this rail line is used infrequently and only during the night. Therefore, analysis was based on the San Pedro Branch Line and TraPac ICTF lead. As stated previously, trains are required to sound their horns when entering an at-grade crossing. Based on the Soundplan 6.4 analysis, the exterior noise levels at the proposed commercial land uses would be approximately 75 dBA CNEL. This level would not exceed the 77 dBA CNEL[5] threshold derived from the General Plan of the City of Los Angeles Guidelines for Noise Compatibility Land Use [Noise element?]. Therefore, impacts would be less than significant.

However, it is recommended that the proposed Project implement a project design feature to design all commercial structures having exterior uses (e.g., outside seating for restaurants) a minimum of 100 feet from the existing San Pedro Branch Line and TraPac ICTF lead. In addition, it is recommended that all commercial structures be designed in such a way as to shield any exterior land uses from the existing rail line by locating the exterior use on the side opposite the rail alignment or by erecting clear Plexiglas noise barriers at locations with a direct line of sight to the existing rail lines east of Fries Avenue.

The Harbor Generation Station currently produces noise levels in excess of the 67 dBA CNEL park standard. A noise study was conducted by URS Corporation in

[5] A noise threshold of 77 dBA CNEL was used as criteria for determining significance based on the threshold in the City of Los Angeles General Plan Guidelines for Noise Compatibility Land Use. Between 75 and 80 dBA CNEL is considered Conditionally Acceptable/Normally Unacceptable.

2004(" Noise Analysis Results and Recommendations for Potential Park Sites near the Harbor Generating Station") to analyze potential impacts to the proposed land bridge[6]. The study measured noise during times when the Harbor Generation Station's peaker units were both inactive and active.

Ambient noise levels during times of peaker plant inactivity at representative locations were approximately 57 dBA L_{eq}. The noise environment was dominated by rail noise from the Pacific Rail Line, horns, and birds. Noise levels with 4 of the 5 peaker units active were approximately 71 dBA L_{eq} at the fence line of the Harbor Generation Station, a difference of 14 dBA at approximately 130 feet. Predictive noise modeling using Cadna/A predicted noise levels in representative noise locations in the proposed park area. Noise levels ranged from 65 dBA L_{eq} to 77 dBA L_{eq}. (URS 2004)

According to the URS study, existing noise levels would exceed the noise criteria of 67 dBA and would require mitigation. The URS study suggested that a 32-foot-high wall built at the property boundary would reduce noise levels to less-than-significant levels. However, with the current design of the proposed land bridge, the wall would not be necessary.

The proposed park and land bridge would be designed in such a way that the park would be raised above existing grade. The proposed land bridge would range from an at-grade elevation on the north side of the proposed land bridge to 40 feet above the existing ground elevation.

Based on the design of the land bridge and Figure 5 in the URS report (included as Appendix (H)) the existing 67 dBA L_{eq} contour would extend approximately 30 feet into the proposed land bridge. This area would not constitute a large portion of the land bridge, and land bridge users would be able to avoid impacted locations by moving toward a quieter area of the park on occasions when the peaker units are in use. Therefore, impacts are considered less than significant.

Impact Determination

Noise analysis conducted using Soundplan 6.4 was used to quantify potential impacts from the existing rail lines and rail traffic surrounding the proposed Project. Based on modeling, rail traffic would not significantly impact the proposed land and pedestrian "water" bridge because only the edges of the land bridge would be exposed to noise levels in excess of 67 dBA CNEL and the pedestrian "water" bridge is a transportation mode in which pedestrians would use to arrive at the water's edge. The proposed commercial land uses would also not be significantly impacted by the rail traffic located along the existing rail lines because noise from the trains would not exceed the 77 dBA CNEL threshold.

Noise analysis conducted by URS Corporation in 2004, determined that the Harbor Generation Station and peaker power units would expose park patrons to noise levels

[6] The Harbor Generation Station's peaker power units were not modeled using Soundplan 6.4. TheURS report modeled the peaker power units and laid out the 66 dBA CNEL contours using Cadna/A.

in excess of the 67 CNEL standard. The report, which assumed that park elevations would be at-grade, concluded that a sound wall along the western and southern boundary with the Harbor Generation Station would mitigate noise levels and reduce impacts to a less-than-significant level. Based on the current design the proposed park and land bridge would be raised above existing grade, thus providing additional topographic shielding not anticipated by the URS study in 2004. Therefore, the only location which would experience noise levels in excess of 67 dBA CNEL is the area at the northern portion of the land bridge where planned grades do not change from the existing grades.

Because areas affected by noise levels in excess of the 67 dBA CNEL standard would be limited to the park edges and park patrons would be able to move to the quieter, interior areas of the park, the noise impacts from the peaker units and trains are considered less than significant.

Mitigation Measures

No mitigation is required

Residual Impacts

Impacts would be less than significant.

3.9.4.3.2 Summary of Impact Determinations

Table 3.9-10 summarizes the impact determinations of the proposed Project related to Noise, as described in the detailed discussion in Section 3.9.4.3.1. Identified impacts may be based on federal, state, and City of Los Angeles significance criteria, LAHD criteria, and the scientific judgment of the report preparers.

For each type of potential impact, the table describes the impact, notes the impact determinations, describes any applicable mitigation measures, and notes the residual impacts (i.e., the impact remaining after mitigation). All impacts, whether significant or not, are included in this table.

Table 3.9-10. Summary Matrix of Potential Impacts and Mitigation Measures for Noise Associated with the Proposed Project

Environmental Impacts	*Impact Determination*	*Mitigation Measures*	*Impacts after Mitigation*
3.9 Noise			
Construction			
NOI-1: The proposed Project would last more than 1 day and exceed existing ambient exterior noise levels by 10 dBA or more at a noise-sensitive use; construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use.	Significant	**MM NOI-1:** The following procedures will help reduce noise impacts from construction activities: a) **Temporary Noise Barriers**. When construction occurs within 500 feet of a residence or park, temporary noise barriers (solid fences or curtains) will be located between noise-generating construction activities and sensitive receptors. b) **Construction Hours**. Construction will be limited to between 7:00 a.m. and 9:00 p.m. on weekdays; between 8:00 a.m. and 6:00 p.m. on Saturdays; and there will be no construction equipment noise anytime on Sundays as prescribed by the City of Los Angeles Municipal Code. c) **Construction Days.** Noise-generating construction activities will not occur on Sundays or holidays unless critical to a particular activity (e.g., concrete work). d) **Construction Equipment.** All construction equipment powered by internal combustion engines will be properly muffled and maintained. e) **Idling Prohibitions.** Unnecessary idling of internal combustion engines near noise-sensitive areas will be prohibited. f) **Equipment Location.** All stationary noise-generating construction equipment, such as air compressors and portable power generators, will be located as far as practical from existing noise-sensitive land uses. g) **Quiet Equipment Selection.** Quiet construction equipment will be	Significant and unavoidable

Environmental Impacts	Impact Determination	Mitigation Measures	Impacts after Mitigation
		utilized. Noise limits established in the City of Los Angeles Noise Ordinance will be fully complied with. h) **Notification.** Sensitive receptors including residences within 2,000 feet of the proposed project site will be notified of the construction schedule in writing prior to the beginning of construction.	
NOI-2: Construction activities would not exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.	Less than significant	No mitigation is required	Less than significant
NOI-3: The proposed Project would not expose persons to or generate excessive groundborne vibration or groundborne noise levels.	Less than significant	No mitigation is required	Less than significant
Operations			
NOI-4: Operations would not result in ambient noise level measured at the property line of affected uses increasing by 3 dBA in CNEL to or within the “normally unacceptable” or “clearly unacceptable category,” or increasing in any way by 5 dBA or more.	Less than significant	No mitigation is required	Less than significant
NOI-5: Existing land uses surrounding the proposed Project area would generate noise levels in excess of a published standard, but would not substantially inhibit the usability of the proposed project site.	Less than significant	No mitigation is required	Less than significant

3.9.4.4 Mitigation Monitoring

Table 3.9-11. Mitigation Monitoring for Noise

NOI-1: The proposed Project would last more than 1 days and exceed existing ambient exterior noise levels by 10 dBA or more at a noise-sensitive use; construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use.	
Mitigation Measure	**MM NOI-1:** The following procedures will help reduce noise impacts from construction activities: a) **Temporary Noise Barriers**. When construction occurs within 500 feet of a residence or park, temporary noise barriers (solid fences or curtains) will be located between noise-generating construction activities and sensitive receptors. b) **Construction Hours**. Construction will be limited to between 7:00 a.m. and 9:00 p.m. on weekdays; between 8:00 a.m. and 6:00 p.m. on Saturdays; and there will be no construction equipment noise anytime on Sundays as prescribed by the City of Los Angeles Municipal Code. c) **Construction Days.** Noise-generating construction activities will not occur on Sundays unless critical to a particular activity (e.g., concrete work). d) **Construction Equipment.** All construction equipment powered by internal combustion engines will be properly muffled and maintained. e) **Idling Prohibitions.** Unnecessary idling of internal combustion engines near noise-sensitive areas will be prohibited. f) **Equipment Location.** All stationary noise-generating construction equipment, such as air compressors and portable power generators, will be located as far as practical from existing noise-sensitive land uses. g) **Quiet Equipment Selection.** Quiet construction equipment will be utilized. Noise limits established in the City of Los Angeles Noise Ordinance will be fully complied with. h) Notification. Sensitive receptors including residences within 2,000 feet of the proposed project site will be notified of the construction schedule in writing prior to the beginning of construction.
Timing	During construction activities
Methodology	To be implemented during construction activities to reduce noise associated with the activities
Responsible Parties	LAHD and the construction contractors
Residual Impacts	Significant and unavoidable

3.9.5 Significant Unavoidable Impacts

Construction due to the proposed Project would constitute a significant impact. Although mitigation measure MM NOI-1 would reduce impacts resulting from construction noise, it would not be sufficient to reduce the projected increase in the ambient noise level at ST-3 (the existing Wilmington Recreation Center) and surrounding noise-sensitive land uses to a level below significance. Even with implementation of this mitigation measure, construction equipment noise levels would be expected to remain significant. Thus, impacts on sensitive receptors resulting from construction would remain significant even after mitigation.