Chapter 14
NOISE AND VIBRATIONS (TERRESTRIAL)

14.1 Introduction

This chapter describes the existing conditions and regulations applicable to terrestrial noise and vibrations, discusses potential impacts of such noise and vibrations associated with the program and project elements, and determines the significance of impacts. For impacts determined to be potentially significant, mitigation measures are provided, where feasible, to reduce these impacts to less than significant.

Marine noise and vibrations are addressed in Chapter 13. Information on construction- and operations-related noise and vibration sources for the program and project elements was provided by Parsons and the Sanitation Districts of Los Angeles County (Sanitation Districts).

As discussed in Section 3.6.1, a Preliminary Screening Analysis (Appendix 1-A) was performed to determine impacts associated with the construction and operation of program and project elements by resource area. During preliminary screening, each element was determined to have no impact, a less than significant impact, or a potentially significant impact. Those elements determined to be potentially significant were further analyzed in this environmental impact report/environmental impact statement (EIR/EIS). This EIR/EIS analysis discloses the final impact determination for those elements deemed potentially significant in the Preliminary Screening Analysis. The location of the noise and vibrations impact analysis for each program element is summarized by alternative in Table 14-1.

Table 14-1. Impact Analysis Location of Program Elements by Alternative

	Alternative						Analysis Location	
Program Element	**1**	**2**	**3**	**4**	**5[a]**	**6[b]**	**PSA**	**EIR/EIS**
Conveyance System								
Conveyance Improvements	X	X	X	X	X	N/A	C,O	C
SJCWRP								
Plant Expansion	X	X	X	X	X	N/A	C,O	C,O
Process Optimization	X	X	X	X	N/A	N/A	C,O	C
WRP Effluent Management	X	X	X	X	X	N/A	O	-
POWRP								
Process Optimization	X	X	X	X	N/A	N/A	C,O	C
WRP Effluent Management	X	X	X	X	X	N/A	O	-
LCWRP								
Process Optimization	X	X	X	X	N/A	N/A	C,O	C
WRP Effluent Management	X	X	X	X	X	N/A	O	-
LBWRP								
Process Optimization	X	X	X	X	N/A	N/A	C,O	C
WRP Effluent Management	X	X	X	X	X	N/A	O	-

Table 14-1 (Continued)

	Alternative						Analysis Location	
Program Element	**1**	**2**	**3**	**4**	**5[a]**	**6[b]**	**PSA**	**EIR/EIS**
WNWRP								
WRP Effluent Management	X	X	X	X	X	N/A	O	-
JWPCP								
Solids Processing	X	X	X	X	X	N/A	C,O	C
Biosolids Management	X	X	X	X	X	N/A	O	O
JWPCP Effluent Management	X	X	X	X	N/A	N/A	Evaluated at the project level. See Table 14-2.	

WRP effluent management and biosolids management do not include construction.
[a] See Section 14.4.7 for a discussion of the No-Project Alternative.
[b] See Section 14.4.8 for a discussion of the No-Federal-Action Alternative.
PSA = Preliminary Screening Analysis
C = construction
O = operation
N/A = not applicable

As discussed in Section 3.2.2, Joint Water Pollution Control Plant (JWPCP) effluent management was the one program element that was carried forward as a project. The location of the noise and vibration impact analysis for each project element is summarized by alternative in Table 14-2.

Table 14-2. Impact Analysis Location of Project Elements by Alternative

	Alternative						Analysis Location	
Project Element	**1**	**2**	**3**	**4**	**5[a]**	**6[b]**	**PSA**	**EIR/EIS**
Tunnel Alignment								
Wilmington to SP Shelf (onshore)	X				N/A	N/A	C,O	C
Wilmington to SP Shelf (offshore)	X				N/A	N/A	C,O	C
Wilmington to PV Shelf (onshore)		X			N/A	N/A	C,O	C
Wilmington to PV Shelf (offshore)		X			N/A	N/A	C,O	C
Figueroa/Gaffey to PV Shelf (onshore)			X		N/A	N/A	C,O	C
Figueroa/Gaffey to PV Shelf (offshore)			X		N/A	N/A	C,O	C
Figueroa/ Western to Royal Palms (onshore)				X	N/A	N/A	C,O	C
Shaft Sites								
JWPCP East	X	X			N/A	N/A	C,O	C
JWPCP West			X	X	N/A	N/A	C,O	C
TraPac	X	X			N/A	N/A	C,O	C
LAXT	X	X			N/A	N/A	C,O	C
Southwest Marine	X	X			N/A	N/A	C,O	C
Angels Gate			X		N/A	N/A	C,O	C
Royal Palms				X	N/A	N/A	C,O	C

Table 14-2 (Continued)

Project Element	Alternative 1	2	3	4	5[a]	6[b]	Analysis Location PSA	EIR/EIS
Tunnel Alignment								
Riser/Diffuser Areas								
SP Shelf	X				N/A	N/A	See Chapter 13.	
PV Shelf		X	X		N/A	N/A	See Chapter 13.	
Existing Ocean Outfalls	X	X	X	X	N/A	N/A	See Chapter 13.	

[a] See Section 14.4.7 for a discussion of the No-Project Alternative.
[b] See Section 14.4.8 for a discussion of the No-Federal-Action Alternative.
PSA = Preliminary Screening Analysis
C = construction
O = operation
N/A = not applicable

14.2 Environmental Setting

14.2.1 Noise Fundamentals

14.2.1.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ. Noise is defined as any loud, unexpected, or annoying sound. In the science of acoustics, the fundamental model has a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the source, as well as obstructions or atmospheric factors affecting the propagation path to the receiver, determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

14.2.1.2 Frequency (Hertz)

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz). A frequency of 250 cycles per second would be referred to as 250 Hz. High frequencies are sometimes more conveniently expressed in kilohertz (thousands of hertz; kHz). The audible frequency range for humans is generally between 20 and 20,000 Hz.

14.2.1.3 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micropascals (µPa). One µPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100 million µPa. Because of this huge range of values, sound is rarely expressed in terms of µPa. Instead, a logarithmic scale is used to describe sound pressure level in terms of decibels (dB). The threshold of hearing for young people is about 20 µPa, which corresponds to 0 dB.

14.2.1.4 Addition of Decibels

Because decibels are logarithmic units, sound pressure level cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. When two identical sources are producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces a sound pressure level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB, but 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

14.2.1.5 A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies and in the way it perceives the sound pressure level in that range. In general, people are most sensitive to the frequency range of 1,000 to 8,000 Hz. They perceive sounds within that range better than sounds of the same amplitude at higher or lower frequencies. To approximate the response of the human ear, the sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. An A-weighted sound level (expressed in units of A-weighted decibels [dBA]) can then be computed based on this information. The A-weighting is commonly used for the measurement of environmental and industrial noise, as well as assessing potential hearing damage.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in reference to human response to environmental noise levels. Noise levels for traffic noise reports are normally reported in terms of dBA. Typical A-weighted noise levels for various noise sources are described in Table 14-3.

Table 14-3. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet fly-over at 1,000 feet		
	100	
Gas lawn mower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower at 100 feet	**70**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**60**	
		Large business office
Quiet urban daytime	**50**	Dishwasher, next room

Table 14-3 (Continued)

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Quiet urban nighttime	**40**	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night
	20	
		Broadcast/recording studio
	10	
Lowest threshold of human hearing	**0**	Lowest threshold of human hearing

dBA = A-weighted decibel
Source: Caltrans 1998

14.2.1.6 Human Response to Changes in Noise Levels

As discussed in Section 14.2.1.4, doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured. Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels when exposed to steady, single-frequency (pure-tone) signals in the mid-frequency (1,000 to 8,000 Hz) range. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB for typical noisy environments. Furthermore, a 10-dB increase is generally perceived as a doubling of loudness. Therefore, doubling sound energy (e.g., doubling the volume of traffic on a highway) would generally be perceived as a detectable but not substantial increase in sound level.

14.2.1.7 Noise Descriptors

Noise in our daily environment fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following noise descriptors are used in this analysis:

- **Equivalent sound level (L_{eq}).** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level (L_{eq}[h]) is the energy average of A-weighted sound levels occurring during a 1-hour period and is the basis for noise abatement criteria (NAC) used by the California Department of Transportation and the Federal Highway Administration (FHWA).
- **Percentile-exceeded sound level (L_{xx}).** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time).
- **Maximum sound level (L_{max}).** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-night level (L_{dn}).** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring between 10 p.m. and 7 a.m.
- **Community noise equivalent level (CNEL).** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to

A-weighted sound levels occurring between 10 p.m. and 7 a.m., and a 5-dB penalty between 7 p.m. and 10 p.m.

14.2.1.8 Sound Propagation

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

- **Geometric spreading.** Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (i.e., decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path. Therefore, they can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.
- **Ground absorption.** The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance from the noise source. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface, such as a parking lot or body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.
- **Atmospheric effects.** Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors, such as air temperature, humidity, and turbulence, can also have significant effects.
- **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 shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Barriers are often constructed between a noise 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. Taller barriers provide increased noise reduction.

14.2.2 Groundborne Vibration

This section describes basic concepts related to groundborne vibration. Dynamic construction equipment can create groundborne vibrations that radiate along the surface of and downward into the earth. These surface waves can be felt as groundborne vibration. Vibration can result in effects ranging from the annoyance of people to the damage of structures. Varying geology and distance result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance from the vibration source.

As vibration waves travel outward from a source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (ppv).

Groundborne vibration can also be expressed in terms of root mean square (RMS) vibration velocity to evaluate human response to vibration levels. RMS is defined as the average of the squared amplitude of the vibration signal. The vibration amplitude is expressed in terms of vibration decibels (VdB), which use a reference level of 1 micro-inch per second. The threshold of perception for most people is around 65 VdB. Vibration levels in the 70- to 80-VdB range are often noticeable but acceptable. Typically, vibration levels must exceed 100 VdB before building damage occurs, except for historic structures, which can have a damage threshold as low as 88 VdB.

The potential for annoyance and physical damage to buildings from vibration is the primary issue associated with groundborne vibration. The human response to continuous groundborne vibration is shown in Table 14-4.

Table 14-4. Human Response to Continuous Vibration From Traffic

Peak Particle Velocity (Inches/Second)	Human Response
0.4–0.6	Unpleasant
0.2	Annoying
0.1	Begins to annoy
0.08	Readily perceptible
0.006–0.019	Threshold of perception

Source: Whiffen and Leonard 1971

Damage potential thresholds for vibration generated by construction activities are shown in Table 14-5.

Table 14-5. Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (ppv in inches/second)	Approximate Vibration Level (VdB)
Historic sites or other critical locations	0.1	88
Residential buildings, plastered walls	0.2–0.3	94–98
Residential buildings in good repair with gypsum board walls	0.4–0.5	100–102
Engineered structures, without plaster	1.0–1.5	108–111

ppv = peak particle velocity
VdB = vibration decibel
Source: American Association of State Highway and Transportation Officials (AASHTO)1990

At higher frequencies, groundborne vibration can be perceived as a noise source. At sufficiently high amplitudes, propagation of vibration waves through the ground can couple with building elements and cause them to vibrate at a frequency that is audible to the human ear. Groundborne noise could result in rattling of windows, walls, or other items coupled to building surfaces. Groundborne vibration levels resulting in groundborne noise are often experienced as a combination of perceptible vibration and low-frequency noise.

Sensitive land uses for groundborne vibration include residences, schools, churches, and hospitals. Outdoor park facilities, such as picnic areas or athletic fields, are not considered to be sensitive to

groundborne noise or vibration. Hospital operating rooms and certain types of industries that use vibration-sensitive equipment are considered highly sensitive to groundborne noise and vibration.

The human response to different levels of groundborne noise and vibration is shown in Table 14-6. Vibration levels with spectral components within the range of human hearing (30 Hz and 60 Hz in the table) would produce the corresponding approximate A-weighted noise levels. Thus, it is possible to experience vibrations as audible noise, even though physical vibrations may not be detected.

Table 14-6. Human Response to Groundborne Noise

Vibration Velocity (VdB)	Low-Frequency Noise Level[a] (dBA)	Mid-Frequency Noise Level[b] (dBA)	Human Response
65	25	40	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible; mid-frequency sound excessive for quiet sleeping areas.
75	35	50	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable for sleeping areas; mid-frequency noise annoying in most quiet occupied areas.
85	45	60	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise annoying for sleeping areas; mid-frequency noise annoying even for infrequent events with institutional land uses such as schools and churches.

[a] Approximate noise level when vibration spectrum peak is near 30 Hz.
[b] Approximate noise level when vibration spectrum peak is near 60 Hz.
VdB = vibration decibel
dBA = A-weighted decibel
Source: FTA 2006

14.2.3 Regional Setting

Automobile, bus, and truck traffic are the major noise sources in the Joint Outfall System (JOS) service area because it is located in the urban portions of southern and eastern Los Angeles County. Air and rail traffic and commercial and industrial activities are also sources of noise in some parts of the JOS service area. Sources of groundborne vibration in the JOS service area typically include trucks and buses operating on surface streets, and freight and passenger train operations.

14.2.4 Program Setting

Conveyance System

Based on population forecasts and flow modeling, it is projected that approximately 33 miles of JOS sewers will require relief between now and the year 2050. The conveyance system is located underground throughout the JOS service area. The conveyance system does not produce audible noise above the ground or detectable groundborne vibrations. The noise setting of the conveyance system is the same as the regional setting.

San Jose Creek Water Reclamation Plant

The San Jose Creek Water Reclamation Plant (SJCWRP) is located behind the Sanitation Districts' Joint Administrative Office, adjacent to both Interstate (I-) 605 and State Route (SR-) 60 in an unincorporated area of Los Angeles County. The main sources of noise in the area are the automobiles, buses, and trucks using these freeways. Sensitive land uses near the SJCWRP include schools to the north, east, and west

and residences in all four directions. No sensitive receptors are located directly adjacent to the SJCWRP, and no complaints have been received concerning noise from this facility.

Pomona Water Reclamation Plant

The Pomona Water Reclamation Plant (POWRP) is located in the city of Pomona approximately 0.5 mile east of SR-57, 0.5 mile west of SR-71, and 1 mile south of I-10. The main sources of noise in the area are the automobiles, buses, and trucks using these freeways. Train noise from the Union Pacific Railroad, which defines the northern border of the POWRP, also contributes to the noise environment in the area. The POWRP is located at the northern base of Elephant Hill, which serves as the plant's southern and western boundary and provides acoustical shielding to areas south and west of the POWRP.

Sensitive land uses near the POWRP include single- and multi-family residences, and elementary schools to the northeast and southeast, each about 0.7 mile from the plant. Land uses directly adjacent to the POWRP consist of industry and offices. No complaints have been received concerning noise from the POWRP.

Los Coyotes Water Reclamation Plant

The Los Coyotes Water Reclamation Plant (LCWRP) is located in the northwest quadrant of SR-91/I-605 interchange in the city of Cerritos. The main sources of noise in the area are the automobiles, buses, and trucks using these freeways.

Sensitive noise receptors near the LCWRP include Cerritos College to the east, Bellflower High School to the northwest, Valley Christian High School to the south, Bellwood Hospital to the southwest, and a church to the south. Single- and multi- family residences and neighborhood parks are located west and east of the LCWRP. No sensitive receptors are located directly adjacent to the LCWRP, and no complaints have been received concerning noise from this facility.

Long Beach Water Reclamation Plant

The Long Beach Water Reclamation Plant (LBWRP) is located in the city of Long Beach near the southeast quadrant of the I-605/East Willow Street interchange in a triangular area enclosed by Coyote Creek to the east, the San Gabriel River to the west, and East Willow Street to the north. The main sources of noise in the area are the automobiles, buses, and trucks using these freeways.

Single- and multi-family residences in the area are located to the east and southwest of the LBWRP. El Dorado Regional Park and Golf Course is located west of the San Gabriel River. Oak Academy Park and the El Dorado Nature Center Park are located to the north of the LBWRP. No sensitive receptors are located directly adjacent to the LBWRP, and no complaints have been received concerning noise from this facility.

Joint Water Pollution Control Plant

The JWPCP is located in the city of Carson at the city's boundary with the community of Wilmington–Harbor City. The western boundary of the JWPCP is directly adjacent to I-110. The Pacific Coast Highway (SR-1) also passes near the plant. The main sources of noise in the area are the automobiles, buses, and trucks using these freeways.

Sensitive receptors near the plant include residences and schools in all directions, Little Company of Mary Women's and Children's Clinic to the west, and Kaiser Permanente Hospital to the southwest. Although pumps, aerators, trucks, and other equipment at the facility generate noise, no adverse effects have been reported from surrounding neighborhoods. No complaints have been received from neighbors or users of other sensitive land uses in the area regarding noise from the JWPCP.

Trucks used for hauling biosolids from the JWPCP to offsite locations enter and leave the plant via Figueroa Street, Sepulveda Boulevard, and I-110. Although these trucks generate noise, there are no residences or other sensitive uses along this route, and no noise complaints have been received from the nearby community. The JWPCP is located directly adjacent to I-110 and major arterials, and the noise environment in the area is dominated by traffic noise. The noise generated by trucks entering and exiting the JWPCP tends to blend with other traffic noise in the area and is not considered a major component of overall traffic noise.

14.2.5 Project Setting

14.2.5.1 Tunnel Alignment

Wilmington to San Pedro Shelf Alignment

The Wilmington to San Pedro Shelf (SP Shelf) alignment would extend south from the JWPCP East shaft site along the roadway alignment of North Wilmington Boulevard in mostly residential areas, at a tunnel crown depth of approximately 100 to 200 feet below ground surface (bgs). The tunnel would continue under the Port of Los Angeles and then offshore into the Pacific Ocean until it reaches the SP Shelf at a tunnel crown depth of approximately 100 to 200 feet bgs or below the seafloor. Because the tunnel alignment would be underground, it does not have an existing noise setting.

Wilmington to Palos Verdes Shelf Alignment

The onshore portion of this tunnel alignment would be the same as the onshore portion of the Wilmington to SP Shelf alignment. The offshore portion of the tunnel would extend from the Port of Los Angeles to the Palos Verdes Shelf (PV Shelf) at a tunnel crown depth of approximately 100 to 250 feet bgs or below the seafloor. Because the tunnel alignment would be underground, it does not have an existing noise setting.

Figueroa/Gaffey to Palos Verdes Shelf Alignment

The Figueroa/Gaffey to PV Shelf alignment would extend south from the JWPCP West shaft site along Figueroa Street and then Gaffey Street in mostly residential areas, at a tunnel crown depth of approximately 70 to 370 feet bgs. The offshore portion of the tunnel would extend from Point Fermin Park to the PV Shelf at a tunnel crown depth of approximately 100 to 250 feet bgs or below the seafloor. Because the tunnel alignment would be underground, it does not have an existing noise setting.

Figueroa/Western to Royal Palms Alignment

The Figueroa/Western to Royal Palms alignment would extend south from the JWPCP West shaft site for a short distance and then would cut west under a golf course and Harbor Lake (also known as Machado Lake). The tunnel alignment would continue under Gaffey Street in mostly commercial and industrial areas, then under West Capitol Drive and Western Avenue in mostly residential areas, to Royal Palms Beach. The onshore tunnel crown depth would range from approximately 70 to 450 feet bgs, except for where the tunnel alignment would connect to the Royal Palms shaft and the existing manifold structure (approximately 30 feet bgs). The manifold structure is connected to the existing ocean outfalls that extend offshore from Royal Palms Beach to the PV Shelf. Because the tunnel alignment would be underground, it does not have an existing noise setting.

Fish Harbor

While the specific location from which the excavated dredged material from construction of the offshore tunnel would be loaded onto barges is still unknown, for this analysis it was assumed that the barges would be loaded at Fish Harbor. Fish Harbor is located in the Port of Los Angeles across Seaside Avenue from the Southwest Marine shaft site. Noise from local traffic, ships, and port activities contribute to the

area's ambient noise environment. The Terminal Island Federal Prison and Fire Station 111 of the City of Los Angeles Fire Department are located southwest of Fish Harbor, and residential neighborhoods are located across the Main Channel, approximately 0.7 mile west of the Southwest Marine shaft site.

Ambient Noise Levels

Long-term monitoring was conducted at the LAXT shaft site (described in Section 14.2.5.2), which is also located within the industrial setting of the Port of Los Angeles and is representative of the noise setting of the Fish Harbor. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

14.2.5.2 Shaft Site

JWPCP East

The JWPCP East shaft site is located in the city of Carson at the southeastern corner of the JWPCP. The shaft site is in an area containing industrial, residential, commercial, school, and church land uses. The site is bound to the north by a railway and JWPCP facilities. South Main Street follows the eastern edge of the site and is lined with industrial warehouses. Commercial development is located northeast and southwest of the Main Street and Lomita Boulevard intersection. Lomita Boulevard follows the southern edge of the site and is lined with residential development. The western edge of the site is also bound by JWPCP facilities. I-110 is approximately 0.5 mile west of the shaft site. Traffic noise from automobiles, buses, and trucks using nearby arterials and I-110 is the main source of noise in the JWPCP area. Occasional trains also contribute to the area's noise environment. Single-family residences across Lomita Boulevard to the south are the closest noise-sensitive receptors to the shaft site.

Ambient Noise Levels

Long-term monitoring characterizes the existing noise setting. Noise monitoring was conducted near the JWPCP East shaft site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

The noise monitor was located in the backyard of a residence south of West Lomita Boulevard, approximately 100 feet from the edge of pavement. Hourly sound levels ranged from a low of 52.4 dBA L_{eq}(1h) during the 12 a.m. hour to a high of 66.4 dBA L_{eq}(1h) during the 11 a.m. hour. The overall day-night level was 62.4 dB L_{dn}.

JWPCP West

The JWPCP West shaft site is located within the community of Wilmington–Harbor City at the southern boundary of the city of Carson. The northern portion of the shaft site is located in the city of Carson. The southern portion of the shaft site is located in a triangular area enclosed by I-110 to the west, Figueroa Street to the east, and West Lomita Boulevard to the north. The shaft site is directly adjacent to I-110; therefore, traffic noise generated by automobiles, buses, and trucks is the main source of noise in the area.

Single- and multi-family residences are located to the east, south, and west of the shaft site. The JWPCP lies to the north. A recreational area with ball fields is the closest noise-sensitive receptor, located directly east of the shaft site across Figueroa Street.

Ambient Noise Levels

Long-term monitoring was conducted near the JWPCP West shaft site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

The noise monitor was located next to a ball field in the outdoor recreation area adjacent to the shaft site, approximately 30 feet from the edge of Figueroa Street and 600 feet from I-110. Hourly sound levels ranged from a low of 60.6 dBA L_{eq}(1h) during the 3 a.m. hour to a high of 69.6 dBA L_{eq}(1h) during the 6 p.m. hour. The overall day-night level was 71.5 dB L_{dn}.[1]

TraPac

The Trans Pacific Container Service Corporation (TraPac) shaft site is located in the northernmost portion of the Port of Los Angeles, in a highly industrialized area within the city of Los Angeles. The shaft site is within a freight container stacking yard and is bordered on the east, south, and west by rows of stacked containers. I-110 is approximately 0.3 mile west of the shaft site. The site is bordered on the north by a railway running parallel to Harry Bridges Boulevard and the Harry Bridges Boulevard Buffer, which serves as a park and public open space. The buffer includes a large landscaped berm (approximately 30 feet in height) to protect the park and residences to the north from the noise and activity of the port. Traffic noise generated by automobiles, buses, and trucks is the main source of noise in the area. The railway and port activities also contribute to the area's ambient noise environment.

The nearest noise-sensitive receptors are single- and multi-family residences fronting West C Street, 700 feet north of the shaft site. Other noise-sensitive receptors include the Wilmington Recreation Center, 0.25 mile northeast of the shaft site, which contains outdoor sports courts, and the Hawaiian Avenue Elementary School, 0.25 mile northwest of the site.

Ambient Noise Levels

Long-term monitoring was conducted at the Los Angeles Export Terminal (LAXT) shaft site (described in the following section), which is also located within the industrial setting of the Port of Los Angeles and is representative of the noise setting of the TraPac site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

LAXT

The LAXT shaft site is located on Terminal Island within the Port of Los Angeles, adjacent to Ferry Street, which is a designated truck transport route. The site is bordered to the north by Fire Station 40 of the Los Angeles Fire Department, and to the east and south by the former Petroleum Coke Storage and Reclaim Facility Site. The Terminal Island Water Reclamation Plant is located west of the shaft site. Pilchard Street and Terminal Way terminate to the east into Ferry Street. Large container stacking yards and rail yards border the shaft site to the south, west, and northeast. The noise environment at the LAXT shaft site is dominated by rail and truck cargo traffic at the port.

The nearest noise-sensitive receptor is the fire station located approximately 150 feet north of the shaft site. The next-nearest noise-sensitive use is a residential neighborhood more than 1 mile away from the shaft site.

Ambient Noise Levels

Long-term monitoring was conducted near the LAXT shaft site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

The noise monitor was located next to the fire station adjacent to the LAXT shaft site. Hourly sound levels ranged from a low of 48.6 dBA L_{eq}(1h) during the 3 a.m. hour to a high of 62.4 dBA L_{eq}(1h) during the 11 a.m. hour. The overall day-night level was 63.5 dB L_{dn}.[1]

[1] The overall day-night level is a higher number than the hourly level because it uses a different noise metric (L_{dn} instead of L_{eq}) for which penalties are applied to noise levels occurring during nighttime hours. For a detailed description refer to Section 14.2.1.7.

Southwest Marine

The Southwest Marine shaft site is located in the Port of Los Angeles, west of South Seaside Avenue on the vacant Southwest Marine Shipbuilding property adjacent to the Main Channel of Los Angeles Harbor. Noise from local traffic, ships, and port activities contribute to the area's ambient noise environment.

The nearest noise-sensitive receptors are Fire Station 111, which is located across South Seaside Avenue from the shaft site, and the Terminal Island Federal Prison, which is located approximately 200 feet to the south. The prison includes several residential structures and outdoor sports courts and ball fields. The shaft site is 0.3 mile southeast of Ports O'Call Village, which is across the Main Channel in the community of San Pedro. Ports O'Call Village supports outdoor use associated with restaurants, waterfront walkways, and patios. Residential neighborhoods in the San Pedro community are located across the Main Channel approximately 0.7 mile west of the shaft site.

Ambient Noise Levels

Long-term monitoring was conducted at the LAXT shaft site, which is also located within the industrial setting of the Port of Los Angeles and is representative of the noise setting of the Southwest Marine site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

Angels Gate

The Angels Gate shaft site is located near the Pacific coastline in the community of San Pedro, adjacent to Angels Gate Park. It is located east of South Gaffey Street, north of Point Fermin Park, and east of West Paseo Del Mar/Shepard Street. Traffic noise generated by automobiles, buses, and trucks on local roadways is the main source of noise in the area.

There are noise-sensitive receptors, such as single- and multi-family residences across South Gaffey Street to the east, less than 100 feet from the shaft site. Point Fermin Park is to the south, across Shepard Street. Lookout Point and the Korean Bell of Friendship at Angels Gate Park are located to the north, approximately 80 feet above the shaft site. This terrain edge continues southwest toward West Paseo Del Mar, forming an intervening berm between Joan Milke Flores Park and the shaft site.

Ambient Noise Levels

Long-term monitoring was conducted at the Royal Palms shaft site (described in following section), which is also located within the coastal urban setting in San Pedro adjacent to West Paseo Del Mar and is representative of the noise setting at the Angels Gate shaft site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

Royal Palms

The Royal Palms shaft site is located adjacent to the Pacific coastline at Royal Palms Beach near White Point Park and White Point County Beach in the community of San Pedro. It sits at the base of a bluff lined by residences along West Paseo Del Mar that have views down into the shaft site. Traffic noise generated by automobiles, buses, and trucks on West Paseo Del Mar above the shaft site is the main source of noise in the area. Natural sounds from ocean waves along the coastline are also present in the ambient noise setting.

The nearest noise-sensitive receptors are single- and multi-family residences that lie to the north, approximately 120 feet from the shaft site. The first row of residences sits on the bluff about 125 feet above the ground elevation of the shaft site.

Ambient Noise Levels

Long-term monitoring was conducted near the Royal Palms shaft site. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

The noise monitor was located at the top of the bluff near the intersection of Western Avenue and West Paseo Del Mar. Hourly sound levels ranged from a low of 57.7 dBA L_{eq}(1h) during the 10 a.m. hour to a high of 60.3 dBA L_{eq}(1h) during the 1 p.m. hour. The overall day-night level was 65.2 dB L_{dn}.[2]

14.2.5.3 Riser/Diffuser Area

The riser and diffuser areas are located on the seafloor of the SP and PV Shelves. The noise setting of the riser and diffuser areas consists of natural sounds associated with the ocean. The noise setting and noise impacts on the marine environment are addressed in Chapter 13.

Pasha Terminal

While the specific location for pre-assembly of the parts and materials for the riser and diffuser is still unknown, for this analysis it was assumed that the riser and diffuser would be preassembled at the Pasha Terminal. Pasha Terminal is located on Mormon Island in the northern portion of the Port of Los Angeles in a highly industrialized area within the city of Los Angeles. I-110 is approximately 1 mile west. Noise from traffic, railway sources, and port activity contribute to the area's noise environment. The nearest noise-sensitive receptors are single- and multi-family residences and hotels that front West C Street about 0.3 mile north in the community of Wilmington–Harbor City.

Ambient Noise Levels

Long-term monitoring was conducted at the LAXT shaft site (previously described), which is also located within the industrial setting of the Port of Los Angeles and is representative of the noise setting of the Pasha Terminal. A full summary of noise monitoring for this project element is provided in Section 14.4.1.

14.3 Regulatory Setting

14.3.1 Federal

14.3.1.1 Noise Control Act of 1972

The Noise Control Act of 1972 (Public Law 92 574) established a requirement that all federal agencies administer their programs to promote an environment free of noise that would jeopardize public health or welfare. The United States (U.S.) Environmental Protection Agency (EPA) was given the responsibility for:

- Providing information to the public regarding identifiable effects of noise on public health and welfare
- Publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety
- Coordinating federal research and activities related to noise control

[2] The overall day-night level is a higher number than the hourly level because it uses a different noise metric (L_{dn} instead of L_{eq}) for which penalties are applied to noise levels occurring during nighttime hours. For a detailed description refer to Section 14.2.1.7.

- Establishing federal noise emission standards for selected products distributed in interstate commerce

14.3.1.2 U.S. Environmental Protection Agency

In 1974, in response to the requirements of the federal Noise Control Act, the EPA identified indoor and outdoor noise limits to protect public health and welfare (communication disruption, sleep disturbance, and hearing damage). Outdoor L_{dn} limits of 55 dB and indoor L_{dn} limits of 45 dB are identified as desirable to protect against speech interference and sleep disturbance for residential, educational, and healthcare areas. Sound-level criteria to protect against hearing damage in commercial and industrial areas are identified as 24-hour L_{eq} values of 70 dB (both outdoors and indoors).

The Noise Control Act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations. Although the EPA was given a major role in disseminating information to the public and coordinating federal agencies, each federal agency retains authority to adopt noise regulations pertaining to agency programs. The EPA can, however, require other federal agencies to justify their noise regulations in terms of Noise Control Act policy requirements. Key federal agencies that have adopted noise regulations and standards include:

- **Housing and Urban Development (HUD).** Noise standards for federally funded housing projects.
- **Federal Aviation Administration (FAA).** Noise standards for aircraft noise.
- **Federal Highway Administration (FHWA).** Noise standards for federally funded highway projects.
- **Federal Transit Administration (FTA).** Noise standards for federally funded transit projects.
- **Federal Railroad Administration (FRA)**. Noise standards for federally funded rail projects.

14.3.1.3 Federal Highway Administration

The FHWA has developed methods for evaluating construction noise, which are discussed in the Roadway Noise Construction Model User's Guide (FHWA 2006). The FHWA does not recommend specific noise level criteria for construction activities.

14.3.1.4 Federal Transit Administration

The FTA has developed methods for evaluating construction noise, which are discussed in Transit Noise and Vibration Impact Assessment (FTA 2006). In addition, the FTA (2006) recommends noise criteria for residential uses exposed to construction noise, as summarized in Table 14-7.

Table 14-7. FTA Recommended Construction Noise Criteria for Residential Uses

1-Hour L_{eq} (Day[a])	1-Hour L_{eq} (Night[b])	8-Hour L_{eq} (Day)	8-Hour L_{eq} (Night)	L_{dn} (30-Day Average)
90	80	80	70	75

All values are A-weighted decibels.
[a] 7 a.m.–10 p.m.
[b] 10 p.m.–7 a.m.
L_{eq} = equivalent sound level
L_{dn} = day-night sound level

Although the FTA has established vibration criteria related to rail transit, there are no federal regulations or guidelines for vibration caused by construction tunneling. Human response to vibration and the potential for damage to buildings are discussed in Section 14.2.2.

14.3.2 State

The State of California General Plan Guidelines (Office of Planning and Research 2003) provides noise compatibility guidelines for land use planning; however, these guidelines offer no information on construction noise. The state has also published the Model Community Noise Ordinance (California Office of Noise Control 1977), which provides guidance to cities and counties on how to develop a community noise ordinance. These guidelines include recommended limits on construction noise levels. These are guidelines only and are not enforceable. Construction noise is typically regulated at the local level.

14.3.3 Regional

14.3.3.1 County of Los Angeles General Plan Noise Element

The County of Los Angeles General Plan Noise Element establishes noise-related goals and policies and describes the general noise environment in Los Angeles County. Los Angeles County has also adopted a noise ordinance that recommends maximum expected ambient noise levels for four land use categories:

- **Noise-sensitive areas.** For noise-sensitive areas, the maximum expected ambient noise level is 45 dB anytime.
- **Residential.** For residential land uses, the maximum expected ambient daytime (7 a.m.–10 p.m.) noise level is 50 dB. The maximum expected ambient nighttime (10 p.m.–7 a.m.) noise level is 45 dB.
- **Commercial.** For commercial land uses, the maximum expected ambient daytime noise level is 60 dB. The maximum expected ambient nighttime noise level is 55 dB.
- **Industrial.** For industrial land uses, including JOS facilities, the maximum expected ambient noise level is 70 dB anytime.

If the measured ambient noise level at a specific project location exceeds the expected ambient levels, the measured ambient noise level should be used as the baseline noise level.

14.3.3.2 Los Angeles County General Noise Standards

Exterior noise standards in Los Angeles County are as follows:

- The baseline noise level for a given land use may not be exceeded for more than 30 minutes in any 1-hour period.
- The baseline noise level plus 5 dB may not be exceeded for more than 15 minutes in any 1-hour period.
- The baseline noise level plus 10 dB may not be exceeded for more than 5 minutes in any 1-hour period.

- The baseline noise level plus 15 dB may not be exceeded for more than 1 minute in any 1-hour period.
- The baseline noise level plus 20 dB may not be exceeded for any period of time.

In addition, Los Angeles County has interior noise standards. For all multifamily residential land uses, the allowable interior noise level is 40 dB at night and 45 dB during the day. The allowable interior noise level may not be exceeded for more than 5 minutes in any 1-hour period, and the allowable interior noise level plus 5 dB cannot be exceeded for more than 1 minute in any 1-hour period. The allowable interior noise level plus 10 dB or the maximum measured ambient noise level may not be exceeded for any period of time. If the measured ambient noise level exceeds the allowable interior level, each standard described above may be increased by 5 dB.

14.3.3.3 Los Angeles County Construction Noise Requirements

Los Angeles County has specific restrictions for construction-related noise. The noise ordinance includes maximum noise levels for short- and long-term construction activities. For short-term construction, maximum noise levels from 7 a.m. to 8 p.m., excluding Sundays and holidays are 75 dB for single-family residential land uses, 80 dB for multifamily residential land uses, and 85 dB for semi-residential/ commercial land uses. From 8 p.m. to 7 a.m. daily and all day on Sundays and holidays, maximum noise levels are 60 dB for single-family residential land uses, 65 dB for multifamily residential land uses, and 70 dB for semi-residential/commercial land uses.

For long-term construction, maximum noise levels from 7 a.m. to 8 p.m., excluding Sundays and holidays, are 60 dB for single-family residential land uses, 65 dB for multifamily residential land uses, and 70 dB for semi-residential/commercial land uses. From 8 p.m. to 7 a.m. daily and all day on Sundays and holidays, maximum noise levels are 50 dB for single-family residential land uses, 55 dB for multifamily residential land uses, and 60 dB for semi-residential/commercial land uses.

14.3.4 Local

The program and project elements are subject to different local ordinances and planning standards depending on the applicable jurisdictions. Local regulations are discussed in this section by each program and project element.

San Jose Creek Water Reclamation Plant

The SJCWRP is located in the unincorporated area of Los Angeles County. Therefore, the Los Angeles County General Plan Noise Element and the county noise standards and construction noise requirements discussed in Section 14.3.3 are applicable to this plant. However, the plant is adjacent to the city of South El Monte, which could be affected by noise generated at the SJCWRP. The city of South El Monte standard discussed below is based on a L_{eq} threshold for construction noise, as opposed to the county's L_{max} threshold.

City of South El Monte

The city of South El Monte noise ordinance lists maximum permissible sound levels by zone: low-density residential, multifamily residential or public land use, commercial or commercial/manufacturing, and manufacturing. In specific project locations, if the measured ambient noise level exceeds the maximum permissible sound levels listed below, the measured ambient noise level should be used as the baseline.

For low-density residential zones, the maximum permissible daytime (7 a.m.–10 p.m.) sound level is 55 dB and the maximum permissible nighttime (10 p.m.–7 a.m.) sound level is 45 dB. For multifamily

residential zones, the maximum permissible daytime sound level is 60 dB and the maximum permissible nighttime sound level is 50 dB. For commercial or commercial/manufacturing zones, the maximum permissible sound level is 60 dB in the daytime and 55 dB at night. For manufacturing zones, the maximum permissible sound level is 70 dB anytime.

Exterior noise limits based on the maximum permissible sound levels described above are as follows:

- The maximum permissible sound level for a given zone may not be exceeded for more than 30 minutes in any 1-hour period.
- The maximum sound level plus 5 dB may not be exceeded for more than 15 minutes in any 1-hour period.
- The maximum permissible sound level plus 10 dB may not be exceeded for more than 5 minutes in any 1-hour period.
- The maximum permissible sound level plus 15 dB may not be exceeded for more than 1 minute in any 1-hour period.
- The maximum permissible sound level plus 20 dB may not be exceeded for any period of time.

Additionally, if an offensive noise contains a steady, audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting, the exterior noise limits described above should be reduced by 5 dB.

The City of South El Monte General Plan Noise Element serves as an official guide to the city council, planning commission, city departments, businesses, private organizations, and community members concerned with noise pollution in the city. The general plan noise element characterizes noise levels and describes policies applicable to noise issues and includes land use compatibility criteria for noise levels in the city. These criteria describe acceptable community noise equivalent level (CNEL) designations for various land uses. As explained in the general plan's Appendix D (Noise), the CNEL is a weighted-average measurement of daily noise levels. These criteria differ from those set forth in the city's noise ordinance, which are applicable only to brief periods within a single hour. Land use compatibility criteria in South El Monte are as follows:

- For low-density residential land uses, 60 dB is the normally acceptable CNEL.
- For multifamily residential and transient lodging land uses (i.e., motels), 65 dB is the normally acceptable CNEL.
- For schools, libraries, churches, hospitals, nursing homes, playgrounds, and neighborhood parks, 70 dB is the normally acceptable CNEL.
- For office, business commercial, and professional buildings, 70 dB is the normally acceptable CNEL.
- For industrial, manufacturing, utility, and agricultural land uses, 75 dB is the normally acceptable CNEL.

Pomona Water Reclamation Plant

The POWRP is located in the city of Pomona. The city of Pomona standard is based on a L_{eq} threshold for construction noise, as opposed to the county's L_{max} threshold.

City of Pomona

The city of Pomona noise ordinance lists maximum permissible sound levels by zone: low-density residential, multifamily residential, commercial, industrial, and high-traffic corridors. In specific project locations, if the measured ambient noise level exceeds the maximum permissible sound levels listed below, the measured ambient noise level should be used as the baseline.

For single-family residential zones, the allowable exterior daytime (7 a.m.–10 p.m.) sound level is 60 dB and the maximum permissible nighttime (10 p.m.–7 a.m.) sound level is 50 dB. For multifamily residential zones, the maximum permissible daytime sound level is 65 dB and the maximum permissible nighttime sound level is 50 dB. For commercial or commercial/manufacturing zones, the maximum permissible sound level is 65 dB in the daytime and 60 dB at night. For industrial zones and high-traffic corridor zones, the maximum permissible sound level is 70 dB during daytime and nighttime.

Exterior noise limits based on the maximum permissible sound levels described above are as follows:

- The maximum permissible sound level for a given zone may not be exceeded for more than 30 minutes in any 1-hour period.
- The maximum sound level plus 5 dB may not be exceeded for more than 15 minutes in any 1-hour period.
- The maximum permissible sound level plus 10 dB may not be exceeded for more than 5 minutes in any 1-hour period.
- The maximum permissible sound level plus 15 dB may not be exceeded for more than 1 minute in any 1-hour period.
- The maximum permissible sound level plus 20 dB may not be exceeded for any period of time.

Noise and vibration from construction sources are exempt provided that such activities do not take place between the hours of 8 p.m. and 7 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday, or exceed the noise standard of 65 dB plus limits specified above.

Los Coyotes Water Reclamation Plant

The LCWRP is located in the city of Cerritos. The city of Cerritos standard is based on a L_{eq} threshold for construction noise, as opposed to the county's L_{max} threshold.

City of Cerritos

The LCWRP is located in the city of Cerritos. The City of Cerritos General Plan Noise Element establishes policies designed to control noise levels in the city. In addition, the city of Cerritos noise ordinance lists maximum acceptable noise levels applicable within the city limits. These levels are divided based on land use: 50 dB in residential or agricultural areas, 60 dB in commercial areas, and 70 dB in industrial areas. The LCWRP is considered an industrial land use. The ordinance states that no noise will be generated that causes these noise levels to be exceeded by more than 5 dB.

For any repetitive noise or steady, audible tone, 5 dB should be subtracted from the maximum sound-level limit to determine whether a violation of the ordinance has occurred. The following adjustments should be applied to the maximum sound level limit only between 7 a.m. and 7 p.m., except for uses in or near residential areas:

- For any noise occurring for less than 15 minutes per hour, 5 dB should be added to the maximum sound level.

- For any noise occurring for less than 5 minutes per hour, 10 dB should be added to the maximum sound level.
- For any noise occurring for less than 1 minute per hour, 15 dB should be added to the maximum sound level.

Long Beach Water Reclamation Plant

The LBWRP is located in the city of Long Beach. The city of Long Beach standard is based on a L_{eq} threshold for construction noise, as opposed to the county's L_{max} threshold.

City of Long Beach

The city of Long Beach noise ordinance lists maximum permissible sound levels by zone: residential, commercial, and industrial. In specific project locations, if the measured ambient noise level exceeds the maximum permissible sound levels listed below, the measured ambient noise level should be used as the baseline.

For residential zones, the maximum permissible daytime (7 a.m.–10 p.m.) sound level is 50 dB and the maximum permissible nighttime (10 p.m.–7 a.m.) sound level is 45 dB. For commercial zones, the maximum permissible daytime sound level is 60 dB and the maximum permissible nighttime sound level is 55 dB. For industrial zones, the maximum permissible sound level is 65 dB, day or night.

Exterior noise limits based on the maximum permissible sound levels described above are as follows:

- The maximum permissible sound level for a given zone may not be exceeded for more than 30 minutes in any 1-hour period.
- The maximum sound level plus 5 dB may not be exceeded for more than 15 minutes in any 1-hour period.
- The maximum permissible sound level plus 10 dB may not be exceeded for more than 5 minutes in any 1-hour period.
- The maximum permissible sound level plus 15 dB may not be exceeded for more than 1 minute in any 1-hour period.
- The maximum permissible sound level plus 20 dB or the maximum measured ambient may not be exceeded for any period of time.

Additionally, if an offensive noise contains a steady, audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting, the exterior noise limits described above should be reduced by 5 dB.

Shaft Sites – JWPCP East and JWPCP West

The JWPCP is located along the southern boundary of the city of Carson and is adjacent to the city of Los Angeles' community of Wilmington–Harbor City. Because communities in both jurisdictions could be affected by noise generated at the JWPCP, noise guidelines for both jurisdictions are applicable to this analysis.

City of Carson

The Los Angeles County ordinance for construction noise was adopted and amended by the city of Carson to use different definitions for durations of short- and long-term construction.

The city of Carson's noise ordinance identifies several types of noise-producing activities that are considered unacceptable within city limits. The noise ordinance states that operation of any electric motor or engine, machine, or mechanical device between the hours of 11 p.m. and 7 a.m. is unacceptable unless the device is enclosed in a sound-insulated structure that prevents noise from being plainly audible 50 feet from the structure or within 10 feet of any residence.

The noise ordinance restricts the operation of certain equipment, including a pile driver, pneumatic hammer, derrick, hoist, or "other appliance" that produces loud or unusual noise, to between 7 a.m. and 6 p.m. Furthermore, the erection, demolition, alteration, construction, or repair of any building is restricted to between 7 a.m. and 6 p.m., except in emergency situations.

The City of Carson General Plan Noise Element background report lists expected ambient noise levels for single-family residential, multifamily residential, commercial, and industrial land uses. The noise element states that raising the ambient noise level of any area by 5 dB would result in a "slightly noisy" sound level.

For single-family residential land uses in the city of Carson, the expected ambient daytime (7 a.m.–7 p.m.) noise level is 55 dB. The expected ambient early evening (7 p.m.–10 p.m.) noise level is 50 dB, and the expected ambient nighttime (10 p.m.–7 a.m.) noise level is 45 dB. For multifamily residential land uses in the city of Carson, the expected ambient daytime noise level is 55 dB. The expected ambient evening and nighttime noise level is 50 dB. For commercial land uses in Carson, the expected ambient daytime noise level is 60 dB. The expected ambient evening and nighttime noise level for commercial land uses is 55 dB. For industrial land uses in the city of Carson (such as the JWPCP), the expected ambient noise level is 70 dB anytime.

City of Los Angeles

The City of Los Angeles General Plan Noise Element lists expected ambient noise levels for various land uses. These land use categories are not as clearly defined as those described for the city of Carson, but they translate approximately to residential, commercial, industrial, and heavy industrial.

The expected ambient noise level in residential areas during the day (7 a.m.–10 p.m.) is 50 dB and during the night (10 p.m.–7 a.m.) is 40 dB. The expected ambient noise level in commercial areas during the day is 60 dB and during the night is 55 dB.

The expected ambient noise level in industrial areas is 65 dB at all times. The expected ambient noise level in heavy industrial areas is 70 dB at all times.

The city of Los Angeles has adopted a noise ordinance that prevents an intruding noise from increasing the ambient noise level of an area by more than 5 dB. When applied to specific project locations, if the measured ambient noise level exceeds the expected ambient noise level, the measured ambient noise level should be used as the baseline (Jones & Stokes 1984).

The city also requires that adjustments be applied to noise level measurements to determine whether a violation of the ordinance has occurred. For any noise with an audible fundamental frequency of 200 Hz, 5 dB should be added to the noise level measurement. For any repeated, impulsive noise, 5 dB should be added to the noise level measurement. For any noise occurring for less than 15 minutes in any consecutive l-hour period between 7 a.m. and 10 p.m., 5 dB should be subtracted from the noise level measurement.

Shaft Sites – TraPac, LAXT, Southwest Marine, Angels Gate, and Royal Palms

Local noise standards specified in the city of Los Angeles code are applicable to shaft sites located in the Port of Los Angeles and the community of San Pedro.

Pasha Terminal and Fish Harbor

Local noise standards specified in the city of Los Angeles code are applicable to the Pasha Terminal and Fish Harbor, located in the Port of Los Angeles.

14.4 Environmental Impacts and Mitigation Measures

14.4.1 Methodology and Assumptions

14.4.1.1 Construction Noise

The assessment of potential construction noise levels was based on methodology developed by the FTA (2006). Noise levels produced by commonly used construction equipment are summarized in Table 14-8. Individual types of construction equipment are expected to generate maximum noise levels ranging from 80 to 85 dBA at a distance of 50 feet. The construction noise level at a given receiver depends on the type of construction activity, the noise level generated by that activity, and the distance and shielding between the activity and noise-sensitive receivers.

Table 14-8. Construction Equipment Noise Emission Levels

Equipment	Quantity	Typical Noise Level (dBA) 50 Feet From Source
Grader	1	85[a]
Bulldozers	1	85[a]
Truck	2	84[b]
Loader	1	85[a]
Air Compressor	1	81[a]
Backhoe	1	80[a]
Pneumatic Tool	1	85[a]
Excavator	2	85[b]
Auger Drill Rig (for drilled piles)	1	85[a]

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
dBA = A-weighted decibel

Utilization factors for construction noise are used in the analysis when the applicable construction noise ordinance uses a noise standard based on L_{eq} noise exposure. The L_{eq} noise standard accounts for the energy-average of noise over a specified interval (usually 1 hour), so a utilization factor represents the amount of time a type of equipment is used during the interval. Jurisdictions such as the county of Los Angeles use an L_{max} standard, which represents a loudest-case scenario that assumes all equipment is operating simultaneously.

14.4.1.2 Traffic Noise Modeling

Existing traffic noise levels at sensitive receptors surrounding the JWPCP were evaluated through use of the FHWA Traffic Noise Model Lookup program (TNM). This model estimates average noise levels at fixed distances from the roadway centerline based on estimated traffic volumes for automobiles and medium- and heavy-duty trucks, vehicle speeds, and a designated noise drop-off rate. Shielding effects

from topographical features and buildings are not accounted for in the model. The model was programmed to produce a conservative, worst-hour estimate of traffic-generated noise levels due to heavy truck and increased commuter trips associated with construction at the JWPCP shaft sites (project) and with biosolids management at the JWPCP (program).

14.4.1.3 Noise Monitoring of Ambient Noise Levels

Where applicable to local standards, results of noise monitoring conducted at project elements are used in the analysis to describe the ambient noise environment in the area.

14.4.1.4 Groundborne Vibration and Noise From Tunneling Operations

Analysis of groundborne vibration and noise from tunneling operations is based on methodology used in the Integrated Resources Plan (IRP) Draft Environmental Impact Report (EIR) (City of Los Angeles 2005). Tunneling operations for the IRP required the use of tunnel boring machines (TBMs) and haul trains (or locomotives), which shuttle materials, equipment, and construction workers back and forth in the tunnel between the TBM and the shaft. The tunneling operations for the Clearwater Program are similar.

The analysis is based on vibration measurements of TBM and haul train operations during tunnel construction of the Metropolitan Transportation Authority Red Line in the city of Los Angeles. The data from that study were supplemented by vibration data from the city of Los Angeles' North Outfall Replacement Sewer (NORS) project. The IRP vibration study determined that vibration data from the Red Line and NORS projects would be analogous to construction vibration levels from TBM and haul train operations for the IRP. However, it should be noted that the impact estimates for the analysis of this project element are conservative, because tunnel depths studied in the IRP vibration analysis were generally shallower.

Currently, there are no federal regulations or California Environmental Quality Act (CEQA) guidelines for vibration resulting from tunnel construction. The thresholds used for this project were specified in the IRP and were adapted from thresholds used in other tunneling projects in the city of Los Angeles (City of Los Angeles 2005), and the Federal Transit Administration Guidance Manual (FTA 2006). The impact threshold for groundborne vibrations from TBM operations is 80 VdB (based on a crest factor of 4), which is equivalent to a ppv of 0.04 inch per second. The impact threshold for groundborne vibrations from locomotive operation is 75 VdB (based on a crest factor of 5), which is equivalent to a ppv of 0.025 inch per second. The impact threshold for groundborne noise levels from haul trains is 45 dBA, which is equivalent to a ppv of approximately 0.01 inch per second. Due to variations in geology and building types, actual vibration and noise levels could vary.

It should be noted that vibration from TBM operations occurs at low frequencies, whereas groundborne noise typically is caused by higher frequency vibration. Therefore, audible groundborne noise from TBM operation is not anticipated at sensitive receptors located above the tunnel and will not be further discussed. Based on data presented in the IRP study, maximum groundborne vibration levels of 0.02 inch per second ppv were measured up to a minimum 20-foot horizontal distance from the tunnel centerline during TBM operations for an average tunnel depth of 50 feet, which is less than the TBM vibration impact threshold of 0.04 inch per second. Therefore, groundborne vibrations from the TBM for the Clearwater Program are generally anticipated to be below the threshold for significant impact.

Consequently, for this project, the haul trains would be the only likely source of any perceivable groundborne noise and vibration. Groundborne noise from moving haul trains would be generated from

the wheel-rail interface and could propagate through the ground to nearby buildings at a frequency within the range of human hearing and manifest as audible noise inside structures.

Based on data presented in the IRP study, maximum ppv levels of 0.025 inch per second were measured up to a minimum 35-foot horizontal distance from the tunnel centerline during haul train operations, based on an average tunnel depth of 50 feet, which is at the haul train vibration threshold of 0.025 inch per second, and higher than the groundborne noise threshold of 0.01 inch per second at horizontal distances of less than 100 feet.

At the average tunnel depth of 50 feet used in the IRP analysis, a horizontal distance of 100 feet from tunnel centerline translates to a diagonal distance of approximately 110 feet from the tunnel base. Groundborne noise impacts for this project element were derived from the IRP analysis; therefore, the conditions under which receivers may be affected by groundborne noise from haul trains occur where receivers are less than 110 diagonal feet away from the tunnel base. This concept is translated into horizontal distance to the groundborne noise threshold level as a function of tunnel depth as shown on Figure 14-1. The vertical, diagonal, and horizontal distance relationships between the tunnel base, ground surface, and tunnel centerline are shown on Figure 14-2. In areas where the depth of the tunnel base is greater than 110 feet, groundborne noise levels would be below the impact threshold.

14.4.1.5 Baseline

CEQA Baseline

The CEQA baseline is the ambient noise level in a given program and project element location. Baseline noise levels vary greatly depending on the extent of urban development and proximity to transportation corridors. Ambient urban noise levels are typically in the range of 55 to 65 dB (see Table 14-3). Ambient noise levels near major highways can be as high as 75 dB.

Noise monitoring was conducted for the Clearwater Program to characterize ambient noise levels near shaft sites, which are anticipated to be the most active construction areas. Monitoring was conducted over 24-hour periods at four positions, using a Rion Model NL-21 Type 2 sound level meter (serial numbers 773232 and 776887). The purpose of the monitoring was to describe variations in sound levels throughout the day, rather than absolute sound levels at a specific receptor of concern. The long-term sound level data were collected over the 24-hour periods at each site from Tuesday, February 16, to Thursday, February 18, 2010. Locations of noise monitoring are shown on Figure 14-3. Noise monitoring was conducted at the following sites:

- **LT-1.** Long-term monitoring site LT-1 was located in the backyard of a residence west of Frigate Avenue, and set back about 100 feet south of West Lomita Boulevard. The microphone was placed approximately 3 feet above the surrounding ground. The purpose of the measurement at this site was to characterize ambient noise levels in the neighborhood near the JWPCP further away from I-110, where arterial traffic is the dominant noise source.
- **LT-2.** Long-term monitoring site LT-2 was located next to Fire Station 40 within the Port of Los Angeles, and set back about 160 feet east of Ferry Street. The microphone was placed approximately 3 feet above the surrounding ground. The purpose of the measurement at this site was to characterize typical ambient noise levels in the Port of Los Angeles, including the LAXT, TraPac, and Southwest Marine shaft sites.
- **LT-3.** Long-term monitoring site LT-3 was located at a baseball field at the Wilmington Athletic Complex approximately 40 feet east of Figueroa Street. The microphone was placed approximately 3 feet above the surrounding ground. The purpose of the measurement at this site

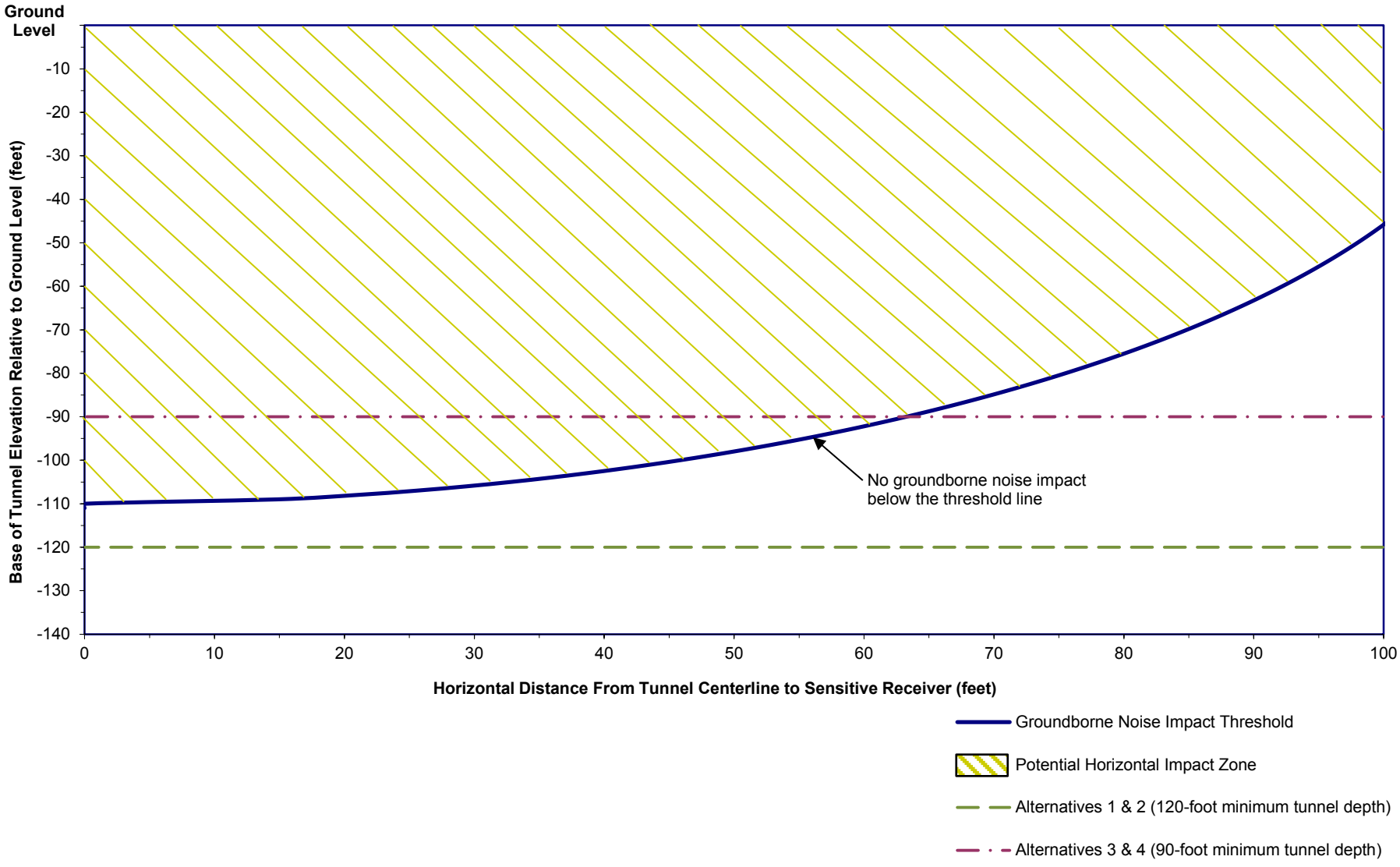

FIGURE 14-1

CLEARWATER Program

Groundborne Noise Impact Threshold as a Function of Tunnel Depth

Source: Sanitation Districts of Los Angeles County 2011

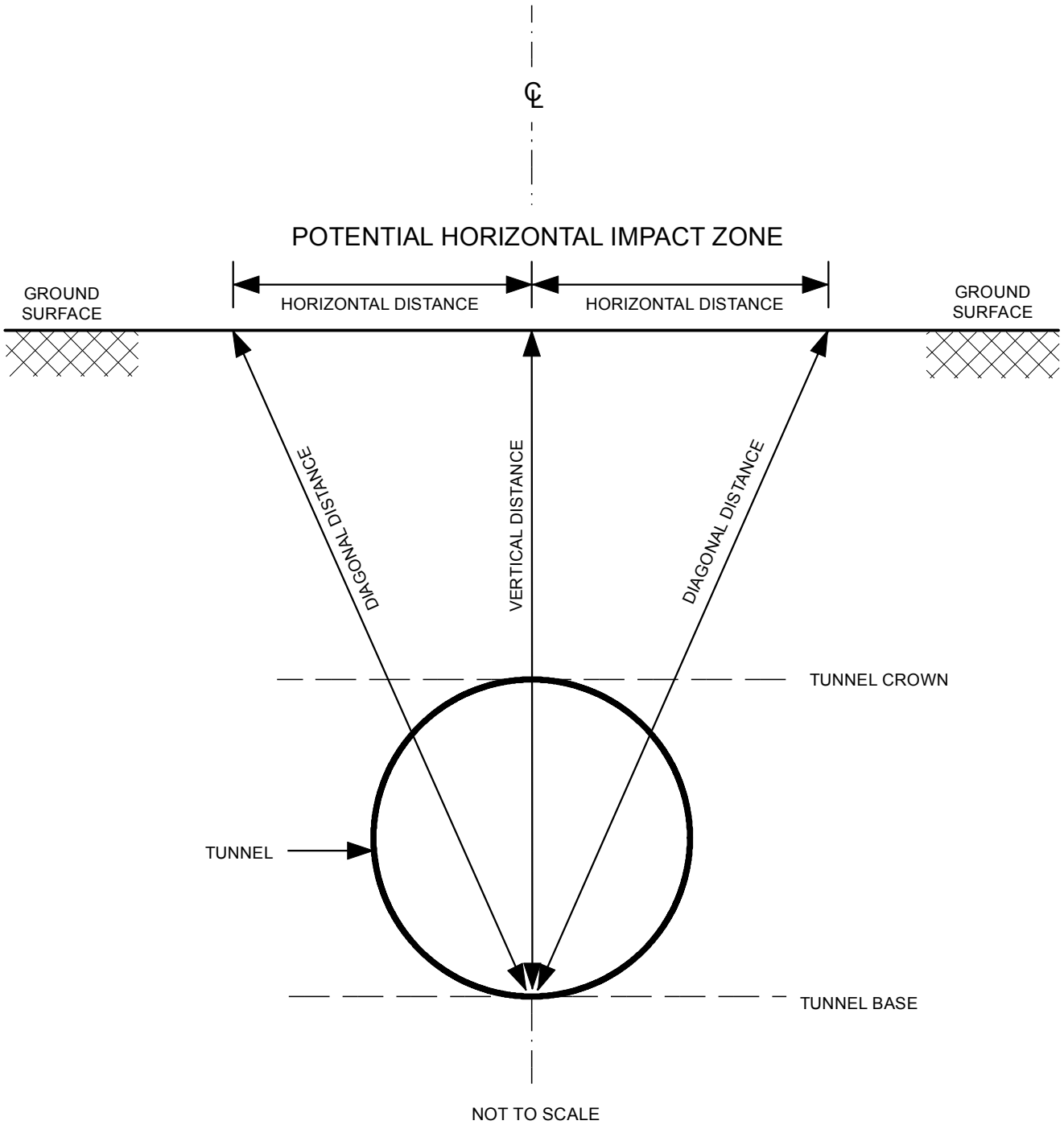

FIGURE 14-2

CLEARWATER Program

Potential Horizontal Impact Zone From Tunnel Hauling Activities

Source: Sanitation Districts of Los Angeles County 2011, City of Los Angeles 2005

FIGURE 14-3

CLEARWATER Program

Long-Term Noise Monitoring Locations

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011, ESRI 2011

was to characterize ambient noise levels in the neighborhood near the JWPCP, which has high ambient noise levels from traffic on I-110.

- **LT-4.** Long-term monitoring site LT-4 was located on the bluff overlooking Royal Palms Beach, and set back about 120 feet south of West Paseo Del Mar near its intersection with Western Avenue. The microphone was placed approximately 3 feet above the surrounding ground. The purpose of the measurement at this site was to characterize typical ambient noise levels along this coastal highway environment in the community of San Pedro, including the Royal Palms and Angels Gate shaft sites.

Noise monitoring for the project elements is discussed in Section 14.2.5 where applicable and is summarized in Table 14-9.

Table 14-9. Long-Term Noise Monitoring Locations

Noise Monitoring Site	Location	Loudest Daytime Noise Level dBA L_{eq}(1h)	Quietest Daytime Noise Level dBA L_{eq}(1h)	Quietest Nighttime Noise Level dBA L_{eq}(1h)	L_{dn}
LT-1	Lomita Blvd., near the JWPCP East shaft site	66.4	52.3	52.4	62.4
LT-2	Seaside Ave., near the LAXT shaft site	62.4	57.9	48.6	63.5
LT-3	Figueroa St., near the JWPCP West shaft site	69.6	63.6	60.6	71.5
LT-4	W Paseo Del Mar, near the Royal Palms shaft site	60.3	57.7	58.1	65.2

L_{eq} = equivalent sound level
L_{dn} = day-night sound level
dBA = A-weighted decibel

NEPA No-Federal-Action Baseline

The National Environmental Policy Act (NEPA) no-federal-action baseline for the Clearwater Program is described in Section 1.7.4.2. The NEPA baseline in general represents the condition of resources at the year 2022 when construction of project elements under the U.S. Army Corps of Engineers' (Corps') jurisdiction would conclude.

The project area is fully developed and encompasses industrial, commercial, residential, and recreational uses. Furthermore, the project alternatives would not permanently change land use patterns. Therefore, the analysis assumes that the existing noise and vibration patterns would continue to remain in a comparable state through the completion of construction in 2022. As a result, the NEPA no-federal-action baseline is the same as the CEQA baseline.

Note that the NEPA analysis includes direct and indirect impacts as discussed in Section 3.5.2. Any impact associated with project elements located within the Corps' geographic jurisdiction (i.e., the marine environment) during construction would be the direct result of the Corps permit and considered a direct impact under NEPA. Any impact associated with project elements located outside the Corps' geographic jurisdiction during construction would be the indirect result of the Corps permit and considered an indirect impact under NEPA. Any impact that occurs during operation would be considered an indirect impact under NEPA.

14.4.2 Thresholds of Significance

The program and/or project would pose a significant impact if it exceeds any of the following thresholds for terrestrial noise and vibrations (NOI):

NOI-1. Exposes persons to or generates noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies.

NOI-2. Exposes persons to or generates excessive groundborne vibration or groundborne noise levels.

NOI-3. Results in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

NOI-4. Results in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

In addition, the program and/or project would pose a significant impact if it:

NOI-5. Is located within an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and exposes people residing or working in the project area to excessive noise levels.

NOI-6. Is located in the vicinity of a private airstrip and exposes people residing or working in the project area to excessive noise levels.

Program and project elements were analyzed by threshold in the Preliminary Screening Analysis (Appendix 1-A) to identify potentially significant noise and vibrations impacts before mitigation. Table 14-10 identifies which elements were brought forward for further analysis by threshold in this EIR/EIS for Alternatives 1 through 4. If applicable, Table 14-10 also identifies thresholds evaluated in this EIR/EIS if an emergency discharge into various water courses were to occur under the No-Project or No-Federal Action Alternatives, as described in Sections 3.4.1.5 and 3.4.1.6.

Table 14-10. Thresholds Evaluated

		Threshold					
	Alt.	**NOI-1**	**NOI-2**	**NOI-3**	**NOI-4**	**NOI-5**	**NOI-6**
Program Element							
Conveyance System Improvements	1–5	X			X		
SJCWRP Plant Expansion	1–5	X			X		
SJCWRP Process Optimization	1–4	X			X		
POWRP Process Optimization	1–4	X			X		
LCWRP Process Optimization	1–4	X			X		
LBWRP Process Optimization	1–4	X			X		
JWPCP Solids Processing	1–5	X			X		
JWPCP Biosolids Management	1–5	X		X	X		

Table 14-10 (Continued)

		Threshold					
	Alt.	**NOI-1**	**NOI-2**	**NOI-3**	**NOI-4**	**NOI-5**	**NOI-6**
Project Element							
Wilmington to SP Shelf (onshore tunnel)[a]	1,2		X				
Wilmington to SP Shelf (offshore tunnel)	1		X				
Wilmington to PV Shelf (onshore tunnel)[a]	1,2		X				
Wilmington to PV Shelf (offshore tunnel)	2		X				
Figueroa/Gaffey to PV Shelf (onshore tunnel)	3		X				
Figueroa/Gaffey to PV Shelf (offshore tunnel)	3		X				
Figueroa/ Western to Royal Palms (onshore tunnel)	4		X				
JWPCP East Shaft Site	1,2	X	X		X		
TraPac Shaft Site	1,2	X	X		X		
LAXT Shaft Site	1,2	X	X		X		
Southwest Marine Shaft Site	1,2	X	X		X		
JWPCP West Shaft Site	3,4	X	X		X		
Angels Gate Shaft Site	3	X	X		X		
Royal Palms Shaft Site	4	X	X		X		

[a] The onshore tunnel alignment for the Wilmington to SP Shelf is the same as the onshore tunnel alignment for the Wilmington to PV Shelf.
Alt. = alternative

For a detailed discussion of impacts on noise and vibrations resulting from construction and operations within the riser and diffuser areas, refer to Chapter 13. In the alternatives analysis that follows, if a program or project element is common to more than one alternative, a detailed discussion is presented only in the first alternative in which it appears.

14.4.3 Alternative 1

14.4.3.1 Program

Impact NOI-1. Would Alternative 1 (Program) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Conveyance System – Conveyance Improvements

Construction

The Los Angeles County ordinance and/or applicable local city noise ordinances for short-term construction noise are applicable to construction of conveyance system improvements throughout the JOS.

Potential noise levels from construction of the conveyance system improvements were evaluated by combining the noise levels of the three loudest pieces of equipment that would likely operate at the same time (loader, backhoe, and truck). The combined noise level is 88 dBA at 50 feet. The estimated sound

levels from construction activities as a function of distance based on calculated point-source attenuation over soft (i.e., acoustically absorptive) ground are shown in Table 14-11.

Table 14-11. Predicted Noise Levels From Construction Activities – Conveyance System

Distance Between Source and Receiver (feet)	Calculated L_{max} Sound Level (dBA)
50	88
100	80
160	75
200	72
250	70
300	68
400	65
500	62
600	60
700	58
800	57
1,000	54

Calculations are based on FTA 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{max} = maximum sound level

dBA = A-weighted decibel

The results shown in Table 14-11 indicate that residences located within 160 feet of an active construction site could be exposed to construction noise in excess of the county's daytime (7 a.m.–8 p.m.) maximum noise standard of 75 dBA. Nighttime construction of conveyance improvements is not anticipated. However, the Sanitation Districts occasionally conduct nighttime work during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes that have no isolation valves or gates. These activities generally would not cause noise to increase noticeably above background levels. City noise ordinances vary by jurisdiction. The conveyance system extends through many residential areas in the county, usually under surface streets that are fronted by single-family homes. Construction activities could occur within 50 feet of a given residence, and construction noise could exceed daytime and nighttime noise standards at nearby residences under applicable local noise ordinance thresholds.

However, no specific conveyance projects have been proposed, and the location, duration, extent, and timing of the sewer relief work are unknown at this time. The Sanitation Districts incorporate many standard practices and requirements into each publicly bid construction contract, including installation of new sewers or rehabilitation of existing sewers, to minimize project impacts. These standard practices and requirements contain public outreach requirements and noise-reducing measures. Prior to construction, notices that provide an estimated project schedule and contact information are distributed to the surrounding community. During construction, the Sanitation Districts require contractors to meet local noise ordinances. Therefore, construction noise impacts resulting from conveyance improvements are considered less than significant, and no mitigation is required.

San Jose Creek Water Reclamation Plant – Plant Expansion

Construction

The Los Angeles County ordinance for short-term construction noise applies to construction of the SJCWRP expansion.

Potential noise levels from construction of the SJCWRP expansion were evaluated by combining the noise levels of the three loudest pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and auger drill rig). Any construction involving piles would utilize a drilling method, rather than impact pile driving. The combined noise level is 89 dBA at 50 feet. The estimated sound levels from construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-12.

Table 14-12. Predicted Noise Levels From Construction Activities at SJCWRP – Plant Expansion

Distance Between Source and Receiver (feet)	Calculated L_{max} Sound Level (dBA)
50	89
100	82
200	74
400	66
600	61
800	58
900	57

Calculations are based on FTA 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{max} = maximum sound level

dBA = A-weighted decibel

Expansion activities would occur on the western part of the property. The nearest residences west of the SJCWRP are approximately 600 feet to the southwest across SR-60 and 900 feet to the northwest across San Jose Creek. Any construction noise at residences adjacent to SR-60 would be overshadowed by traffic noise. The results shown in Table 14-12 indicate that residences located within 900 feet of the SJCWRP construction site could be exposed to a construction noise level of about 57 dBA, which is below the county's daytime maximum noise standard of 75 dBA. Nighttime construction of plant expansion elements at the SJCWRP is not anticipated. However, the Sanitation Districts occasionally conduct nighttime work at the plant during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes or channels that have no isolation valves or gates. These activities generally would not cause noise to increase noticeably above background levels. Therefore, construction noise impacts resulting from the SJCWRP plant expansion are considered less than significant, and no mitigation is required.

San Jose Creek Water Reclamation Plant – Process Optimization

Construction

The Los Angeles County ordinance for short-term construction noise is applicable to construction of the SJCWRP process optimization facilities.

Potential noise levels from construction of the SJCWRP process optimization facilities were evaluated by summing the noise levels of the three loudest pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and trucks). The combined noise level is 88 dBA at 50 feet. The estimated sound levels from construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-13.

Table 14-13. Predicted Noise Levels From Construction Activities at SJCWRP – Process Optimization

Distance Between Source and Receiver (feet)	Calculated L_{max} Sound Level (dBA)
50	88
100	80
160	75
200	72
250	70
300	68
400	65
500	62
600	60
700	58
800	57
1,000	54

Calculations are based on FTA 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{max} = maximum sound level

dBA = A-weighted decibel

The nearest residences to the SJCWRP are approximately 400 feet to the east across San Jose Creek. The results shown in Table 14-13 indicate that residences located within 400 feet of the construction site at the SJCWRP would not be exposed to construction noise in excess of the county's daytime maximum standard of 75 dBA. Nighttime construction of process optimization elements at the SJCWRP is not anticipated. However, the Sanitation Districts occasionally conduct nighttime work at the plant during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes or channels that have no isolation valves or gates. These activities generally would not cause noise impacts beyond background levels. Therefore, noise impacts resulting from construction of the SJCWRP process optimization facilities are considered less than significant, and no mitigation is required.

Pomona Water Reclamation Plant – Process Optimization

Construction

The city of Pomona ordinance for construction noise is applicable to construction of the POWRP process optimization facilities.

Potential noise levels from construction of the POWRP process optimization facilities were evaluated by summing the noise levels of pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and trucks), and applying a 40 percent utilization factor (Thalheimer 2000) for each piece of equipment. The combined L_{eq} noise level is 86 dBA at 50 feet. The estimated sound levels from

construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-14.

Table 14-14. Predicted Noise Levels From Construction Activities – POWRP

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level (dBA)
50	86
100	78
200	71
500	60
1,000	52

Calculations are based on FTA 2006. Calculation do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{eq} = A-weighted equivalent sound level

dBA = A-weighted decibel

The nearest residences to the POWRP are approximately 1,000 feet to the north across a railway and West Pomona Boulevard. The results shown in Table 14-14 indicate that residences located within 1,000 feet of the construction site at the POWRP would not be exposed to construction noise levels that would exceed the city's daytime noise standard of 60 dBA L_{eq} for equipment operating up to 30 minutes in a given 1-hour period. Nighttime construction of process optimization elements at the POWRP is not anticipated. However, the Sanitation Districts occasionally conduct nighttime work at the plant during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes or channels that have no isolation valves or gates. These activities generally would not cause noise impacts beyond background levels. Therefore, noise impacts resulting from construction of the POWRP process optimization facilities are considered less than significant, and no mitigation is required.

Los Coyotes Water Reclamation Plant – Process Optimization

Construction

The city of Cerritos noise ordinance is applicable to construction of the LCWRP process optimization facilities.

Potential noise levels from construction of the LCWRP process optimization facilities were evaluated by summing the noise levels of pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and trucks), and applying a 40 percent utilization factor for each piece of equipment. The combined L_{eq} noise level is 86 dBA at 50 feet. The estimated sound levels from construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-15.

Table 14-15. Predicted Noise Levels From Construction Activities – LCWRP

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level (dBA)
50	86
100	78
200	71
500	60
700	56
1,000	52

Calculations are based on FTA 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

The nearest residences to the LCWRP process optimization site are approximately 700 feet to the east across a 10-lane segment of I-605. Construction noise from the LCWRP would be overshadowed by traffic noise in this location. The second-nearest residences to the LCWRP are approximately 1,000 feet to the west across the channelized San Gabriel River. The results shown in Table 14-15 indicate that residences located within 1,000 feet of the construction site at the LCWRP would not be exposed to a construction noise level resulting in a 5 dB increase over the city's daytime noise standard of 50 dBA L_{eq}. Nighttime construction of process optimization elements at the LCWRP is not anticipated. However, the Sanitation Districts occasionally conduct nighttime work at the plant during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes or channels that have no isolation valves or gates. These activities generally would not cause noise impacts beyond background levels. Therefore, noise impacts resulting from construction of the LCWRP process optimization facilities are considered less than significant, and no mitigation is required.

Long Beach Water Reclamation Plant – Process Optimization

Construction

The Long Beach noise ordinance is applicable to construction of the LBWRP process optimization facilities.

Potential noise levels from construction of the LBWRP process optimization facilities were evaluated by summing the noise levels of pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and trucks), and applying a 40 percent utilization factor for each piece of equipment. The combined L_{eq} noise level is 86 dBA at 50 feet. The estimated sound levels from construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-16.

Table 14-16. Predicted Noise Levels From Construction Activities – LBWRP

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level (dBA)
50	86
100	78
250	71
500	60
1,000	52
1,200	50
1,500	48
2,000	44

Calculations are based on FTA 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

The nearest residences to the LBWRP process optimization site are approximately 1,200 feet to the east across a 10-lane segment of I-605. Construction noise from the LBWRP would be overshadowed by traffic noise on I-605. The second-nearest residences to the LBWRP are approximately 2,000 feet to the west across the channelized San Gabriel River. The results shown in Table 14-16 indicate that residences located within 2,000 feet of the construction site at the LBWRP could be exposed to a construction noise level of about 44 dBA, which is below the city's daytime maximum noise standard of 50 dBA. However, the Sanitation Districts occasionally conduct nighttime work at the plant during times of low wastewater flow for activities such as the connection of new facilities and systems to existing operations. This type of work mostly involves a power shutdown for connection to an electrical system or a flow stoppage for connection to pipes or channels that have no isolation valves or gates. These activities generally would not cause noise impacts beyond background levels. Therefore, noise impacts resulting from construction of the LBWRP process optimization facilities are considered less than significant, and no mitigation is required.

Joint Water Pollution Control Plant – Solids Processing

Construction

The city of Carson noise ordinance is applicable to short-term construction noise associated with solids processing facilities at the JWPCP. The construction of new facilities at the JWPCP is anticipated to take place during daytime hours only.

Potential noise levels from construction of the JWPCP solids processing facilities were evaluated by summing the noise levels of the three loudest pieces of equipment that would likely operate at the same time (bulldozer, backhoe, and trucks). The combined noise level is 88 dBA at 50 feet. The estimated sound levels from construction activities as a function of distance based on calculated point-source attenuation over soft ground are shown in Table 14-17.

Table 14-17. Predicted Noise Levels From Construction Activities – JWPCP Solids Processing

Distance Between Source and Receiver (feet)	Calculated L_{max} Sound Level (dBA)
50	88
100	80
200	72
300	68
400	65
500	62
1,100	53

Calculations are based on FTA 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

L_{max} = Maximum sound level

dBA = A-weighted decibel

The nearest residences to the JWPCP solids processing construction sites are approximately 400 feet to the southwest across an 8-lane segment of I-110. The results shown in Table 14-17 indicate that residences located within 400 feet of the construction site could be exposed to a construction noise level of about 65 dBA, which is below the city's daytime maximum construction noise standard of 75 dBA. Further, construction noise from the JWPCP solid processing sites would be overshadowed by traffic on I-110. Therefore, noise impacts resulting from construction of the JWPCP solids processing facilities are considered less than significant, and no mitigation is required.

Joint Water Pollution Control Plant – Biosolids Management

Operation

The increase in biosolids generated by the JWPCP would result in an estimated increase in heavy truck trips of approximately 20 per day. The existing noise levels near surface streets adjacent to the JWPCP are in the range of 52 to 66 dBA L_{eq}(1h). Based on TNM modeling results, this increased truck traffic is predicted to produce an overall increase of less than 1 dB in ambient noise levels. Therefore, impacts are considered less than significant.

CEQA Impact Determination

Construction and operation of Alternative 1 (Program) would not expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts would be less than significant.

Mitigation

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

Impact NOI-3. Would Alternative 1 (Program) result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Joint Water Pollution Control Plant – Biosolids Management

Operation

As stated under Impact NOI-1, the truck traffic increase from the JWPCP is predicted to produce an overall increase of less than 1 dB in ambient noise levels. Therefore, impacts are considered less than significant.

CEQA Impact Determination

Operation of Alternative 1 (Program) would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts would be less than significant.

Mitigation

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

Impact NOI-4. Would Alternative 1 (Program) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Conveyance System – Conveyance Improvements

Construction

Construction impacts associated with conveyance improvements under Alternative 1 (Program) were previously discussed under Impact NOI-1. The Sanitation Districts incorporate many standard practices and requirements into each publicly bid construction contract, including installation of new sewers or rehabilitation of existing sewers, to minimize project impacts. These standard practices and requirements contain public outreach requirements and noise-reducing measures. Prior to construction, notices that provide an estimated project schedule and contact information are distributed to the surrounding community. During construction, Sanitation Districts require contractors to meet local noise ordinances. Therefore, construction noise impacts resulting from conveyance improvements are considered less than significant, and no mitigation is required.

San Jose Creek Water Reclamation Plant – Plant Expansion

Construction

Construction associated with the SJCWRP plant expansion would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The results shown in Table 14-12 indicate that residences located within 900 feet of the SJCWRP construction site could be exposed to a construction

noise level of about 57 dBA, which could result in a noise increase of 5 dB or more above ambient noise levels. This would be considered a detectable increase in ambient noise levels. Because a substantial temporary increase in ambient noise levels is predicted to occur during construction of plant expansion facilities at the SJCWRP, impacts are considered significant. Implementation of Mitigation Measure (MM) NOI-4a and MM NOI-4b would reduce impacts to less than significant.

Operation

An emergency generator is scheduled to be installed in the western section of the SJCWRP. The generator could intermittently cause an increase in ambient noise levels adjacent to the SJCWRP during times when emergency power is required and when the generator system is tested. This generator would be housed in an acoustical enclosure. Noise emissions from the generator would be required to conform to acoustical performance standards specified by the Sanitation Districts. Each piece of equipment at SJCWRP is required to produce a noise level of no more than 85 dBA at a distance of 3 feet from the source.

The nearest residences west of the SJCWRP are approximately 600 feet to the southwest across SR-60 and 900 feet to the northwest across San Jose Creek. Operations noise at residences adjacent to SR-60 would be overshadowed by traffic noise. During times of operation, the emergency generator is predicted to produce an overall increase of less than 1 dB in ambient noise levels at nearby residential locations. This would not be a detectable increase in noise levels, and impacts would be less than significant.

San Jose Creek Water Reclamation Plant – Process Optimization

Construction

Construction associated with SJCWRP process optimization under Alternative 1 (Program) would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The CEQA analysis for the construction of process optimization at the SJCWRP is the same as discussed under Impact NOI-1. The results shown in Table 14-13 indicate that residences located within 400 feet of the SJCWRP construction site could be exposed to a construction noise level of about 65 dBA, which could result in a noise increase of 5 dB or more above ambient noise levels. This would be a detectable increase in noise levels. Because a substantial temporary increase in ambient noise levels is predicted to occur during construction of process optimization facilities at the SJCWRP, impacts are considered significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

Pomona Water Reclamation Plant – Process Optimization

Construction

Construction associated with POWRP process optimization under Alternative 1 (Program) would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The CEQA analysis for the construction of process optimization at the POWRP is the same as discussed under Impact NOI-1. The results shown in Table 14-14 indicate that residences located within 1,000 feet of the POWRP construction site could be exposed to a construction noise level of about 52 dBA. Construction

noise at the POWRP would be overshadowed by local traffic noise and would not result in a substantial increase above ambient noise levels in this urban setting. Impacts would be less than significant.

Los Coyotes Water Reclamation Plant – Process Optimization

Construction

Construction associated with LCWRP process optimization under Alternative 1 (Program) would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The CEQA analysis for the construction of process optimization at the LCWRP is the same as discussed under Impact NOI-1. The results shown in Table 14-15 indicate that residences located within 1,000 feet of the LCWRP construction site could be exposed to a construction noise level of about 52 dBA, which would not result in a substantial increase above ambient noise levels in this urban setting. Impacts would be less than significant.

Long Beach Water Reclamation Plant – Process Optimization

Construction

Construction associated with LBWRP process optimization under Alternative 1 (Program) would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The CEQA analysis for the construction of process optimization at the LBWRP is the same as discussed under Impact NOI-1. The results shown in Table 14-16 indicate that residences located within 2,000 feet of the LBWRP construction site could be exposed to a construction noise level of about 44 dBA, which would not result in a substantial increase above ambient noise levels in this urban setting next to a transportation corridor. Impacts would be less than significant.

Joint Water Pollution Control Plant – Solids Processing

Construction

Construction associated with the JWPCP solids processing facilities would temporarily increase noise in the vicinity of the plant. Noise increases would result from onsite construction activities (especially during site preparation, grading, and other earthmoving activities) and from construction-related vehicle traffic delivering materials to and from the construction site. The CEQA analysis for the construction of solids processing facilities is the same as discussed under Impact NOI-1. The results shown in Table 14-17 indicate that residences located within 1,100 feet of the JWPCP solids processing sites could be exposed to a construction noise level of about 53 dBA, which would not result in a substantial increase above ambient noise levels in this urban setting. Impacts would be less than significant.

Joint Water Pollution Control Plant – Biosolids Management

Operation

As stated under Impact NOI-1, the truck traffic increase from the JWPCP is predicted to produce an overall increase of less than 1 dB in ambient noise levels. This would not result in a substantial increase above ambient noise levels in this urban setting. Impacts would be less than significant.

CEQA Impact Determination

Construction of the plant expansion at the SJCWRP and process optimization at the SJCWRP for Alternative 1 (Program) would result in a substantial temporary or periodic increase in ambient noise levels in the plant vicinity above levels existing without the program. Impacts would be significant before mitigation. Operation of Alternative 1 (Program) would result in less than significant impacts.

Mitigation

MM NOI-4a. Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following:

- Limit construction operations to exempt hours
- Locate equipment as far as practical from noise-sensitive uses
- Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation
- Prohibit gasoline or diesel engines from having unmuffled exhaust
- Use noise-reducing enclosures around noise-generating equipment
- Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission

MM NOI-4b. Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.

Residual Impacts

MM NOI-4a and MM NOI-4b would reduce the significant impacts associated with plant expansion and process optimization construction at the SJCWRP. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

14.4.3.2 Project

Impact NOI-1. Would Alternative 1 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Shaft Site – JWPCP East

Construction

CEQA Analysis

The cities of Los Angeles and Carson ordinances for construction noise are both applicable to construction at the JWPCP East shaft site. The JWPCP East shaft site is a working shaft site, and construction activities would likely occur 10 to 24 hours a day. Therefore, daytime and nighttime noise standards apply.

Potential noise levels resulting from construction at the JWPCP East shaft site were evaluated by assigning utilization factors and quantities to pieces of equipment that would be used during shaft and tunneling construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-18.

Table 14-18. Construction Source Level Assumptions – JWPCP East

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	20	78
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	75	84
Loaders – Wheeled	2	85[b]	60	86
Crawler Crane	2	85[a]	25	82
Water Truck	1	84[a]	30	79
All Sources Combined				90

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 90 dBA L_{eq} at 50 feet. To reduce the neighborhood noise impacts, the Sanitation Districts are planning to construct noise barriers along the southern and eastern boundaries of the shaft site that front Lomita Boulevard and Main Street, respectively. Estimated sound levels from construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-19. Calculations are based on point-source attenuation over soft ground.

Table 14-19. Predicted Noise Levels From Construction Activities – JWPCP East Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	90	14	76
100	82	11	71
200	74	9	65
300	70	8	62
400	66	7	59
500	64	7	57
600	62	7	55
700	60	7	53
800	59	6	53
900	57	6	51
1,000	56	6	50

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

There are several noise-sensitive receptors adjacent to the JWPCP East shaft site. The shaft site is located in the city of Carson, but the closest noise-sensitive receptors are to the south in the city of Los Angeles, so the more restrictive city standards are used in this analysis. The closest residential receptors are 150 feet to the south across Lomita Boulevard. Wilmington Junior High School is located about 600 feet southeast of the shaft site. The next-closest residential neighborhood lies approximately 1,200 feet to the east of the shaft site beyond a row of commercial and industrial buildings in the city of Carson.

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the nighttime is 40 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 40 dBA, the measured value should be used as the baseline.

Noise monitoring data collected at the JWPCP East shaft site indicate that 52 dBA is the lowest noise level equivalent at residences nearest to the shaft site when construction would take place (nighttime). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 57 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The results shown in Table 14-19 indicate that residences located within 500 feet of the JWPCP East shaft site could be exposed to construction noise levels of 57 dBA or higher (an increase of 5 dB above the measured ambient level).

Neither the city's noise element nor its noise ordinance explicitly states noise level restrictions for schools. For this analysis, the noise-level restrictions applied to residential land uses will be applied to the school. This is a conservative approach because residential noise limits are usually more stringent than limits for any other land use. The construction noise level at the school is predicted to be 55 dBA L_{eq}.

Construction noise would exceed city nighttime noise standards at nearby residences. Therefore, impacts are considered significant. Implementation of MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b) would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – TraPac

Construction

CEQA Analysis

The city of Los Angeles ordinance for construction noise is applicable to construction at the TraPac access shaft site. Construction of the TraPac shaft would only occur during daytime hours. However, access to the shaft during construction of the tunnel may also be required during nighttime hours.

Potential noise levels resulting from construction of the TraPac access shaft were evaluated by assigning utilization factors and quantities to pieces of equipment that would be used during shaft construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-20.

Table 14-20. Construction Source Level Assumptions – TraPac Shaft Site

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	50	82
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	25	79
Loaders – Wheeled	2	85[b]	75	87
Crawler Crane	2	85[a]	50	85
Water Truck	1	84[a]	25	78
All Sources Combined				91

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 91 dBA L_{eq} at 50 feet. The Sanitation Districts do not plan to install a noise barrier at the TraPac shaft site, so barrier noise reduction was not calculated. Estimated sound levels from construction activities are shown in Table 14-21. Calculations are based on point-source attenuation over soft ground.

Table 14-21. Predicted Noise Levels From Construction Activities – TraPac Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)
50	91
100	83
200	75
300	70
400	67
500	65
600	63
700	61
800	59
900	58
1,000	57

Calculations are based on FTA 2006. Calculations do not include the effects, if any, of local shielding from walls, topography, or barriers that may reduce sound levels further.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the day is 50 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 50 dBA, the measured value should be used as the baseline.

Noise monitoring data were collected at the LAXT shaft site, about 2 miles south of TraPac. Ambient noise levels recorded at the LAXT shaft site are considered in this analysis as representative of the port setting. The noise monitoring data indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during daytime hours). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 63 dBA L_{eq}. During nighttime hours when access to the shaft may be required, the lowest level measured was 49 dBA L_{eq}. The city ordinance indicates that nighttime noise from generators at the shaft site should not exceed the measured ambient level plus 5 dB, or 54 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The results shown in Table 14-21 indicate that the nearest residences (located approximately 700 feet from the TraPac shaft site) could be exposed to construction noise levels of 61 dBA (less than 5 dB above the ambient level). Nighttime shaft site access may require the use of a generator (assumed to have a rated output of 25 KVA or greater) to power ventilation equipment inside the tunnel. At a distance of 700 feet from the shaft site, noise levels from the generator would be about 49 dBA L_{eq}. This is equal to (i.e., less than 5 dB above) the ambient nighttime noise level. Therefore, construction noise at the TraPac shaft site would not exceed city noise standards. Impacts would be less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – LAXT

Construction

CEQA Analysis

The city of Los Angeles ordinance for construction noise is applicable to construction at the LAXT shaft site. The LAXT shaft site is a working shaft site, and construction activities would likely occur 10 to 24 hours a day. Therefore, daytime and nighttime noise standards apply.

Potential noise levels resulting from construction at the LAXT shaft site were evaluated by assigning utilization factors and quantities to pieces of equipment typically used during shaft and tunnel construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-22.

Table 14-22. Construction Source Level Assumptions – LAXT Shaft Site

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	20	78
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	75	84
Loaders – Wheeled	2	85[b]	60	86
Crawler Crane	2	85[a]	25	82
Water Truck	1	84[a]	30	79
All Sources Combined				90

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 90 dBA L_{eq} at 50 feet. To reduce the noise impacts of ongoing tunneling construction at the shaft site, the Sanitation Districts are planning to construct a noise barrier along the northwest boundary of the shaft site that faces Fire Station 40. Estimated sound levels from construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-23. Calculations are based on point-source attenuation over soft ground.

Table 14-23. Predicted Noise Levels From Construction Activities – LAXT Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	90	14	76
100	82	11	71
200	74	9	65
300	70	8	62
400	66	7	59
500	64	7	57
600	62	7	55

Table 14-23 (Continued)

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
700	60	7	53
800	59	6	53
900	57	6	51
1,000	56	6	50

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the nighttime is 40 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 40 dBA, the measured value should be used as the baseline.

Noise monitoring data collected at the LAXT shaft site indicate that 49 dBA is the lowest noise L_{eq} at locations nearest to the shaft site when construction would take place (nighttime). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 54 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The nearest residential receptors to the LAXT are over 1 mile from the shaft site. However, Fire Station 40 is approximately 100 feet from the edge of the shaft site. Because firefighters sleep at the fire station, it is treated as a residence or sensitive receptor in this analysis. The city does not specify an interior residential noise standard. Therefore, the county of Los Angeles interior nighttime noise standard of 40 dBA L_{eq} would apply to this analysis. Assuming an outdoor-to-indoor noise reduction of 20 dB, the interior noise level at the fire station would be approximately 51 dBA (the exterior noise level is 71 dBA at 100 feet, as shown in Table 14-23). This exceeds the county's interior nighttime level of 40 dBA. Because construction noise would exceed county interior nighttime noise standards at a nearby residence, this impact is considered significant. Implementation of MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b) would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – Southwest Marine

Construction

CEQA Analysis

The city of Los Angeles ordinance for construction noise is applicable to construction at the Southwest Marine access shaft site. Construction of the Southwest Marine shaft would only occur during daytime

hours. However, access to the shaft during construction of the tunnel may be also required during nighttime hours.

Potential noise levels resulting from construction of the Southwest Marine access shaft were evaluated by assigning utilization factors and quantities to pieces of equipment typically used during shaft site and tunneling construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-24.

Table 14-24. Construction Source Level Assumptions – Southwest Marine Shaft Site

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	50	82
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	25	79
Loaders – Wheeled	2	85[b]	75	87
Crawler Crane	2	85[a]	50	85
Water Truck	1	84[a]	25	78
All Sources Combined				91

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 91 dBA L_{eq} at 50 feet. To reduce noise impacts, the Sanitation Districts are planning to construct noise barriers at the shaft site. Estimated sound levels from construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-25. Predicted levels are based on point-source attenuation over soft ground.

Table 14-25. Predicted Noise Levels From Construction Activities – Southwest Marine Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	91	14	77
100	83	11	72
200	75	9	66
300	70	8	62
400	67	7	60
500	65	7	58
600	63	7	56
700	61	7	54
800	59	6	53
900	58	6	52
1,000	57	6	51

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.
L_{eq} = equivalent sound level
dBA = A-weighted decibel
dB = decibel

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the day is 50 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 50 dBA, the measured value should be used as the baseline.

Noise monitoring data were collected at the LAXT shaft site, about 1 mile northeast of the shaft site. Ambient noise levels recorded at the LAXT site are considered in this analysis as representative of the port setting at Southwest Marine. The noise monitoring data indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during daytime hours). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 63 dBA L_{eq}. During nighttime hours when access to the shaft may be required, the lowest level measured was 49 dBA L_{eq}. The city ordinance indicates that nighttime noise from generators at the shaft site should not exceed the measured ambient level plus 5 dB, or 54 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The Terminal Island Federal Prison boundary is approximately 200 feet from the shaft site. The results shown in Table 14-25 indicate an exterior noise level of 66 dBA at this location with a noise barrier installed at the shaft site. The nearest residential use is more than 0.7 mile from the shaft site. However, Fire Station 111 is approximately 100 feet from the edge of the shaft site. Because firefighters sleep at the fire station, it is treated as a residence or sensitive receptor in this analysis. Construction at Southwest Marine would occur during daytime hours, so construction of the shaft site would not cause nighttime noise impacts at the fire station. Nighttime shaft site access may require the use of a generator (assumed to have a rated output of 25 KVA or greater) to power ventilation equipment inside the tunnel. At a distance of 100 feet from the shaft site, noise levels from the generator would be about 71 dBA L_{eq} without a noise barrier. With the noise barrier in place, this level would reduce to 60 dBA L_{eq}, which is above the nighttime ambient noise level. Therefore, construction noise at the Southwest Marine shaft site would exceed city noise standards. Noise impacts resulting from daytime construction or nighttime access at the Southwest Marine shaft site are considered significant. Implementation of MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b) would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction at the JWPCP East, LAXT, and Southwest Marine shaft sites for Alternative 1 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under CEQA would be significant before mitigation.

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

MM NOI-1a and MM NOI-1b would reduce the significant impacts associated with construction activities at the JWPCP East, LAXT, and Southwest Marine shaft sites. The mitigation measures

would reduce noise at sensitive receptors below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination

Construction at the JWPCP East, LAXT, and Southwest Marine shaft sites for Alternative 1 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

Residual impacts would be less than significant, as described under the CEQA impact determination.

Impact NOI-2. Would Alternative 1 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?

Tunnel Alignment – Wilmington to San Pedro Shelf (Onshore)

Construction

CEQA Analysis

The tunnel alignment under Alternative 1 follows Wilmington Boulevard through mostly densely populated single- and multi-family residential areas. The tunnel would also pass near several churches, overnight lodging, and commercial areas as it continues to the Port of Los Angeles.

Construction of the tunnel alignment could potentially cause groundborne vibration and noise in the immediate vicinity of the tunneling operations. Vibration sources include the TBM and haul trains shuttling equipment, materials, and construction workers between the JWPCP East and/or LAXT shaft site(s) and the face of the tunnel. Construction vibrations would be intermittent and short-term, ceasing after tunneling work is complete.

As described in Section 14.4.1.4, groundborne vibration levels from operation of the TBM are anticipated to be below the impact threshold. Under Alternative 1, the tunnel crown depth would range between 100 and 200 feet bgs. For the IRP study, which was based on an average tunnel depth of 50 feet, groundborne vibration levels from the TBM were below the impact threshold. Therefore, impacts from TBM operations would be less than significant.

Groundborne vibrations and noise from the wheel-rail interface during haul train passbys would originate from the tunnel base rather than the tunnel crown, as in the case of TBM operations. The tunnel base would have a minimum depth of approximately 120 feet under Alternative 1. As shown on Figure 14-1, passbys occurring at this depth would be below groundborne vibration and noise thresholds. Therefore, impacts would be less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Tunnel Alignment – Wilmington to San Pedro Shelf (Offshore)

Construction

CEQA Analysis
Within the Port of Los Angeles, the tunnel alignment would pass near Fire Station 40 and lodging associated with the Terminal Island Federal Prison on the way offshore to the SP Shelf. The offshore tunnel depth for Alternative 1 would range between 100 and 200 feet. The CEQA analysis for the offshore tunnel alignment is the same as for the onshore tunnel alignment. Therefore, impacts would be less than significant.

NEPA Analysis
Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered direct impacts.

Shaft Sites – JWPCP East, TraPac, LAXT, and Southwest Marine

Construction

CEQA Analysis
Construction activities associated with the operation of heavy equipment may generate localized groundborne vibration and noise in the vicinity of shaft sites. However, vibration from non-impact construction activities is typically below the threshold of perception when the activity is more than approximately 50 feet from vibration-sensitive receptor locations. Moreover, vibration from construction activities is a short-term effect that ends when construction is completed. Construction activities at the shaft sites are not anticipated to include high-impact activities. Where piles may be required, low-impact drilling techniques would be used. All vibration-sensitive receptor locations are located more than 50 feet from the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites. Therefore, vibration from construction activities at the shaft sites is not predicted to cause perceptible groundborne vibration and noise levels at receptor locations. Impacts would be less than significant.

NEPA Analysis
Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination
Construction of Alternative 1 (Project) would not expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under CEQA would be less than significant.

Mitigation
No mitigation is required.

Residual Impacts
Impacts would be less than significant.

NEPA Impact Determination

Construction of Alternative 1 (Project) would not expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under NEPA would be less than significant with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

Impact NOI-4. Would Alternative 1 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Shaft Site – JWPCP East

Construction

CEQA Analysis

Noise monitoring data collected at the JWPCP East shaft site indicate that 52 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (nighttime). The results shown in Table 14-19 indicate that residences located within 500 feet of the JWPCP East shaft site could be exposed to construction noise levels of 57 dBA or higher (an increase of 5 dB above the measured ambient level). Therefore, construction noise at the JWPCP East shaft site would result in a substantial increase in ambient noise levels at adjacent noise-sensitive land uses. Impacts would be significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – TraPac

Construction

CEQA Analysis

Noise monitoring data were collected at the LAXT shaft site, about 2 miles south of TraPac. The data indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during daytime hours). Shaft site access could occur during nighttime hours, during which the nighttime ambient noise level is 49 dBA L_{eq}. The results shown in Table 14-21 indicate that the nearest residences (located approximately 700 feet from the TraPac shaft site) could be exposed to construction noise levels of 61 dBA (less than 5 dB above the ambient level). Nighttime noise levels due to operation of a generator during shaft site access are predicted to be equal to or below the ambient noise level. A noise barrier would not be required at the TraPac shaft site to mitigate the increase in ambient noise levels resulting from construction or nighttime shaft site access. Therefore, construction noise at the TraPac shaft site would not result in a significant increase in ambient noise levels. Impacts would be less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – LAXT

Construction

CEQA Analysis

Noise monitoring data collected at the LAXT shaft site indicate that 49 dBA is the lowest noise L_{eq} at locations nearest to the shaft site when construction would take place (nighttime). The nearest residential receptors are over 1 mile from the LAXT shaft site. However, Fire Station 40 is 100 feet away. Because firefighters sleep at the fire station, it is treated as a residence in this analysis. During construction, the exterior noise level is predicted to be 71 dBA at the fire station exterior with a noise barrier in place (an increase of 5 dB or more above the ambient level), as shown in Table 14-23. This is a substantial increase over the ambient level measured at the LAXT shaft site. Therefore, construction noise at the LAXT shaft site would result in a significant increase in ambient noise levels at adjacent noise-sensitive land uses. Impacts would be significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – Southwest Marine

Construction

CEQA Analysis

Noise monitoring data were collected at the LAXT shaft site, about 1 mile northeast of the Southwest Marine shaft site. The data indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during daytime hours). Shaft site access could occur during nighttime hours, during which the nighttime ambient noise level is 49 dBA L_{eq}. The Terminal Island Federal Prison boundary is located approximately 200 feet from the Southwest Marine shaft site. The results shown in Table 14-25 indicate an exterior noise level of 66 dBA at this location with the noise barrier installed (an increase of less than 5 dB above the ambient daytime noise level). Fire Station 111 is 100 feet away. Nighttime noise levels due to operation of a generator during shaft site access are predicted to be approximately 60 dBA L_{eq} at this location, with the noise barrier installed (an increase of less than 5 dB above the ambient nighttime noise level). Therefore, construction or nighttime shaft site access at the Southwest Marine shaft site would result in a significant increase in ambient noise levels. Noise impacts resulting from construction or nighttime access at the Southwest Marine shaft site would be significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

NEPA Analysis
Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination
Construction at the JWPCP East, LAXT, and Southwest Marine shaft sites for Alternative 1 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under CEQA would be significant before mitigation.

Mitigation
Implement MM NOI-4a and MM NOI-4b.

Residual Impacts
MM NOI-4a and MM NOI-4b would reduce the significant impacts associated with construction at the JWPCP East, LAXT, and Southwest Marine shaft sites. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination
Construction at the JWPCP East, LAXT, and Southwest Marine shaft sites for Alternative 1 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation
Implement MM NOI-4a and MM NOI-4b.

Residual Impacts
Residual impacts would be less than significant, as described under the CEQA impact determination.

14.4.3.3 Impact Summary – Alternative 1

Impacts on terrestrial noise and vibrations analyzed in this EIR/EIS for Alternative 1 are summarized in Table 14-26 and Table 14-27. The proposed mitigation, where feasible, and the significance of the impact before and following mitigation are also listed in the tables.

Table 14-26. Impact Summary – Alternative 1 (Program)

Program Element	Impact Determination Before Mitigation	Mitigation	Residual Impact After Mitigation
Impact NOI-1. Would Alternative 1 (Program) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			
Conveyance System			
Conveyance Improvements	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction

Table 14-26 (Continued)

Program Element	Impact Determination Before Mitigation	Mitigation	Residual Impact After Mitigation
SJCWRP			
Plant Expansion	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
POWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
LCWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
LBWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
JWPCP			
Solids Processing	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
Biosolids Management	CEQA Less Than Significant Impact During Operation	No mitigation is required.	CEQA Less Than Significant Impact During Operation
Impact NOI-3. Would Alternative 1 (Program) result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			
JWPCP			
Biosolids Management	CEQA Less Than Significant Impact During Operation	No mitigation is required.	CEQA Less Than Significant Impact During Operation
Impact NOI-4. Would Alternative 1 (Program) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
Conveyance System			
Conveyance Improvements	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction

Table 14-26 (Continued)

Program Element	Impact Determination Before Mitigation	Mitigation	Residual Impact After Mitigation
SJCWRP			
Plant Expansion	CEQA Significant Impact During Construction	MM NOI-4a. Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission MM NOI-4b. Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	CEQA Less Than Significant Impact During Construction
	CEQA Less than Significant Impact During Operation	No mitigation is required.	CEQA Less Than Significant Impact During Operation
Process Optimization	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
POWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction

Table 14-26 (Continued)

Program Element	Impact Determination Before Mitigation	Mitigation	Residual Impact After Mitigation
LCWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
LBWRP			
Process Optimization	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
JWPCP			
Solids Processing	CEQA Less Than Significant Impact During Construction	No mitigation is required.	CEQA Less Than Significant Impact During Construction
Biosolids Management	CEQA Less Than Significant Impact During Operation	No mitigation is required.	CEQA Less Than Significant Impact During Operation

Table 14-27. Impact Summary – Alternative 1 (Project)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-1. Would Alternative 1 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?				
Shaft Site				
JWPCP East	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a). Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission	CEQA Less Than Significant Impact During Construction

Table 14-27 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
			MM NOI-1b (same as MM NOI-4b). Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
Impact NOI-2. Would Alternative 1 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?				
Tunnel Alignment				
Wilmington to SP Shelf (Onshore)	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction

Table 14-27 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Wilmington to SP Shelf (Offshore)	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Direct	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Shaft Site				
JWPCP East	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Impact NOI-4. Would Alternative 1 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				
Shaft Site				
JWPCP East	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction

Table 14-27 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction

14.4.4 Alternative 2

14.4.4.1 Program

Alternative 2 (Program) is the same as Alternative 1 (Program).

14.4.4.2 Project

The impacts for the onshore tunnel and the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites for Alternative 2 (Project) would be the same as for Alternative 1 (Project).

Impact NOI-2. Would Alternative 2 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?

Tunnel Alignment – Wilmington to Palos Verdes Shelf (Offshore)

Construction

CEQA Analysis

Within the Port of Los Angeles, the tunnel alignment would pass near Fire Station 40 and lodging associated with the Terminal Island Federal Prison on the way offshore to the SP Shelf.

Construction of the tunnel alignment could potentially cause groundborne vibration and noise in the immediate vicinity of the tunneling operations. Vibration sources include the TBM and haul trains shuttling equipment, materials, and construction workers between the JWPCP East and/or LAXT shaft

sites and the face of the tunnel. Construction vibrations would be intermittent and short-term, ceasing after tunneling work is complete.

As described in Section 14.4.1.4, groundborne vibration levels from operation of the TBM are anticipated to be below the impact threshold. Under Alternative 2, the tunnel crown depth would range between 100 and 250 feet bgs. For the IRP study, which was based on an average tunnel depth of 50 feet, groundborne vibration levels from the TBM were below the impact threshold. Therefore, impacts from TBM operations would be less than significant.

Groundborne vibrations and noise from the wheel-rail interface during haul train passbys would originate from the tunnel base rather than the tunnel crown, as in the case of TBM operations. The tunnel base would have a minimum depth of 120 feet under Alternative 2. As shown on Figure 14-1, passbys occurring at this depth would be below groundborne vibration and noise thresholds. Therefore, impacts would be less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered direct impacts.

CEQA Impact Determination

Construction of Alternative 2 (Project) would not expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under CEQA would be less than significant.

Mitigation

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

NEPA Impact Determination

Construction of Alternative 2 (Project) would not expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under NEPA would be less than significant with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

No mitigation is required.

Residual Impacts

Impacts would be less than significant.

14.4.4.3 Impact Summary – Alternative 2

Impacts on terrestrial noise and vibrations for Alternative 2 (Program), which are the same as Alternative 1 (Program), are summarized in Table 14-26. Impacts analyzed in this EIR/EIS for Alternative 2 (Project) are summarized in Table 14-28. The proposed mitigation, where feasible, and the significance of the impact before and following mitigation are also listed in the tables.

Table 14-28. Impact Summary – Alternative 2 (Project)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-1. Would Alternative 2 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?				
Shaft Site				
JWPCP East	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a). Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission	CEQA Less Than Significant Impact During Construction

Table 14-28 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
			MM NOI-1b (same as MM NOI-4b). Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b)	NEPA Less Than Significant Impact During Construction

Table 14-28 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-2. Would Alternative 2 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?				
Tunnel Alignment				
Wilmington to PV Shelf (Onshore)	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Wilmington to PV Shelf (Offshore)	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Direct	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Shaft Site				
JWPCP East	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction

Table 14-28 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-4. Would Alternative 2 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				
Shaft Site				
JWPCP East	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction
TraPac	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
LAXT	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction
Southwest Marine	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction

14.4.5 Alternative 3

14.4.5.1 Program

Alternative 3 (Program) is the same as Alternative 1 (Program).

14.4.5.2 Project

Impact NOI-1. Would Alternative 3 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Shaft Site – JWPCP West

Construction

CEQA Analysis

The cities of Los Angeles and Carson ordinances for construction noise are both applicable to construction at the JWPCP West shaft site. The JWPCP West shaft site is a working shaft site, and construction activities would likely occur 10 to 24 hours a day. Therefore, daytime and nighttime noise standards apply.

Potential noise levels resulting from construction of the JWPCP West shaft site were evaluated by assigning utilization factors and quantities to pieces of equipment that would be used during shaft site and tunneling construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-29.

Table 14-29. Construction Source Level Assumptions – JWPCP West

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	20	78
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	75	84
Loaders – Wheeled	2	85[b]	60	86
Crawler Crane	2	85[a]	25	82
Water Truck	1	84[a]	30	79
All Sources Combined				90

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 90 dBA L_{eq} at 50 feet. To reduce the neighborhood noise impacts, the Sanitation Districts are planning to construct noise barriers at the shaft site. Estimated sound levels from construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-30. Calculations are based on point-source attenuation over soft ground.

Table 14-30. Predicted Noise Levels From Construction Activities – JWPCP West Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	90	14	76
100	82	11	71
200	74	9	65
300	70	8	62
400	66	7	59
500	64	7	57
600	62	7	55
700	60	7	53
800	59	6	53
900	57	6	51
1,000	56	6	50

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

There are several noise-sensitive receptors adjacent to the JWPCP West shaft site. The majority of the shaft site is located within the city of Los Angeles, with a small northern portion located in the city of Carson. The nearest noise-sensitive residential receptors are to the south in the city of Los Angeles, so the more restrictive city standards are used in this analysis. The closest residential receptors are 200 feet to the west across I-110, and are behind a 12-foot high noise wall relative to an elevated section of I-110 South. The next-closest residential neighborhood lies approximately 200 feet to the southeast. The Wilmington Athletic Complex and the Wilmington Boys and Girls Club lie just across Figueroa Street about 100 feet to the east. The nearest residential area in the city of Carson is about 1,800 feet from the shaft site.

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the nighttime is 40 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 40 dBA, the measured value should be used as the baseline.

Noise monitoring data collected at the JWPCP West shaft site indicate that 61 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (nighttime). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 66 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 below are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The results shown in Table 14-30 indicate that residences located within 200 feet to the east and southeast of the JWPCP West shaft site could be exposed to construction noise levels of 65 dBA (less than 5 dB above the ambient level), with the noise barrier in place at the shaft site. Construction noise would not exceed city nighttime noise standards at nearby residences, or daytime noise standards at recreation areas to the east. Impacts would be less than significant, and no mitigation is required.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – Angels Gate

Construction

CEQA Analysis

The city of Los Angeles ordinance for construction noise is applicable to construction at the Angels Gate access shaft site. Construction of the Angels Gate shaft would only occur during daytime hours. However, access to the shaft during construction of the tunnel may be also required during nighttime hours.

Potential noise levels resulting from construction of the Angels Gate access shaft were evaluated by assigning utilization factors and quantities to pieces of equipment specified typically used during shaft and tunnel construction. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-31.

Table 14-31. Construction Source Level Assumptions – Angels Gate Shaft Site

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	50	82
Hydraulic Excavator – Medium	1	85[a]	30	80
Motor Grader	1	85[a]	25	79
Loaders – Wheeled	2	85[b]	75	87
Crawler Crane	2	85[a]	50	85
Water Truck	1	84[a]	25	78
All Sources Combined				91

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 91 dBA L_{eq} at 50 feet. To reduce the neighborhood noise impacts, the Sanitation Districts are planning to construct noise barriers at the shaft site. Estimated sound levels from construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-32. Calculations are based on point-source attenuation over soft ground.

Table 14-32. Predicted Noise Levels From Construction Activities – Angels Gate Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	91	14	77
100	83	11	72
120	81	11	70
140	79	11	68
160	78	10	68
200	75	9	66
275	71	8	63
400	67	7	60
500	65	7	58
600	63	7	56
700	61	7	54

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the day is 50 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 50 dBA, the measured value should be used as the baseline.

Noise monitoring data were collected at the Royal Palms shaft site, about 2 miles west of the Angels Gate shaft site. Ambient noise levels recorded at the Royal Palms shaft site are considered in this analysis to be representative of the coastal urban setting at Angels Gate. The noise monitoring data indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during daytime hours). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 63 dBA L_{eq}. During nighttime hours when access to the shaft may be required, the lowest level measured was also 58 dBA L_{eq} (same as the daytime ambient level). The city ordinance indicates that nighttime noise from generators at the shaft site should not exceed the measured ambient level plus 5 dB, or 63 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The nearest residential receptors are in a densely populated neighborhood approximately 80 feet to the east across South Gaffey Street. Point Fermin Park is about 120 feet from the shaft site across West Paseo Del Mar to the south. The results shown in Table 14-32 indicate that residences and park uses located within a 275-foot radius of the Angels Gate shaft site would be exposed to construction noise levels of 63 dBA or more with the noise barrier installed at the shaft site (an increase of 5 dB above the ambient level). Therefore, construction noise would exceed city noise standards at nearby residences and at Point Fermin Park.

Nighttime shaft site access may require the use of a generator (assumed to have a rated output of 25 KVA or greater) to power ventilation equipment inside the tunnel. At a distance of 100 feet from the shaft site,

noise levels from the generator would be about 71 dBA L_{eq} without a noise barrier. With the noise barrier in place, this level would reduce to 60 dBA L_{eq}, which is less than the nighttime ambient noise level.

Although a noise barrier along the northern boundary of the shaft site would be necessary to reduce construction noise levels at residences northeast of the shaft site, it may not effectively reduce construction noise levels at recreational use areas at Angels Gate Park because the park is located more than 40 feet in elevation above the shaft site. Therefore, the no-noise-barrier levels in Table 14-32 more accurately describe the construction noise levels at the park, which could be exposed to construction noise levels of 63 dBA or more at a distance of 600 feet from the shaft site. Given the significant ground elevation difference, construction noise would likely only be audible at locations near the terrain edge of the park, where there is a direct line of sight to the shaft site, because of the acoustical shielding effects of the terrain edge. Impacts are considered to be significant. Implementation of MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b) would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction at the Angels Gate shaft site for Alternative 3 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under CEQA would be significant before mitigation.

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

MM NOI-1a and MM NOI-1b would reduce the significant impacts associated with construction activities at the Angels Gate shaft site. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination

Construction at the Angels Gate shaft site for Alternative 3 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

Residual impacts would be less than significant, as discussed under the CEQA impact determination.

Impact NOI-2. Would Alternative 3 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?

Tunnel Alignment – Figueroa/Gaffey to Palos Verdes Shelf (Onshore)

Construction

CEQA Analysis

The tunnel alignment under Alternative 3 follows the Figueroa Street and North Gaffey Street roadway alignments through mostly densely populated single- and multi-family residential areas. The tunnel would also pass near a school, overnight lodging, and commercial areas as it continues to the Angels Gate shaft site.

Construction of the tunnel alignment could potentially cause groundborne vibration and noise in the immediate vicinity of the tunneling operations. Vibration sources include the TBM and haul trains shuttling equipment, materials, and construction workers between the JWPCP West shaft site and the face of the tunnel. Construction vibrations would be intermittent and short-term, ceasing after tunneling work is complete.

As described in Section 14.4.1.4, groundborne vibration levels from operation of the TBM are anticipated to be below the impact threshold. Under Alternative 3, the tunnel crown depth would range between 70 and 370 feet bgs. For the IRP study, which was based on an average tunnel depth of 50 feet, groundborne vibration levels from the TBM were below the impact threshold. Therefore, impacts from TBM operations would be less than significant.

Groundborne vibrations and noise from the wheel-rail interface during haul train passbys would originate from the tunnel base rather than the tunnel crown, as in the case of TBM operations. The minimum tunnel base depth for Alternative 3 is approximately 90 feet. This is shallower than the 110-foot tunnel depth threshold for groundborne noise derived from the IRP study; therefore, a potential horizontal impact zone exists along the tunnel alignment where the tunnel depth at the base is less than 110 feet, as shown on Figure 14-4. At the minimum tunnel base depth of 90 feet, significant impacts due to groundborne noise could occur at sensitive receivers located within a horizontal distance of up to 63 feet from the tunnel centerline. This distance is referred to as the potential horizontal impact zone on Figure 14-2. As shown on Figure 14-1, the width of the impact zone varies as the tunnel depth changes along the alignment. Some commercial uses would be located within the potential horizontal impact zone for groundborne noise under Alternative 3. Therefore, impacts due to groundborne noise from haul train passbys would be considered significant. Implementation of MM NOI-2a and MM NOI-2b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

FIGURE 14-4

CLEARWATER Program

Alternative 3 Tunnel Depths (Less than 110 ft) With Potential Vibration Impacts Before Mitigation

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011, ESRI 2011

Tunnel Alignment – Figueroa/Gaffey to Palos Verdes Shelf (Offshore)

Construction

CEQA Analysis

There are no vibration-sensitive receptors located along the offshore alignment. Tunneling construction offshore would not cause detectable groundborne vibration or noise levels onshore. Impacts due to groundborne vibration and groundborne noise would be less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered direct impacts.

Shaft Sites – JWPCP West and Angels Gate

Construction

CEQA Analysis

Construction activities associated with the operation of heavy equipment may generate localized groundborne vibration and noise in the vicinity of shaft sites. However, vibration from non-impact construction activities is typically below the threshold of perception when the activity is more than approximately 50 feet from vibration-sensitive receptor locations. Moreover, vibration from construction activities is a short-term effect that ends when construction is completed. Construction activities at the shaft sites are not anticipated to include high-impact activities. Where piles may be required, low-impact drilling techniques would be used. All vibration-sensitive receptors are located more than 50 feet away from the JWPCP West and Angels Gate shaft sites. Therefore, vibration from construction activities at shaft sites is not predicted to cause perceptible groundborne vibration and noise levels at receptor locations. Impacts would be less than significant, and no mitigation is required.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction of the onshore tunnel for Alternative 3 (Project) would expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under CEQA would be significant before mitigation.

Mitigation

MM NOI-2a. Prepare and implement a rail maintenance plan for reducing groundborne noise caused by haul train activities. The plan will include routine inspection and maintenance of locomotives, especially those parts that affect the wheel/rail interface to ensure there are no open joints or discontinuities that would cause excessive noise at the wheel/rail interface.

MM NOI-2b. Prepare and implement a vibration control plan to reduce groundborne noise (and vibration) levels. The plan will ensure that groundborne noise levels from operation of locomotives do

not exceed the Federal Transit Administration Guidance Manual's threshold level of 45 dBA (A-weighted decibels). The plan may include measures such as the use of:

- Haul Train Speed Restrictions – Lower speed limits for haul trains operating within 110 diagonal feet of vibration-sensitive buildings
- Ballast Mats – A ballast mat consisting of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties, and rail on top
- Resilient Fasteners – Resilient fasteners for reducing the amount of vibration energy that is transferred into the track substructure and for minimizing groundborne vibration in frequencies above 30 hertz

Residual Impacts

MM NOI-2a and MM NOI-2b would reduce impacts associated with the construction of the onshore segment of the Figueroa/Gaffey to PV Shelf tunnel alignment. The rail maintenance plan would minimize groundborne noise levels associated with haul trains. The vibration control plan would be implemented in such a manner that compliance with the groundborne noise impact threshold of 45 dBA would be achieved. Residual impacts would be less than significant.

NEPA Impact Determination

Construction of the onshore tunnel for Alternative 3 (Project) would expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

Implement MM NOI-2a and MM NOI-2b.

Residual Impacts

Residual impacts would be less than significant, as discussed under the CEQA impact determination.

Impact NOI-4. Would Alternative 3 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Shaft Site – JWPCP West

Construction

CEQA Analysis

Noise monitoring data collected at the JWPCP West shaft site indicate that 61 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (nighttime). The results shown in Table 14-30 indicate that residences located within 200 feet to the east and southeast of the JWPCP West shaft site could be exposed to construction noise levels of 65 dBA (less than 5 dB above the ambient level). Therefore, construction noise at the JWPCP West shaft site would not result in a significant increase in ambient noise levels at adjacent noise-sensitive land uses. Impacts would be less than significant, and no mitigation is required.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With

respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – Angels Gate

Construction

CEQA Analysis

Noise monitoring data collected at the Royal Palms shaft site indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (daytime). Shaft site access could occur during nighttime hours, during which the nighttime ambient noise level is 58 dBA L_{eq} (same as daytime). Ambient noise levels recorded at the Royal Palms site are considered in this analysis as representative of the coastal urban setting at the Angels Gate shaft site. The results shown in Table 14-32 indicate that residences and park uses located within a 275-foot radius of the Angels Gate shaft site would be exposed to construction noise levels of 63 dBA or more with the noise barrier installed at the shaft site (an increase of 5 dB above the ambient level). Nighttime noise levels due to operation of a generator during shaft site access are predicted to be equal to or below the ambient noise level with the noise barrier in place. Therefore, construction noise at the Angels Gate shaft site would result in a significant increase in ambient noise levels at adjacent noise-sensitive land uses. However, as discussed under Impact NOI-1, due to the significant ground elevation difference of Angels Gate Park above noise sources at the shaft site, construction noise would likely be audible only at locations near the park's terrain edge. Under typical conditions, construction noise from the shaft site would not produce a noticeable increase in ambient noise levels at areas in Angels Gate Park that do not have a direct line of sight into the shaft site. Impacts are considered significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction at the Angels Gate shaft site for Alternative 3 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under CEQA would be significant before mitigation.

Mitigation

Implement MM NOI-4a and MM NOI-4b.

Residual Impacts

MM NOI-4a and MM NOI-4b would reduce the significant impacts associated with construction activities at the Angels Gate shaft site. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination

Construction at the Angels Gate shaft site for Alternative 3 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation
Implement MM NOI-4a and MM NOI-4b.

Residual Impacts
Residual impacts would be less than significant, as discussed under the CEQA impact determination.

14.4.5.3 Impact Summary – Alternative 3

Impacts on terrestrial noise and vibrations for Alternative 3 (Program), which are the same as Alternative 1 (Program), are summarized in Table 14-26. Impacts analyzed in this EIR/EIS for Alternative 3 (Project) are summarized in Table 14-33. The proposed mitigation, where feasible, and the significance of the impact before and following mitigation are also listed in the tables.

Table 14-33. Impact Summary – Alternative 3 (Project)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-1. Would Alternative 3 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?				
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Angels Gate	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a). Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission	CEQA Less Than Significant Impact During Construction

Table 14-33 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
			MM NOI-1b (same as MM NOI-4b). Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
Impact NOI-2. Would Alternative 3 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?				
Tunnel Alignment				
Figueroa/ Gaffey to PV Shelf (Onshore)	CEQA Significant Impact During Construction	N/A	MM NOI-2a. Prepare and implement a rail maintenance plan for reducing groundborne noise caused by haul train activities. The plan will include routine inspection and maintenance of locomotives, especially those parts that affect the wheel/rail interface to ensure there are no open joints or discontinuities that would cause excessive noise at the wheel/rail interface. MM NOI-2b. Prepare and implement a vibration control plan to reduce groundborne noise (and vibration) levels. The plan will ensure that groundborne noise levels from operation of locomotives do not exceed the Federal Transit Administration Guidance Manual's threshold level of 45 dBA (A-weighted decibels). The plan may include measures such as the use of: ▪ Haul Train Speed Restrictions – Lower speed limits for haul trains operating within 110 diagonal feet of vibration-sensitive buildings ▪ Ballast Mats – A ballast mat consisting of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties, and rail on top	CEQA Less Than Significant Impact During Construction

Table 14-33 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
			▪ Resilient Fasteners – Resilient fasteners for reducing the amount of vibration energy that is transferred into the track substructure and for minimizing groundborne vibration in frequencies above 30 hertz	
	NEPA Significant Impact During Construction	Indirect	MM NOI-2a MM NOI-2b	NEPA Less Than Significant Impact During Construction
Figueroa/ Gaffey to PV Shelf (Offshore)	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Direct	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Angels Gate	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Impact NOI-4. Would Alternative 3 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Angels Gate	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction

14.4.6 Alternative 4 (Recommended Alternative)

14.4.6.1 Program

Alternative 4 (Program) is the same as Alternative 1 (Program).

14.4.6.2 Project

The impacts for the JWPCP West shaft site for Alternative 4 (Project) would be the same as for Alternative 3 (Project), except tunnel construction would occur over a period of 4 years instead of 5 years.

Impact NOI-1. Would Alternative 4 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Shaft Site – Royal Palms

Construction

CEQA Analysis

The city of Los Angeles ordinance for construction noise is applicable to construction at the Royal Palms exit shaft site. Shaft site construction would primarily take place during daytime hours; however, limited nighttime construction may occur during the connection of the onshore tunnel to the existing manifold structure.

Potential noise levels resulting from construction at the Royal Palms shaft site were evaluated by assigning utilization factors and quantities to pieces of equipment typically used during shaft site construction and the connection of the onshore tunnel to the existing manifold structure. These adjusted noise levels were then summed to calculate an overall L_{eq} noise level at the shaft site. These assumptions are summarized in Table 14-34.

Table 14-34. Construction Source Level Assumptions – Royal Palms Shaft Site

Equipment Type	Quantity	L_{max} Sound Level at 50 Feet (dBA)	Utilization Factor (percent)	L_{eq} Sound Level at 50 Feet (dBA)
Hydraulic Excavator – Large	1	85[a]	50	82
Hydraulic Excavator - Medium	1	85[a]	30	80
Motor Grader	1	85[a]	25	79
Loaders - Wheeled	2	85[b]	75	87
Crawler Crane	2	85[a]	50	85
Water Truck	1	84[a]	25	78
All Sources Combined				91

[a] Source: FTA 2006
[b] Source: Thalheimer 2000
L_{max} = maximum sound level
L_{eq} = equivalent sound level
dBA = A-weighted decibel

The combined noise level is 91 dBA L_{eq} at 50 feet. To reduce the neighborhood noise impacts, the Sanitation Districts are planning to construct noise barriers at the shaft site. Estimated sound levels from

construction activities, including estimated noise barrier reduction, as a function of distance are shown in Table 14-35. Calculations are based on point-source attenuation over soft ground.

Table 14-35. Predicted Noise Levels From Construction Activities – Royal Palms Shaft Site

Distance Between Source and Receiver (feet)	Calculated L_{eq} Sound Level No Noise Barrier (dBA)	Estimated Barrier Noise Reduction (dB)	Calculated L_{eq} Sound Level With Noise Barrier (dBA)
50	91	14	77
100	83	11	72
120	81	11	70
140	79	11	68
160	78	10	68
200	75	9	66
275	71	8	63
400	67	7	60
500	65	7	58
600	63	7	56
700	61	7	54

Calculations are based on FTA 2006. Barrier noise reduction calculations are based on attenuation of construction noise sources with principal frequencies in the 125 to 500 Hz octave bands. Calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further. Noise barriers are assumed to have a height of 20 feet.

L_{eq} = equivalent sound level

dBA = A-weighted decibel

dB = decibel

The City of Los Angeles General Plan Noise Element states that the expected ambient noise level in residential areas during the nighttime hours is 40 dBA. The city's noise ordinance states that the expected ambient noise level in a given area may not be increased by more than 5 dB. If the measured baseline ambient noise level is greater than 40 dBA, the measured value should be used as the baseline.

Noise monitoring data collected at the Royal Palms shaft site indicate that 58 dBA is the lowest noise L_{eq} at residences nearest to the shaft site when construction would take place (during nighttime hours). The city ordinance indicates that construction noise from the shaft site should not exceed this measured ambient level plus 5 dB, or 63 dBA L_{eq}. (Note that this noise standard essentially dictates that impact assessments discussed under Impact NOI-4 are equivalent to those discussed here, for project elements located in the city of Los Angeles.)

The nearest residential receptors are situated on a bluff about 120 feet above the shaft site. Recreational use at Royal Palms Beach surrounds the site. The results shown in Table 14-35 indicate that recreational use at Royal Palms Beach within a 275-foot radius of the shaft site would be exposed to construction noise levels of 63 dBA or more (an increase of 5 dB above the ambient level).

While the shaft site noise barrier is needed to reduce noise in recreational use areas at Royal Palms Beach, a noise barrier along the northern boundary of the shaft site would likely not effectively reduce construction noise levels at the first row of properties that overlook the shaft site. Therefore, even with a noise barrier, the no-barrier levels in Table 14-35 more accurately describe the construction noise levels at the first row of residences, which could be exposed to construction noise levels of 63 dBA at a distance of 600 feet from the shaft site. Due to the substantial ground elevation difference of first-row residences above noise sources at the shaft site, construction noise would likely only be audible at locations near the terrain edge of the bluff where there is a direct line of sight to the shaft site, because of the acoustical

shielding effects of the terrain edge. Under typical conditions, construction noise from the shaft site would not produce a significant increase in overall ambient noise levels at residential areas north of Royal Palms Beach that do not have a direct line of sight into the shaft site. Nevertheless, construction noise would occasionally exceed city noise standards at nearby residences and recreational uses, and impacts would be significant. Implementation of MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b) would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction at the Royal Palms shaft site for Alternative 4 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under CEQA would be significant before mitigation.

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

MM NOI-1a and MM NOI-1b would reduce the significant impacts associated with construction activities at the Royal Palms shaft site. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination

Construction at the Royal Palms shaft site for Alternative 4 (Project) would expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

Implement MM NOI-1a and MM NOI-1b (same as MM NOI-4a and MM NOI-4b).

Residual Impacts

Residual impacts would be less than significant, as described under the CEQA impact determination.

Impact NOI-2. Would Alternative 4 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?

Tunnel Alignment – Figueroa/Western to Royal Palms (Onshore)

Construction

CEQA Analysis

The tunnel alignment under Alternative 4 follows the Figueroa Street and North Gaffey Street roadway alignments through mostly densely populated single- and multi-family residential areas. The tunnel would also pass near a school, overnight lodging, and commercial areas as it continues to the Royal Palms shaft site.

Construction of the tunnel alignment could potentially cause groundborne vibration and noise in the immediate vicinity of the tunneling operations. Vibration sources include the TBM and haul trains shuttling equipment, materials, and construction workers between the JWPCP West shaft site and the face of the tunnel. Construction vibrations would be intermittent and short-term, ceasing after tunneling work is complete.

As described in Section 14.4.1.4, groundborne vibration levels from operation of the TBM are anticipated to be below the impact threshold. Under Alternative 4, the tunnel crown depth would range between 70 and 450 feet bgs. For the IRP study, which was based on an average tunnel depth of 50 feet, groundborne vibration levels from the TBM were below the impact threshold. Therefore, impacts from TBM operations would be less than significant.

Groundborne vibrations and noise from the wheel-rail interface during haul train passbys would originate from the tunnel base rather than the tunnel crown, as in the case of TBM operations. The minimum tunnel base depth for Alternative 4 is approximately 90 feet. This is shallower than the 110-foot tunnel depth threshold for groundborne noise derived from the IRP study; therefore, a potential horizontal impact zone exists along the tunnel alignment where the tunnel depth at the base is less than 110 feet, as shown on Figure 14-5. At the minimum tunnel base depth of 90 feet, significant impacts due to groundborne noise could occur at sensitive receivers located within a horizontal distance of up to 63 feet from the tunnel centerline. This distance is referred to as the potential horizontal impact zone on Figure 14-2. As shown on Figure 14-1, the width of the impact zone varies as the tunnel depth changes along the alignment. Some commercial uses and residential uses would be located within the potential horizontal impact zone for groundborne noise under Alternative 4. Therefore, impacts due to groundborne noise from haul train passbys would be considered significant. Implementation of MM NOI-2a and MM NOI-2b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

Shaft Site – Royal Palms

Construction

CEQA Analysis

Construction activities associated with the operation of heavy equipment may generate localized groundborne vibration and noise in the vicinity of shaft sites. However, vibration from non-impact construction activities is typically below the threshold of perception when the activity is more than about 50 feet from vibration-sensitive receptor locations. Moreover, vibration from construction activities is a short-term effect that ends when construction is completed. Construction activities at the shaft sites are not anticipated to include high-impact activities, such as pile driving or blasting. Where piles may be required, low-impact drilling techniques would be used. Vibration-sensitive receptors, including the residences located on the bluff above Royal Palms Beach, are located more than 50 feet away from the Royal Palms shaft site. Therefore, vibration from construction activities at this shaft site is not predicted to cause perceptible groundborne vibration and noise levels at receptor locations. Impacts would be less than significant, and no mitigation is required.

FIGURE 14-5

CLEARWATER Program

Alternative 4 Tunnel Depths (Less than 110 ft) With Potential Vibration Impacts Before Mitigation

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011, ESRI 2011

NEPA Analysis
Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination
Construction of the onshore tunnel alignment for Alternative 4 (Project) would expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under CEQA would be significant before mitigation.

Mitigation
Implement MM NOI-2a and MM NOI-2b.

Residual Impacts
MM NOI-2a and MM NOI-2b would reduce impacts associated with the construction of the Figueroa/Western to Royal Palms tunnel alignment. The rail maintenance plan would minimize groundborne noise levels associated with haul trains. The vibration control plan would be implemented in such a manner that compliance with local standards would be achieved. Residual impacts would be less than significant.

NEPA Impact Determination
Construction of the onshore tunnel alignment for Alternative 4 (Project) would expose persons to or generate excessive groundborne vibration or groundborne noise levels. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation
Implement MM NOI-2a and MM NOI-2b.

Residual Impacts
Residual impacts would be less than significant, as discussed under the CEQA impact determination.

Impact NOI-4. Would Alternative 4 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Shaft Site – Royal Palms

Construction

CEQA Analysis
Noise monitoring data collected at the Royal Palms shaft site indicates that 58 dBA L_{eq} is the lowest hourly ambient noise level measured during the 24-hour measurement period. The results shown in Table 14-35 indicate that park uses located within 275 feet of the Royal Palms State Beach shaft site could be exposed to construction noise levels of 63 dBA (an increase of 5 dB above the ambient level). Therefore, construction noise at the Royal Palms shaft site would result in a significant increase in ambient noise levels at adjacent noise-sensitive land uses including nearby residences and recreational uses. Impacts are considered significant. Implementation of MM NOI-4a and MM NOI-4b would reduce impacts to less than significant.

NEPA Analysis

Environmental impacts would be the same as described for the CEQA analysis, and would occur for the duration of construction. Baseline conditions would resume upon termination of construction. With respect to the Corps' NEPA scope of analysis described in Section 3.5, the environmental impacts would be considered indirect impacts.

CEQA Impact Determination

Construction at the Royal Palms shaft site for Alternative 4 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under CEQA would be significant before mitigation.

Mitigation

Implement MM NOI-4a and MM NOI-4b.

Residual Impacts

MM NOI-4a and MM NOI-4b would reduce the significant impacts associated with construction activities at the Royal Palms shaft site. The mitigation measures would reduce noise at sensitive receptors to below local standards. Therefore, residual impacts would be less than significant.

NEPA Impact Determination

Construction at the Royal Palms shaft site for Alternative 4 (Project) would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Impacts under NEPA would be significant before mitigation with respect to the No-Federal-Action Alternative (see Section 3.4.1.6).

Mitigation

Implement MM NOI-4a and MM NOI-4b.

Residual Impacts

Residual impacts would be less than significant, as discussed under the CEQA impact determination.

14.4.6.3 Impact Summary – Alternative 4

Impacts on terrestrial noise and vibrations for Alternative 4 (Program), which are the same as Alternative 1 (Program), are summarized in Table 14-26. Impacts analyzed in this EIR/EIS for Alternative 4 (Project) are summarized in Table 14-36. The proposed mitigation, where feasible, and the significance of the impact before and following mitigation are also listed in the tables.

Table 14-36. Impact Summary - Alternative 4 (Project)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Impact NOI-1. Would Alternative 4 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?				
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Royal Palms	CEQA Significant Impact During Construction	N/A	MM NOI-1a (same as MM NOI-4a). Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission MM NOI-1b (same as MM NOI-4b). Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	CEQA Less Than Significant Impact During Construction

Table 14-36 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
	NEPA Significant Impact During Construction	Indirect	MM NOI-1a (same as MM NOI-4a) MM NOI-1b (same as MM NOI-4b)	NEPA Less Than Significant Impact During Construction
Impact NOI-2. Would Alternative 4 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?				
Tunnel Alignment				
Figueroa/ Western to Royal Palms (Onshore)	CEQA Significant Impact During Construction	N/A	MM NOI-2a. Prepare and implement a rail maintenance plan for reducing groundborne noise caused by haul train activities. The plan will include routine inspection and maintenance of locomotives, especially those parts that affect the wheel/rail interface to ensure there are no open joints or discontinuities that would cause excessive noise at the wheel/rail interface. MM NOI-2b. Prepare and implement a vibration control plan to reduce groundborne noise (and vibration) levels. The plan will ensure that groundborne noise levels from operation of locomotives do not exceed the Federal Transit Administration Guidance Manual's threshold level of 45 dBA (A-weighted decibels). The plan may include measures such as the use of: ▪ Haul Train Speed Restrictions – Lower speed limits for haul trains operating within 110 diagonal feet of vibration-sensitive buildings ▪ Ballast Mats – A ballast mat consisting of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties, and rail on top ▪ Resilient Fasteners – Resilient fasteners for reducing the amount of vibration energy that is transferred into the track substructure and for minimizing groundborne vibration in frequencies above 30 hertz	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-2a MM NOI-2b	NEPA Less Than Significant Impact During Construction
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction

Table 14-36 (Continued)

Project Element	Impact Determination Before Mitigation	NEPA Direct or Indirect	Mitigation	Residual Impact After Mitigation
Royal Palms	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Impact NOI-4. Would Alternative 4 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				
Shaft Site				
JWPCP West	CEQA Less Than Significant Impact During Construction	N/A	No mitigation is required.	CEQA Less Than Significant Impact During Construction
	NEPA Less Than Significant Impact During Construction	Indirect	No mitigation is required.	NEPA Less Than Significant Impact During Construction
Royal Palms	CEQA Significant Impact During Construction	N/A	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact During Construction	Indirect	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact During Construction

14.4.7 Alternative 5 (No-Project Alternative)

Pursuant to CEQA, an EIR must evaluate a no-project alternative. A no-project alternative describes the no-build scenario and what reasonably would be expected to occur in the foreseeable future if the project were not approved. Under the No-Project Alternative for the Clearwater Program, the Sanitation Districts would continue to expand, upgrade, and operate the JOS in accordance with the JOS 2010 Master Facilities Plan (2010 Plan) (Sanitation Districts 1994), which includes all program elements proposed under the Clearwater Program, excluding process optimization at the water reclamation plants (WRPs), as described in Section 3.4.1.5. A new or modified ocean discharge system would not be constructed. As a result, there would be a greater potential for an emergency discharge into various water courses, as described in Section 3.4.1.5.

Because there would be no construction of a new or modified JWPCP ocean discharge system, the Corps would not make any significance determinations under NEPA and would not issue any permits or discretionary approvals for dredge or fill actions or for transport or ocean disposal of dredged material.

14.4.7.1 Program

Alternative 5 (Program) would consist of the implementation of the 2010 Plan. The impacts for conveyance improvements, plant expansion at the SJCWRP, WRP effluent management, JWPCP solids processing, and JWPCP biosolids management for Alternative 5 (Program) would be the same as for Alternative 1 (Program) and would be subject to mitigation in accordance with the EIR prepared for the 2010 Plan (Jones & Stokes 1994).

14.4.7.2 Project

Alternative 5 does not include a project; therefore, a new or modified ocean discharge system would not be constructed. As a consequence of taking no action, there would be a greater potential for emergency discharges into various water courses, as described in Section 3.4.1.5. The emergency discharges would not create any noise or vibrations. Therefore, terrestrial noise and vibration impacts would not occur under Alternative 5 (Project).

14.4.7.3 Impact Summary – Alternative 5

Terrestrial noise and vibrations impacts for Alternative 5 (Program) would be the same as those summarized for Alternative 1 (Program) in Table 14-26, excluding process optimization. Note that the mitigation measures for Alternatives 1 through 4 (Program) are not applicable to Alternative 5 (Program). There would be less than significant noise and vibrations impacts for Alternative 5 (Project).

14.4.8 Alternative 6 (No-Federal-Action Alternative)

Pursuant to NEPA, an environmental impact statement (EIS) must evaluate a no-federal-action alternative. The No-Federal-Action Alternative for the Clearwater Program consists of the activities that the Sanitation Districts would perform without the issuance of the Corps' permits. The Corps' permits would be required for the construction of the offshore tunnel, construction of the riser and diffuser, the rehabilitation of the existing ocean outfalls, and the ocean disposal of dredged material. Without a Corps permit to work on the aforementioned facilities, the Sanitation Districts would not construct the onshore tunnel and shaft sites. Therefore, none of the project elements would be constructed under the No-Federal-Action Alternative. The Sanitation Districts would continue to use the existing ocean discharge system, which could result in emergency discharges into various water courses, as described in Section 3.4.1.6. The program elements for the recommended alternative would be implemented in accordance with CEQA requirements. However, based on the NEPA scope of analysis established in Sections 1.4.2 and 3.5, these elements would not be subject to NEPA because the Corps would not make any significance determinations and would not issue any permits or discretionary approvals.

14.4.8.1 Program

The program elements are beyond the NEPA scope of analysis.

14.4.8.2 Project

The impact analysis for Alternative 6 (Project) is the same as described for Alternative 5 (Project).

14.4.8.3 Impact Summary – Alternative 6

The program is not analyzed under Alternative 6. Impacts for Alternative 6 would be the same as discussed under Alternative 5 (Project); therefore, there would be no impacts for Alternative 6.

14.4.9 Comparison of Significant Impacts and Mitigation for All Alternatives

A summary of significant impacts on terrestrial noise and vibrations resulting from the construction and/or operation of program and/or project elements is provided in Table 14-37. Impacts are compared

by alternative. Proposed mitigation, where feasible, and the significance of the impact following mitigation under CEQA and NEPA are also listed in the table.

Table 14-37. Comparison of Significant Impacts and Mitigation for Noise and Vibrations for All Alternatives

Element	Impact Before Mitigation	Mitigation Measure	Residual Impact After Mitigation
Alternatives 1, 2, 3, 4, and 5[a] (Program)			
Impact NOI-4. Would Alternatives 1, 2, 3, 4, and 5 (Program) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
SJCWRP – Plant Expansion and Process Optimization	CEQA Significant Impact During Construction	MM NOI-4a. Employ noise-reducing construction practices such that construction noise does not exceed levels required by local standards. Measures that may be used to limit construction noise include the following: ▪ Limit construction operations to exempt hours ▪ Locate equipment as far as practical from noise-sensitive uses ▪ Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation ▪ Prohibit gasoline or diesel engines from having unmuffled exhaust ▪ Use noise-reducing enclosures around noise-generating equipment ▪ Construct additional barriers between noise sources and noise-sensitive land uses or take advantage of existing barrier features (e.g., terrain, structures) to block sound transmission MM NOI-4b. Prior to construction, initiate a complaint/response tracking program. A construction schedule will be made available to schools, child care facilities, and residents in the vicinity of the construction areas, and a noise disturbance coordinator will be designated. The coordinator will be responsible for responding to complaints regarding construction noise, will determine the cause of the complaint, and will ensure that reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the notification of the construction schedule.	CEQA Less Than Significant Impact During Construction
	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction

[a] Process optimization would not apply to Alternative 5 (Program). Additionally, all mitigation measures and residual impacts would not apply to Alternative 5 (Program).

Table 14-37 (Continued)

Element	Impact Before Mitigation	Mitigation Measure	Residual Impact After Mitigation
Alternative 1 (Project)			
Impact NOI-1. Would Alternative 1 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			
Shaft Sites – JWPCP East, LAXT, Southwest Marine	CEQA Significant Impact During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	NEPA Less Than Significant Impact (Indirect) During Construction
Impact NOI-4. Would Alternative 1 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
Shaft Sites – JWPCP East, LAXT, Southwest Marine	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact (Indirect) During Construction
Alternative 2 (Project)			
Impact NOI-1. Would Alternative 2 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			
Shaft Sites – JWPCP East, LAXT, Southwest Marine	CEQA Significant Impact During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	NEPA Less Than Significant Impact (Indirect) During Construction
Impact NOI-4. Would Alternative 2 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
Shaft Sites – JWPCP East, LAXT, Southwest Marine	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact (Indirect) During Construction
Alternative 3 (Project)			
Impact NOI-1. Would Alternative 3 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			
Shaft Site – Angels Gate	CEQA Significant Impact During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	NEPA Less Than Significant Impact (Indirect) During Construction

Table 14-37 (Continued)

Element	Impact Before Mitigation	Mitigation Measure	Residual Impact After Mitigation
Impact NOI-2. Would Alternative 3 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?			
Tunnel Alignment – Figueroa/ Gaffey to PV Shelf (Onshore)	CEQA Significant Impact During Construction	MM NOI-2a. Prepare and implement a rail maintenance plan for reducing groundborne noise caused by haul train activities. The plan will include routine inspection and maintenance of locomotives, especially those parts that affect the wheel/rail interface to ensure there are no open joints or discontinuities that would cause excessive noise at the wheel/rail interface. MM NOI-2b. Prepare and implement a vibration control plan to reduce groundborne noise (and vibration) levels. The plan will ensure that groundborne noise levels from operation of locomotives do not exceed the Federal Transit Administration Guidance Manual's threshold level of 45 dBA (A-weighted decibels). The plan may include measures such as the use of: ▪ Haul Train Speed Restrictions – Lower speed limits for haul trains operating within 110 diagonal feet of vibration-sensitive buildings ▪ Ballast Mats – A ballast mat consisting of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties, and rail on top ▪ Resilient Fasteners – Resilient fasteners for reducing the amount of vibration energy that is transferred into the track substructure and for minimizing groundborne vibration in frequencies above 30 hertz	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-2a MM NOI-2b	NEPA Less Than Significant Impact (Indirect) During Construction
Impact NOI-4. Would Alternative 3 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
Shaft Site – Angels Gate	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact (Indirect) During Construction
Alternative 4 (Project)			
Impact NOI-1. Would Alternative 4 (Project) expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			
Shaft Site – Royal Palms	CEQA Significant Impact During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI -1a (same as MM NOI-4a) MM NOI -1b (same as MM NOI-4b)	NEPA Less Than Significant Impact (Indirect) During Construction

Table 14-37 (Continued)

Element	Impact Before Mitigation	Mitigation Measure	Residual Impact After Mitigation
Impact NOI-2. Would Alternative 4 (Project) expose persons to or generate excessive groundborne vibration or groundborne noise levels?			
Tunnel Alignment – Figueroa/ Western to Royal Palms (Onshore)	CEQA Significant Impact During Construction	MM NOI-2a MM NOI-2b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-2a MM NOI-2b	NEPA Less Than Significant Impact (Indirect) During Construction
Impact NOI-4. Would Alternative 4 (Project) result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			
Shaft Site – Royal Palms	CEQA Significant Impact During Construction	MM NOI-4a MM NOI-4b	CEQA Less Than Significant Impact During Construction
	NEPA Significant Impact (Indirect) During Construction	MM NOI-4a MM NOI-4b	NEPA Less Than Significant Impact (Indirect) During Construction