5.6 NOISE AND VIBRATION

1. INTRODUCTION

This section analyzes potential impacts resulting from noise and vibration associated with implementation of the RAP. The analysis describes the existing noise environment of the site and within the vicinity of the site, estimates future noise and vibration levels at surrounding land uses resulting from implementation of the RAP, identifies the potential for significant impacts, and provides mitigation measures to address significant impacts. Relevant data and project-specific noise calculation worksheets are included in Appendix F of this EIR.

2. ENVIRONMENTAL SETTING

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perceptibility of sound is subjective, and the physical response to sound complicates the analysis of sound's impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

Sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures; the scale measures the level of sound in decibels (dB). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate this human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The A-weighted sound level is expressed in "dBA." This scale de-emphasizes low frequencies to which human hearing is less sensitive and focuses on mid- to high-range frequencies. The range of human hearing is approximately 3 to 140 dBA, with 110 dBA considered intolerable or painful to the human ear. A change in sound level of 3 dB is considered "just perceptible," a change in sound level of 5 dB is considered "clearly noticeable," and a change in 10 dB is recognized as "twice as loud."[1]

The A-weighted scale accounts for the range of people's responses, and therefore, is commonly used to quantify individual event or general community sound levels. However, it does not quantify the degree of annoyance or other response effects which are dependent on several other perceptibility factors. These factors include:

- Ambient (background) sound level;
- Magnitude of sound event with respect to the background noise level;
- Duration of the sound event;
- Number of event occurrences and their repetitiveness; and
- Time of day that the event occurs.

[1] *California Department of Transportation, Technical Noise Supplement, September 2013. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed, August 2014.*

In an outdoor environment, sound levels attenuate through the air as a function of distance. Such attenuation is called "distance loss" or "geometric spreading" and is based on the source configuration: point source (i.e. stationary equipment), or line source (i.e. roadway with constant flow of traffic). For a point source, the rate of sound attenuation is 6 dB per doubling of distance from the noise source. For example, a sound level of 50 dBA at a distance of 25 feet from the noise source would attenuate to 44 dBA at a distance of 50 feet. A point source can attenuate at a higher rate of 7.5 dBA at acoustically "soft" sites, which are noise-absorptive sites characteristic of normal earth and most ground with vegetation.[2] For a line source the rate of sound attenuation is 3 dB per doubling of distance.[3] Empirical evidence has shown that, where a line source propagates close to "soft" ground, a more suitable drop-off rate to use is 4.5 dBA per doubling of distance.[4]

In addition, structures (e.g., buildings and solid walls) and natural topography (e.g., hills) that obstruct the line-of-sight between a noise source and a receptor further reduce the noise level if the receptor is located within the "shadow" of the obstruction, such as behind a sound wall. This type of sound attenuation is known as "barrier insertion loss." If a receptor is located behind the wall but still has a view of the source (i.e., line-of-sight not fully blocked), some barrier insertion loss would still occur, however to a lesser extent. Additionally, a receptor located on the same side of the wall as a noise source may actually experience an increase in the perceived noise level as the wall reflects noise back to the receptor, thereby compounding the noise. Noise barriers can provide noise level reductions ranging from approximately 5 dBA (where the barrier just breaks the line-of-sight between the source and receiver) to an upper range of 20 dBA with a more substantial barrier.[5]

Community noise levels usually change continuously throughout the day. The equivalent sound level (L_{eq}) is normally used to describe community noise. The L_{eq} is the equivalent steady-state A-weighted sound level that would contain the same acoustical energy as the time-varying A-weighted sound level during the same time interval. For intermittent noise sources, the maximum noise level (L_{max}) is normally used to represent the maximum noise level measured during the measurement. Maximum and minimum noise levels, as compared to the L_{eq}, are a function of the characteristics of the noise source. As an example, sources such as generators have maximum and minimum noise levels that are similar to L_{eq} since noise levels for steady-state noise sources do not substantially fluctuate. However, as another example, vehicular noise levels along local roadways result in substantially different minimum and maximum noise levels when compared to the L_{eq} since noise levels fluctuate during pass-by events.

To assess noise levels over a given 24-hour time period, the Community Noise Equivalent Level (CNEL) descriptor is used in land use planning. CNEL is the time average of all A-weighted sound levels for a 24-hour period with a 10 dBA adjustment (upward) added to the sound levels which occur in the night (10:00 P.M. to 7:00 A.M.) and a 5 dBA adjustment (upward) added to the sound levels which occur in the evening

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2 *U.S. Department of Transportation, Federal Highway Administration, Highway Noise Fundamentals, 1980, 97. An acoustically "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt, concrete, and very hard packed soils. An acoustically "soft" or absorptive site is characteristic of normal earth and most ground with vegetation.*

3 *Caltrans, Technical Noise Supplement (TeNS), 2013. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed, August 2014.*

4 *U.S. Department of Transportation, Federal Highway Administration, Highway Traffic Noise: Analysis and Abatement Guidance, 2010 (revised 8/11/2010), 10.*

5 *Ibid.*

(7:00 P.M. to 10:00 P.M.). These penalties attempt to account for increased human sensitivity to noise during the quieter nighttime periods, particularly where sleep is the most probable activity. CNEL has been adopted by the State of California to define the community noise environment for development of a community noise element of a General Plan and is also used by the City of Carson for land use planning in the City's Noise Element of the General Plan ("Noise Element").[6]

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration.[7] Vibration amplitudes are usually described in terms of peak levels, as in peak particle velocity (PPV). The peak level represents the maximum instantaneous peak of the vibration signal. In addition, vibrations can be measured in the vertical, horizontal longitudinal, or horizontal transverse directions. Ground vibrations are most often greatest in the vertical direction.[8] Therefore, the analysis of ground-borne vibration associated with the project is addressed in the vertical direction. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 50 feet or less) from the source.

Regulatory Framework

Many government agencies have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and ground-borne vibration. The City of Carson has adopted a number of policies that are based in part on federal and State regulations and are intended to control, minimize or mitigate environmental noise effects. The regulations and policies that are relevant to the project are discussed below.

Noise

City of Carson

City of Carson Noise Element

The City of Carson Noise Element includes policies and implementation measures to limit the exposure of the community to excessive noise levels. The Noise Element incorporates California's noise and land use compatibility matrix included as **Table 5.6-1**, *Noise and Land Use Compatibility Matrix*, which presents criteria used to assess the compatibility of land uses with the noise environment. The Noise Element also identifies interior and exterior noise standards included as **Table 5.6-2**, *Interior and Exterior Noise Standards*, which indicate standards and criteria that specify acceptable limits of noise for various land uses throughout the City. Policies and implementation measures of the Noise Element that pertain to the proposed project include the following:[9]

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[6] *State of California, General Plan Guidelines, 2002. City of Carson, 2004. City of Carson General Plan 2004, Noise Element. http://ci.carson.ca.us/content/files/pdfs/GenPlan/Chapter07.Noise.pdf. Accessed August 2014.*

[7] *Federal Transit Authority, Transit Noise and Vibration Impact Assessment, Final Report, page 7-3, April 2006.*

[8] *California Department of Transportation (Caltrans), Transportation Related Earthborne Vibrations, page 4, February 2002.*

[9] *State of California, General Plan Guidelines, 2002. City of Carson, 2004. City of Carson General Plan 2004, Noise Element. http://ci.carson.ca.us/content/files/pdfs/GenPlan/Chapter07.Noise.pdf. Accessed August 2014.*

Table 5.6-1

Noise and Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure CNEL, dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density	50 – 60	60 – 65	65 – 75	75 – 85
Residential – Multi-Family	50 – 60	60 – 65	65 – 75	75 – 85
Transient Lodging—Motels, Hotels	50 – 65	65 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 – 60	60 – 65	65 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 – 65	NA	65 – 85
Sports Arena, Outdoor Spectator Sports	NA	50 – 70	NA	70 – 85
Playgrounds, Neighborhood Parks	50 – 70	NA	70 – 75	75 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 67.5	67.5 – 75	75 – 80	NA
Industrial, Manufacturing, Utilities, Agriculture	50 – 70	70 – 75	75 – 85	NA

NA = not applicable

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

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

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: City of Carson, City of Carson General Plan, Chapter 7,Noise Element, 2004.

Goal N-2: Minimize noise impacts on residential uses and noise sensitive receptors along the City's streets, ensuring that the City's interior and exterior noise levels are not exceeded.

- **Policy N-2.1** – Limit truck traffic to specific routes and designated hours of travel, where necessary, as defined in the Transportation and Infrastructure Element and by the City's Development Services Group. Said routes and hours shall be reviewed periodically to ensure the protection of sensitive receptors and residential neighborhoods.

- **Policy N-2.4** – Minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures such as enforcing the speed limit, shifting travel lanes away from impacted units or sensitive receptors, and adding bike lanes.

Table 5.6-2

City of Carson Interior and Exterior Noise Standards

Land Use Categories		CNEL	
Categories	**Uses**	**Interior[a]**	**Exterior[b]**
Residential	Single-Family, duplex, multi-family	50-55	50-60
	Mobile home	45	65
Commercial, Industrial, Institutional	Hotels, Motel, Transient Lodging	45	--
	Commercial Retail, Bank, Restaurant	55	--
	Office Building, Research and Development, Professional Offices, City Office Building	50	--
	Amphitheatre, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional	Hospital, schools' classrooms	45	65
	Church, Library	45	--
Open Space	Parks	--	65

Noise level requirement with closed windows. Mechanical ventilation system or other means of natural ventilation shall be provided as of Uniform Building Code (UBC) Chapter 12, Section 1205.

Exterior noise level should be such that interior noise levels will not exceed 45 CNEL.

[a] *Indoor environment including bedrooms, living areas, bathrooms, toilets, closets, corridors.*

[b] *Outdoor environment limited to: private yard of single-family or multi-family private patio or balcony which is served by a means of exit from inside, mobile home park, park's picnic area, and school's playground.*

Source: City of Carson, City of Carson General Plan, Chapter 7, Noise Element, 2004.

- **Policy N-2.5** – Discourage through-traffic in residential neighborhoods.
- **Policy N-2.6** – Actively advocate noise control requirements for all motor vehicles.
- **Policy N-2.7** – Continue to promote the use of alternative clean fueled vehicles for personal and business use.

Goal N-7: Incorporate noise considerations into land use planning decisions.

- **Policy N-7.1** – Incorporate noise considerations into land use planning decisions by establishing acceptable limits of noise for various land uses throughout the community.

- **Policy N-7.2** – Continue to incorporate noise assessments into the environmental review processes, as needed. Said assessments shall identify potential noise sources, potential noise impacts, and appropriate sound attenuation. In nonresidential projects, potential noise sources shall include truck pick-up and loading areas, locations of mechanical and electrical equipment, and similar noise sources. Require mitigation of all significant noise impacts as a condition of project approval.

- **Policy N-7.4** – Ensure acceptable noise levels near schools, hospitals, convalescent homes, churches, and other noise-sensitive areas in accordance with Table 5.6-1, above. To this end, require buffers or appropriate mitigation of potential noise sources. Such sources include, but are not limited to truck pick-up and loading areas, mechanical and electrical equipment, exterior speaker boxes, and public address systems.

City of Carson Municipal Code, Noise Control Ordinance

In 1995, the City of Carson adopted the Noise Control Ordinance of the County of Los Angeles (Los Angeles County Code, Title 12, Chapter 12.08), as amended, as the City's Noise Control Ordinance (City of Carson Municipal Code, Ordinance 95-1068; Chapter 5). The City's Noise Ordinance sets standards for noise levels citywide and provides the means to enforce the reduction of obnoxious or offensive noises. The noise sources enumerated in the ordinance include radios, phonographs, loudspeakers and amplifiers, electric motors or engines, animals, motor vehicles, and construction equipment. The Noise Ordinance sets interior and exterior noise levels for all properties within designated noise zones, unless exempted.

Note that the following standards are first taken from the Los Angeles County Noise Control Ordinance[10] and then incorporate City of Carson amendments in accordance with the City's Noise Control Ordinance.[11]

12.08.390 Exterior noise standards--Citations for violations authorized when.

A. Unless otherwise herein provided, the following exterior noise levels, **Table 5.6-3**, *City of Carson Exterior Noise Ordinance,* shall apply to all receptor properties within a designated noise zone:

B. Unless otherwise herein provided, no person shall operate or cause to be operated, any source of sound at any location within the unincorporated county, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person

[10] *County of Los Angeles Noise Control Ordinance. https://library.municode.com/index.aspx?clientId=16274. Accessed, August 2014.*

[11] *City of Carson Noise Control Ordinance, 2014. http://www.codepublishing.com/ca/carson.html. Accessed, August 2014.*

Table 5.6-3

City of Carson Exterior Noise Ordinance

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Exterior Noise Level (dB)
I	Noise-sensitive area	Anytime	45
II	Residential properties	10:00 P.M. to 7:00 A.M. (nighttime) 7:00 A.M. to 10:00 P.M. (daytime)	45 50
III	Commercial properties	10:00 P.M. to 7:00 A.M. (nighttime) 7:00 A.M. to 10:00 P.M. (daytime)	55 60
IV	Industrial properties	Anytime	70

Source: City of Carson, Noise Control Ordinance, Section 12.08.390.

which causes the noise level, when measured on any other property either incorporated or unincorporated, to exceed any of the following exterior noise standards:

- Standard No. 1 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 15 minutes in any 30-minute period. Standard No. 1 shall be the applicable noise level from subsection A of this Section; or, if the ambient L50 exceeds the foregoing level, then the ambient L becomes the exterior noise level for Standard No. 1.
- Standard No. 2 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 7.5 minutes in any 30-minute period. Standard No. 2 shall be the applicable noise level from subsection A of this Section plus 5 dB; or, if the ambient L25 exceeds the foregoing level, then the ambient L25 becomes the exterior noise level for Standard No. 2.
- Standard No. 3 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 2.5 minutes in any 30-minute period. Standard No. 3 shall be the applicable noise level from subsection A of this Section plus 20 dB; or, if the ambient L8.3 exceeds the foregoing level, then the ambient L8.3 becomes the exterior noise level for Standard No. 3.
- Standard No. 4 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 30 seconds in any 30-minute period. Standard No. 4 shall be the applicable noise level from subsection A of this Section plus 15 dB; or, if the ambient L1.7 exceeds the foregoing level, then the ambient L1.7 becomes the exterior noise level for Standard No. 4.
- Standard No. 5 shall be the exterior noise level which may not be exceeded for any period of time. Standard No. 5 shall be the applicable noise level from subsection A of

this Section plus 20 dB; or, if the ambient L0 exceeds the foregoing level then the ambient L0 becomes the exterior noise level for Standard No. 5.

C. If the measurement location is on a boundary property between two different zones, the exterior noise level utilized in subsection B of this section to determine the exterior standard shall be the arithmetic mean of the exterior noise levels in subsection A of the subject zones. Except as provided for above in this subsection C, when an intruding noise source originates on an industrial property and is impacting another noise zone, the applicable exterior noise level as designated in subsection A shall be the daytime exterior noise level for the subject receptor property.

12.08.400 Interior noise standards.

A. No person shall operate or cause to be operated within a dwelling unit, any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving dwelling unit to exceed the following standards:

- Standard No. 1 The applicable interior noise level for cumulative period of more than 5 minutes in any hour; or
- Standard No. 2 The applicable interior noise level plus 5 dB for a cumulative period of more than 1 minute in any hour; or
- Standard No. 3 The applicable interior noise level plus 10 dB or the maximum measured ambient noise level for any period of time.

B. The following interior noise levels, **Table 5.6-4**, *City of Carson Interior Noise Ordinance*, for multifamily residential dwellings shall apply, unless otherwise specifically indicated, within all such dwellings with windows in their normal seasonal configuration.

Table 5.6-4

City of Carson Interior Noise Ordinance

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Allowable Interior Noise Level (dB)
All Zones	Multi-family Residential	10:00 P.M. to 7:00 A.M. (nighttime)	40
	Residential	7:00 A.M. to 10:00 P.M. (daytime)	45

Source: City of Carson, Noise Control Ordinance, Section 12.08.400.

C. If the measured ambient noise level reflected by the L_{50} exceeds that permissible within any of the interior noise standards in subsection A of Section 12.08.390, the allowable interior noise level shall be increased in 5 dB increments in each standard as appropriate to reflect said ambient noise level (L_{50}).

12.08.410 Correction for certain types of sounds.

For any source of sound which emits a pure tone or impulsive noise, the noise levels as set forth in Sections 12.08.390 and 12.08.400 shall be reduced by five decibels.

12.08.440 Construction noise.

A. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of 7:00 PM and 7:00 AM, or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real-property line, except for emergency work of public service utilities or by variance issued by the health officer is prohibited.

B. Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule:

1. At Residential Structures.

a) Mobile Equipment. Maximum noise levels, **Table 5.6-5**, *Short-term Operation Construction Equipment Maximum Noise Levels*, for non-scheduled, intermittent, short-term operation of twenty (20) days or less for construction equipment:

Table 5.6-5

Short-term Operation Construction Equipment Maximum Noise Levels (20 days or less)

Applicability	Single-Family Residential	Multi-Family Residential
Daily, except Sundays and legal holidays, 7:00 A.M. to 8:00 P.M.	75 dBA	80 dBA
Daily, 8:00 P.M. to 7:00 A.M. and all day Sundays and legal holidays,	60 dBA	64 dBA

Source: City of Carson, Noise Control Ordinance, Section 12.08.440.

b) Maximum noise level, **Table 5.6-6**, *Long-term Operation Construction Equipment Maximum Noise Levels*, for repetitively scheduled and relatively long-term operation of twenty-one (21) days or more for construction equipment:

Table 5.6-6

Long-term Operation Construction Equipment Maximum Noise Levels (21 days or more)

Applicability	Single-Family Residential	Multi-Family Residential
Daily, except Sundays and legal holidays, 7:00 A.M. to 8:00 P.M.	65 dBA	70 dBA
Daily, 8:00 P.M. to 7:00 A.M. and all day Sundays and legal holidays,	55 dBA	60 dBA

Source: City of Carson, Noise Control Ordinance, Section 12.08.440.

2. At Business Structures.

a) Mobile equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation of mobile equipment: Daily, including Sunday and legal holidays, all hours: maximum of 85 dBA.

C. All mobile or stationary internal-combustion-engine powered equipment or machinery shall be equipped with suitable exhaust and air-intake silencers in proper working order.

D. In case of a conflict between this chapter and any other ordinance regulating construction activities, provisions of any specific ordinance regulating construction activities shall control.

12.08.460 Loading and unloading operations.

Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans or similar objects between the hours of 9:00 P.M. and 7:00 A.M. in such a manner as to cause noise disturbance is prohibited.

12.08.560 Vibration.

Operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 in/sec over the range of 1 to 100 Hertz.

12.08.580 (H) Variance Procedures.

An appeal shall be considered by the Council as provided in CMC 9173.4, and the fees therefor shall be as specified in CMC 9173.9 thereof.

City of Los Angeles

Although the site is located in the City of Carson, off-site noise sensitive receptors which may be affected by implementation of the RAP are located within the City of Los Angeles. Thus, a discussion of potentially applicable City of Los Angeles regulations and policies is included.

Los Angeles Noise Element

City of Los Angeles Noise Element policies that relate to the proposed project include the following:[12]

- Policy 2.2—Enforce and/or implement applicable city, state and federal regulations intended to mitigate proposed noise producing activities, reduce intrusive noise, and alleviate noise that is deemed a public nuisance.

Los Angeles Municipal Code

The City of Los Angeles Noise Regulation is provided in Chapter XI of the Los Angeles Municipal Code (LAMC). Section 111.02 of the LAMC provides procedures and criteria for the measurement of the sound level of "offending" noise sources. In accordance with the LAMC, a noise level increase of 5 dBA over the existing average ambient noise level at an adjacent property line is considered a noise violation. To account for people's increased tolerance for short-duration noise events, the Noise Regulation provides a 5 dBA allowance for noise source occurring more than five but less than fifteen minutes in any one-hour period and an additional 5 dBA allowance (total of 10 dBA) for noise source occurring five minute or less in any one-hour period.[13]

Section 112.05 of the LAMC sets a maximum noise level for construction equipment of 75 dBA at a distance of 50 feet when operated within 500 feet of a residential zone. Compliance with this standard is only required where "technically feasible."[14] Section 41.40 of the LAMC prohibits construction between the hours of 9:00 P.M. and 7:00 A.M. Monday through Friday, 6:00 P.M. and 8:00 A.M. on Saturday, and at any time on Sunday. (i.e. construction is allowed Monday through Friday between 7:00 a.m. to 9:00 p.m.; and Saturdays and National Holidays between 8:00 a.m. to 6:00 p.m.) In general, the City of Los Angeles Department of Building and Safety enforces noise ordinance provisions relative to equipment and the Los Angeles Police Department enforces provisions relative to noise generated by people.

Ground-Borne Vibration Guidelines

The City of Carson has not adopted policies or guidelines relative to ground-borne vibration for vibration sensitive buildings. Federal Transit Administration's (FTA) ground-borne vibration policies and guidelines were consulted as part of this analysis. With respect to residential structures, FTA's technical publication Transit Noise and Vibration Impacts Assessment (May 2006), provides a vibration damage potential threshold criteria of 0.5 inches per second PPV for residential structures.

Existing Conditions

Noise-Sensitive Receptors and Locations

Some land uses, such as residences, schools, motels and hotels, libraries, and hospitals, are considered more sensitive to intrusive noise than others due to the types of activities typically involved at the receptor

[12] *Noise Element of the Los Angeles City General Plan, adopted February 3, 1999.*

[13] *Los Angeles Municipal Code, Chapter XI, Article I, Section 111.02-(b).*

[14] *In accordance with the City of Los Angeles Noise Ordinances, "technically feasible" means that the established noise limitations can be complied with at a project site, with the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques employed during the operation of equipment.*

location. There are residential uses located east, west, north (across the MTA tracks) and south (across Lomita Boulevard) of the site. Existing noise sensitive uses in the project vicinity are described below:

- Off-Site Single-Family Residential Dwellings: Off-site residential neighborhoods including those located along Carmel Drive, Mill Valley Way, Monterey Street, and Highland Way, residences located on Island Avenue and eastward, residences on Realty Street and northwards, and south of Lomita Boulevard.
- On- Site Single-Family Residential Dwellings: The residences within the Carousel Tract, located along Marbella Avenue, Neptune Venue, Ravenna Avenue, Panama Avenue, East 244th Street, East 247th street, East 248th Street, and East 249th Street, are part of the Site.
- School: Wilmington Middle School is located southwest of the site across from Lomita Boulevard.

In addition to the closest off-site sensitive receptors described above, this EIR also considers on-site residences as sensitive receptors. As described in Chapter 2, Project Description, of this EIR excavation associated with implementation of the RAP would be completed in clusters, with each cluster including approximately eight contiguous properties. Based on approximately eight to ten weeks to complete a cluster of eight properties with some overlapping of remediation activities between clusters, restoration of the entire Site, including targeted remediation beneth the streets, is estimated to take approximately 6 years to complete. On-site properties that are not being remediated or restored and that are not vacated but that are near to the cluster of properties in some stage of remediation and/or restoration would be treated as a sensitive receptor.

Ambient Noise Levels

The existing noise environment at the site is dominated primarily by auto traffic on Lomita Boulevard, Neptune Avenue, and Panama Avenue. Other community noise sources include incidental noise from industrial-related and residential activities and railroad related activities. To quantify existing noise levels in the project area, both long-term (Location R1) and short-term (Location R2 through R7) measurements were conducted. Noise monitoring locations, identified as R1 though R7, and sensitive receptors in the vicinity of the site are shown on **Figure 5.6-1**, *Noise Measurement Locations.* The ambient noise measurements were conducted from Tuesday April 1 through Thursday April 3, 2014, and summarized below:

- Measurement Location R1: This location represents the existing noise environment of the on-site single-family residential neighborhood along Marbella Avenue. The noise measuring device (sound level meter) was placed on the east side of Marbella Avenue north of 247th Street. This location is on-site. Because access is controlled to the Monterey Pines neighborhood, west of the site, noise monitoring could not be performed within the adjacent subdivision. Thus, data from this location is assumed to be representative of that off-site residential neighborhood.
- Measurement Location R2: This location represents the existing noise environment of the on-site single-family residential neighborhood along Ravenna Avenue. The sound level meter was placed along Ravenna Avenue at the intersection with 247th Street.
- Measurement Location R3: This location represents the existing noise environment of Wilmington Middle School southwest of the site. The sound level meter was placed at the closest school building along Lomita Boulevard, approximately 690 feet southwest of the site.

PCR

N

0 500 1,000 Feet

Noise Measurement Locations

Former Kast Property Tank Farm Site Remediation Project

Source: Microsoft, 2010; PCR Services Corporation, 2014.

FIGURE

5.6-1

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- Measurement Location R4: This location represents the existing noise environment of Lomita Boulevard south of the site. The sound level meter was placed on the southern central boundary of the site.
- Measurement Location R5: This location represents the existing noise environment of the single-family residential neighborhood to the east of the site along Island Avenue. The sound level meter was placed along Island Avenue at the intersection with 245th Street approximately 130 feet east of the site.
- Measurement Location R6: This location represents the existing noise environment of Avalon Boulevard east of the site. The sound level meter was placed at the intersection of Avalon Boulevard and East 246th Street approximately 1,140 feet east of the site.
- Measurement Location R7: This location represents the existing noise environment north of the site (and north of the rail lines); the nearest homes are on the south side of Realty Street. The sound level meter was placed at the intersection of Realty Street and Neptune Avenue approximately 280 feet north of the site.

The ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter (SLM). The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute (ANSI) S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of 5 feet above the local grade. The sound level meters were set up to collect the 15-minute average noise level, L_{eq} except for R1 which was a 24 hour measurement.

Table 5.6-7, *Summary of Ambient Noise Measurements,* presents the existing noise levels in the vicinity of the site. Based on field observation and measured sound data, the existing noise environment in the vicinity of the site is dominated mainly by auto traffic noise. As indicated on Table 5.6-7, the noise sensitive receptors within the site are currently exposed to noise levels ranging from 51 to 60 dBA, L_{eq} during daytime. The ambient noise levels in the immediate project vicinity are representative of noise levels in a noisy urban area. Sensitive receptors located within the site were exposed to noise measurements 73 dBA, L_{eq} (Location R3). Noise levels ranging from 55 to 56 dBA, L_{eq} near the site's northern and eastern boundaries (Location R5 and R7). Wilmington Middle School (Location R3 and R5) along Lomita Boulevard is exposed to exterior noise levels ranging from 72 to 73 dBA, L_{eq}. Residential uses outside the site (Location R6) along Avalon Boulevard are exposed to exterior noise level of 69 dBA, L_{eq}.

To further characterize the project area's ambient noise environment, the CNEL noise levels attributed to existing traffic on local roadways were calculated using a noise prediction model which was developed based on calculation methodologies provided in the Caltrans Technical Noise Supplement (TeNS) document and traffic data provided by the traffic consultant.[15] The roadway noise calculation procedures provided in the Caltrans TeNS are consistent with Federal Highway Administration RD-77-108 roadway noise prediction methodologies. This methodology, considered an industry standard, allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

[15] *The roadway noise calculation procedures provided in TeNS are consistent with Federal Highway Administration RD-77-108 "industry standard" roadway noise prediction methodologies.*

Table 5.6-7

Summary of Ambient Noise Measurements

Location, Duration, Existing Land Uses and, Date of Measurements	Measured Ambient Noise Levels,[a] (dBA) Daytime (7 A.M. to 10 P.M.) Hourly L_{eq}	Nighttime (10 P.M. to 7 A.M.) Hourly L_{eq}	24-Hour Average, CNEL
R1			
4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	53 – 58	50	N/A
4/2/14 (full 24 hours)/ Wednesday	51 – 60	43 – 55	59
4/3/14 (11 A.M. to 11:59 P.M.)/ Thursday	51 – 61	43 – 52	N/A
Average (4/2/2014) at R1	58	50	
R2 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	50	N/A	N/A
R3 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	73	N/A	N/A
R4 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	72	N/A	N/A
R5 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	55	N/A	N/A
R6 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	69	N/A	N/A
R7 4/1/14 (11 A.M. to 11:59 P.M.)/ Tuesday	56	N/A	N/A

[a] *Detailed measured noise data, including hourly L_{eq} levels, are included in Appendix F-1.*

Source: PCR Services Corporation, 2014.

A traffic model calibration test was performed to establish the noise prediction model's accuracy. The road segments included in the calibration test were along Lomita Boulevard, between Main Street and Neptune Avenue and Avalon Boulevard, between Sepulveda Boulevard and Lomita Boulevard. At the noted locations, 15-minute noise recordings were made concurrent with logging of actual traffic volumes and auto fleet mix (i.e., standard automobile, medium duty truck, or heavy duty truck). The traffic counts were entered into the noise model along with the observed speed, lane configuration, and distance to the roadway to calculate the traffic noise levels. The results of the traffic noise model calibration are provided in **Table 5.6-8**, *Traffic Noise Model Calibration Results*. As indicated, the noise model results are within less than 1 dBA of the measured noise levels, which is within the industry standard tolerance of the noise prediction model. Therefore, the project specific traffic noise prediction model is considered accurate and reflective of the project's physical setting.

Vibration-Sensitive Receptor Locations

Typically, ground-borne vibration generated by man-made activities (i.e., rail and roadway traffic, operation of mechanical equipment and typical construction equipment) diminishes rapidly as the distance from the source of the vibration become greater. The Federal Transportation Association (FTA) uses a screening distance of 100 feet for highly vibration-sensitive buildings (e.g., hospitals with vibration sensitive equipment) and 50 feet for residential uses. When vibration-sensitive uses are located within those

Table 5.6-8

Traffic Noise Model Calibration Results

Road Segment/ Noise Measurements Locations	Traffic Counts during noise readings, 15 minutes			Measured Traffic Noise Levels, L_{eq} (dBA)	Project Traffic Noise Model Predicted Noise Levels, L_{eq} (dBA)	Difference between Predicted and Measured Levels, dBA
	Autos	Medium Trucks [a]	Heavy Trucks [b]			
Lomita Boulevard	223	15	9	71.6	71.3	-0.3
Avalon Boulevard	213	6	2	68.9	68.4	-0.5

[a] *Medium Truck – 2 axle trucks based on field observations.*

[b] *Heavy Truck – 3 or more axle trucks and buses based on field observations.*

Source: PCR Services Corporation, 2014.

distances from a site, vibration impact analysis is required. With respect to structures, vibration-sensitive receptors generally include historic buildings, buildings in poor structural condition, and uses that require precision instruments (e.g., hospital operating rooms or scientific research laboratories). Therefore, this analysis focuses on potential effects on nearby residential uses.

3. METHODOLOGY AND THRESHOLDS

Methodology

Short-term Noise

On-Site Noise Sources

On-site equipment usage, haul truck staging and haul route noise impacts are evaluated by determining the noise levels generated by the different types of construction activity, calculating the RAP-related noise level at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise). Pilot studies for the demolition and excavation phases were conducted at 24612 Neptune Avenue, from November 5 to 12, 2012 and at 24533 Ravenna Avenue, on December 5, 2012 to test the feasibility of excavation techniques.[16,17] The noise analysis in this EIR uses the demolition and excavation related activity noise levels, in addition to look-up table values for equipment, to estimate project impacts. More specifically, the following steps were undertaken to calculate noise impacts during implementation of the RAP:

1. Ambient noise levels at surrounding sensitive receptor locations were estimated based on field measurement data (refer to Table 5.6-7);

[16] *Noise Measurement Results –Excavation Operations 24612 Neptune Avenue, URS Corporation, December 2012.*

[17] *Noise Measurement Results –Excavation Operations 24533 Ravenna Avenue, URS Corporation, January 2013..*

2. Composite noise levels for the 8-property clusters were taken from the data collected during the pilot studies, and typical noise levels for other on-site construction equipment were obtained from the Federal Highway Administration's (FHWA) Roadway Construction Noise Model;
3. Distances between construction site locations (noise source) and surrounding sensitive receptors were measured using project drawings, Google Earth™, and site plans; and
4. The project-generated noise level was then calculated for sensitive receptor locations based on the conventional standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance.

Off-Site Roadway Noise Sources

Roadway noise impacts were evaluated using the Caltrans Technical Noise Supplement (TeNS) methodology based on data contained in the traffic study. This methodology allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

Ground-Borne Vibration

Ground-borne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a significance determination based on the thresholds discussed below. Potential vibration sources during implementation of the RAP include heavy duty equipment needed for excavation and hauling of materials. Typical vibration levels expected from each type of equipment were obtained from the published standard vibration data by the FTA. The project would be constructed using heavy-duty construction equipment such as excavators, dozers, and trucks. Construction equipment operated during project implementation would be considered as stationary vibration sources such as auger drill rig, backhoe, paver, etc.

Long-Term Noise

On-Site (Stationary) Noise Sources

After implementation of the RAP, the site would be restored to as close to its current state as possible. Sources of long-term noise would include mechanical equipment related to the gas collection system and occasional vehicular access for periodic service of the equipment and routine maintenance. The current plan is to install the Soil Vapor Extraction (SVE) gas collection system throughout the site, and to locate the treatment system at one of three potential locations within the developed industrial area to the immediate west or northwest of the site, as shown in Figure 2-8.

Off-Site Roadway Noise Sources

The project would not generate off-site vehicular traffic, with the exception of the occasional vehicle trips needed to service the SVE system. Even several vehicles accessing the site simultaneously would produce only negligible noise to off-site receptors, and no quantitative analyses are warranted.

Long-Term Vibration

No sources of ground-borne vibration are expected to remain at the site long-term upon completion of the project. Therefore, analysis of long-term vibration impacts is not warranted.

Thresholds of Significance

Appendix G of the State *CEQA Guidelines* provides a set of screening questions that address impacts with regard to noise. These questions are as follows:

Would the project:

a) Exposure of persons to or generation of noise level in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

As determined in the Initial Study, which is contained in Appendix A of this EIR, the nearest airport to the site is the Torrance Municipal Airport, which is located over 3.3 miles to the west of the site. As such, no further analysis of this issue is necessary (Items e and f above). Based on the Cities' applicable regulations and the Appendix G checklist questions the project would result in a significant noise impact if:

NOISE 1: Activities during implementation of the RAP would result in noise levels above the applicable standard of 65 dBA between the hours of 7:00 A.M. to 8:00 P.M. daily, except Sundays and legal holidays or above the applicable standard of 55 dBA between the hours of 8:00 P.M. to 7:00 A.M. daily at a noise-sensitive property boundary located in the City of Carson; or result in noise levels above the applicable standard of 75 dBA at distance of 50 feet from equipment when construction activities are located within 500 feet of a residential area unless technically feasible mitigation measures are incorporated for noise sensitive receptors located in the City of Los Angeles.

NOISE 2: Project-generated mobile noise source (i.e., off-site traffic) would cause ambient noise levels to increase by 5 dBA.

NOISE 3: Project-related stationary noise sources (e.g., mechanical fans) generate noise levels that would exceed measured ambient noise levels at the designated sensitive receptor locations.

Based on FTA's ground-borne vibration policies and guidelines and the City of Carson's Noise Ordinance (Section 12.08.560) the project would result in a significant vibration impact if:

VIB 1: Project construction activities cause a PPV ground-borne vibration level to exceed 0.5 inches per second at a residential structure in accordance with FTA's technical publication Transit Noise and Vibration Impacts Assessment (May 2006).

VIB 2: Short- or long-term vibration impacts result in the exposure of sensitive receptors to vibration levels that exceed the threshold of 0.01 inch per second (in/sec) in accordance with Section 12.08.560 of the City of Carson's Noise Ordinance.

4. PROJECT ANALYSIS

Project Design Features

The following Project Design Features (PDFs) are intended to reduce project-related noise and are proposed as part of the RP's Proposed Remedy. Therefore, they have been taken into account in the analysis of potential project impacts.

PDF NOISE-1 The project contractor(s) will equip all construction machinery and equipment, fixed or mobile, with properly operating and maintained noise mufflers, consistent with manufacturers' standards.

PDF NOISE-2 Engine idling from construction equipment such as excavators and haul trucks will be limited, to the extent feasible.

PDF NOISE-3 Expected hours for construction equipment use on-site will be 7:30 A.M. to 4:30 P.M. Monday through Friday, with hauling activities from 8:00 A.M. to 4:00 P.M.

PDF NOISE-4 Project-related heavy truck traffic will be limited to specific routes.

PDF NOISE-5 During excavation, acoustical attenuation blankets 12 feet in height will be installed between the excavation site and occupied houses to reduce community noise exposure from stationary sources of substantial noise, such as generators and water buffalos (trailer).

Analysis of Project Impacts

On-Site Noise during Implementation of the RP's Proposed Remedy

Threshold NOISE 1: Activities during implementation of the RAP would result in noise levels above the applicable standard of 65 dBA between the hours of 7:00 A.M. to 8:00 P.M. daily, except Sundays and legal holidays or above the applicable standard of 55 dBA between the hours of 8:00 P.M. to 7:00 A.M. daily at a noise-sensitive property boundary located in the City of Carson; or result in noise levels above the applicable standard of 75 dBA at distance of 50 feet from equipment when construction activities are located within 500 feet of a residential area unless technically feasible mitigation measures are incorporated for noise sensitive receptors located in the City of Los Angeles.

Impact Statement NOISE-1: *Impacts due to noise from on-site construction activity would be significant. Maximum noise associated with the project would exceed the significance threshold of 65 dBA L_{eq} at nearby on-site and off-site residential uses located in the City of Carson. However, maximum noise associated with the project would not exceed the significance threshold of 75 dBA L_{eq} at nearby off-site residential uses located in the City of Los Angeles. Impacts due to noise from on-site construction activity would be less than significant at off-site residential uses located in the City of Los Angeles.*

Short-Term Noise

On-Site Noise Sources

Noise impacts from implementation of the RAP are generally a function of the noise generated by construction equipment, equipment locations, the sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Implementation of the RAP would be undertaken in five stages: (1) demolition; (2) excavation and backfill; (3) street trenching; (4) well installation, and (5) paving. Each stage involves the use of different kinds of construction equipment and, therefore, has its own distinct noise characteristics. Demolition involves the use of equipment such as excavator, bobcat, chain saw, jack hammer, generator, and water pump. Excavation involves the use of excavator, bobcat, and generator. Street trenching construction involves the use of backhoe, air compressor, generator, and concrete saw. Well installation involves the use of drill rig. Paving involves the use of street grinder paver, roller, and street sweeper. The project would be constructed using typical construction techniques; no blasting or impact pile driving would be used. Residents of properties adjacent to those where excavation work is being conducted would be offered relocation as necessary.

Implementation of the remediation activities would commence in Fall 2015. Based on working five days per week remediation on a phase of eight properties could be completed within approximately eight to ten weeks. More specifically, it is estimated that excavation and backfill would take approximately six weeks per property and restoration would take an additional approximately two to four weeks. Work on the second phase of properties (i.e., the next eight properties working down the block), would begin approximately at the end of week six to week eight of work on the first phase. After completion of the remediation on the properties within the Carousel Tract, restoration of the streets would occur. This would involve street grinding and street paving. This phase would last approximately six months.

Project construction would require the use of mobile heavy equipment with high noise level characteristics. Individual pieces of construction equipment that would be used for excavation and installation of the SVE

system produce maximum noise levels of 75 dBA to 90 dBA at a reference distance of 50 feet from the noise source, as shown in **Table 5.6-9**, *Typical Construction Equipment Noise Levels*. These maximum noise levels would occur when equipment is operating under full power conditions. However, equipment used on construction sites often operate intermittently over the course of a day. The estimated usage factor for the equipment is also shown Table 5.6-9. The usage factors are based on FHWA's Roadway Construction Noise Model User's Guide.[18] To more accurately characterize construction-period noise levels, the average (Hourly L_{eq}) noise level associated with each construction stage is calculated based on the quantity, type, and usage factors for each type of equipment that would be used during each construction stage and are typically attributable to multiple pieces of equipment operating simultaneously.

Table 5.6-9

Typical Construction Equipment Noise Levels

Equipment	Estimated Usage Factor, %	Maximum Noise Level at 50 feet from Equipment, dBA (L_{max})
Air Compressor	40	80
Auger Drill Rig	20	85
Backhoe	50	78
Concrete Saw	20	90
Generator Set	50	81
Paver	50	77
Roller	20	80
Vacuum Street Sweeper	10	82

Source: FHWA Roadway Construction Noise Model User's Guide, 2006.

Construction noise levels were estimated based on an industry standard sound attenuation rate of 6 dB per doubling of distance for point sources (e.g., construction equipment). In general, equipment was assumed to operate simultaneously at the construction area nearest to potentially affected residential receptors (at the property boundary). These assumptions represent a worst-case noise scenario as the various activities would typically be dispersed throughout an active remedial area and not operate continuously at one, close-by location.

Off-Site Sensitive Receptors

At the perimeter of the Carousel Tract, nearest to sensitive off-site land uses such as residences and schools. Remedial activities are expected to occur at a maximum of four adjacent on-site properties simultaneously. In general, it would be expected that one property would be undergoing demolition, two properties under active remediation (including but not limited to concrete breaking/sawing, soil excavation, and hauling), and the fourth property undergoing restoration. Detailed noise monitoring was performed during the pilot studies, and used in the following analyses. A summary of the noise impacts at the closest off-site sensitive receptors during the various remedial activities are provided in **Table 5.6-10,** *Estimate of Noise Levels*

[18] *Federal Highway Administration, Roadway Construction Noise Model User's Guide, 2006.*

Table 5.6-10

Estimate of Noise Levels (L_{eq}) During RAP Implementation at Off-Site Sensitive Receiver Locations

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at the Noise Sensitive Receptor by Construction Phase,[a] Hourly L_{eq} (dBA)	Project's Significance Threshold (dBA)[c]	Exceeds Significance Threshold?
R3	Residential Remediation	450	54	75[a]	No
	Street Trenching	450	56		No
	SVE Well Installation	450	49		No
	Paving	450	49		No
R4	Residential Remediation	110	67	75[a]	No
	Street Trenching	200	63		No
	SVE Well Installation	110	61		No
	Paving	200	56		No
R5	Residential Remediation	5	104	65[b]	Yes
	Street Trenching	110	68		Yes
	SVE Well Installation	25	68		Yes
	Paving	110	61		No
R7	Residential Remediation	150	69	65[b]	Yes
	Street Trenching	250	61		No
	SVE Well Installation	150	63		No
	Paving	250	54		No
M1	Residential Remediation	5	104	65[b]	Yes
	Street Trenching	30	85[c]		Yes
	SVE Well Installation	25	68		Yes
	Paving	30	77[c]		Yes

[a] *Sensitive receptors are located in the City of Los Angeles*
[b] *Sensitive receptors are located in the City of Carson*
[c] *Noise reduction by sound blanket/temporary barrier were applied.*
Source: PCR Services Corporation, 2014

During Rap Implementation (L_{eq}) at Off-Site Sensitive Receiver Locations. Detailed noise calculations for remedial activities are provided in Appendix F-2 of this EIR. As shown in Table 5.6-10, the applicable City of Los Angeles threshold is not expected to be exceeded at the sensitive receptors (residences and school) located in the City of Los Angeles (R3 and R4) during any of the phases of remedial activity.

Noise levels at the single-family residences bordering the east of the site, (R5, along Island Avenue) are predicted to exceed the 65 dBA threshold for sensitive receptors located in the City of Carson, during remedial activities at on-site residential properties (104 dBA), during SVE well installation (68 dBA), and during street trenching (68 dBA), but would remain below the threshold during paving (61 dBA). At the residences located to the north of the rail lines that border the site to the north (R7), noise levels are predicted to exceed the 65 dBA threshold, at a maximum of 69 dBA, when work would be performed

simultaneously at four properties on-site, but would remain below the threshold during street trenching, SVE well installation, and paving. Noise levels are estimated to reach a maximum of 104 dBA at the closest Monterey Pines neighborhood residences (M1) when remedial activities would occur at the adjacent Carousel Tract properties, approximately 5 feet away. However, the adjacent sensitive receptors would be exposed to the maximum noise level of 104 dBA for a few hours in a day during peak construction activities. The average noise level during Residential Remediation would be 81 dBA at the receptor location, R5. Street trenching, SVE well installation, and paving could also result in noise levels in excess of the 65 dBA significance threshold at the adjacent Monterey Pines community when those activities occur in close proximity to these off-site residences.

On-Site Sensitive Receptors

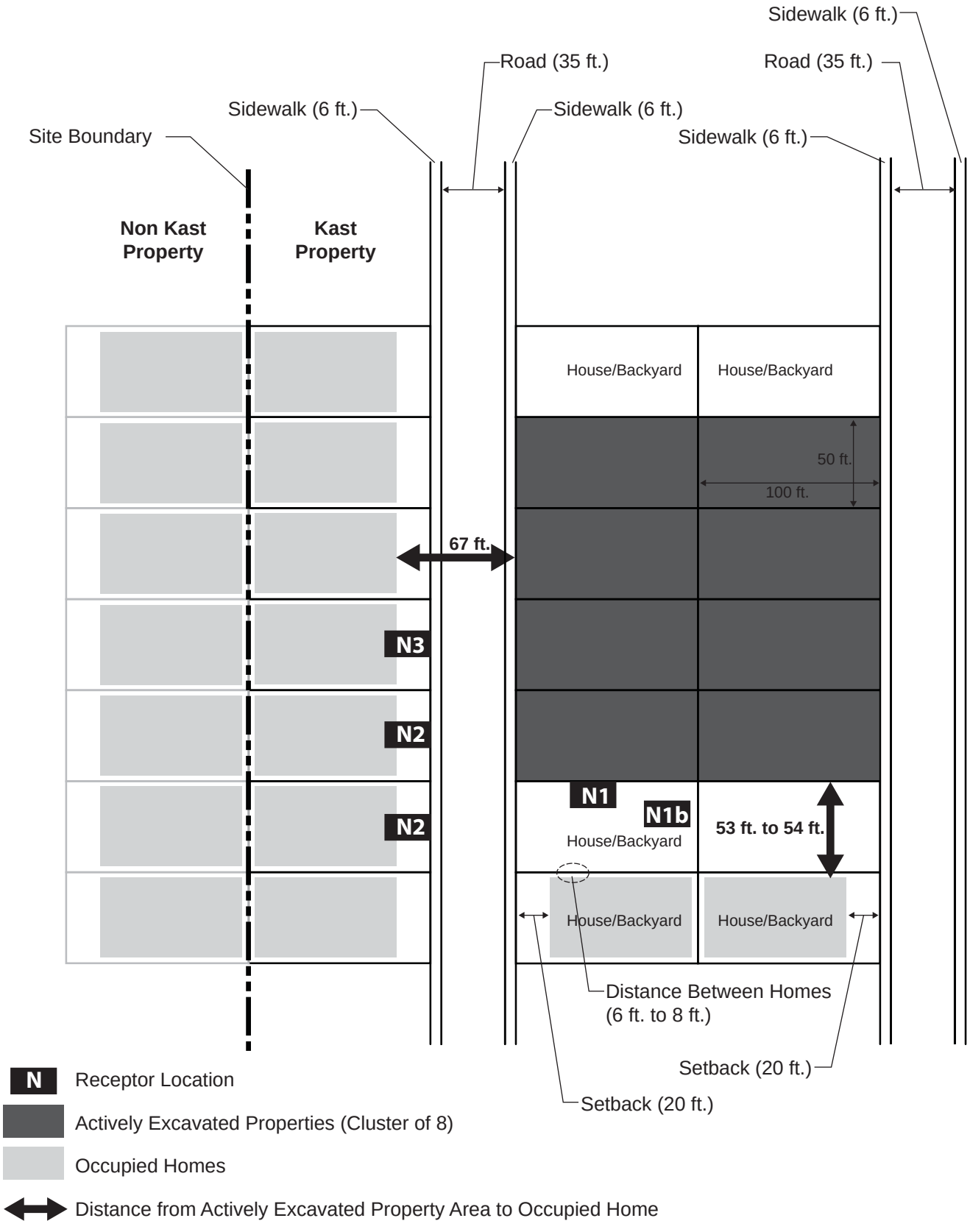
Within the site, remedial activities are expected to occur in a cluster of up to eight properties, four on one street as described above, but with four additional properties on a parallel street, back-to-back. A conceptual 8-property cluster is depicted in **Figure 5.6-2**, *Conceptual Cluster*. Receptor locations were positioned in-line with the cluster (N1 in Figure 5.6-2). Properties adjacent to the cluster were assumed to be vacated since side yard access is limited and fencing between properties are expected to be removed. Also, receptors were positioned to represent the occupied properties (N3) directly across the street from the eight-property cluster, and the property slightly off-center from the cluster, directly across from the vacated properties at the edge of the 8-property cluster (N2).

A summary of the noise impacts at nearby on-site sensitive receptors is provided in **Table 5.6-11,** *Estimate of Noise Levels(L_{eq}) at On-Site Sensitive Receiver Locations During RAP Implementation.* Detailed noise calculations for construction activities are provided in Appendix F-3 of this EIR. As shown in Table 5.6-11, remedial activities at a typical 8-property cluster would result in noise levels of 71 to 88 dBA depending on the activity and distance, all in excess of the 65 dBA threshold for homes across the street directly and off-center from the 8-property cluster, and those located to the side, fully or partially shielded from the remedial activities by one vacated house. Appendix F-8 includes a 65 dBA contour showing the impacted properties surrounding a hypothetical 8-property cluster.

During implementation of the project, remedial activities would be required to comply with the City's construction noise limitations during corresponding hours as described above. As shown in Tables 5.6-10 and 5.6-11, noise resulting from implementation of the RAP would exceed the significance threshold of 65 dBA, L_{eq} at off-site and nearby on-site noise-sensitive receptors in the City of Carson. Therefore, noise resulting from implementation of the RAP would be significant to adjacent residential uses, and mitigation measures such as noise blankets, equipment modification, acoustic protection and relocation of residents would be required.

Expedited Implementation Option

Under the Expedited Implementation Option, rather than a cluster of up to 8 properties, the number being actively remediated could be incrementally increased with up to 16 properties active at one time. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. Under the Expedited Implementation Option the clusters would not be contiguous but would be located in a different area within the site. Two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster. The total amount of demolished materials and excavated soils would be the same as under the



Note: This figure provides a conceptual diagram of remediation activities at a representative "cluster of eight" properties at the site. Distances shown above are estimated typical distances at the site.

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On-Site Construction Noise Sensitive Receptor Locations

Former Kast Property Tank Farm Site Remediation Project

Source: PCR Services Corporation, 2014.

FIGURE

5.6-2

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project. The Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. Therefore, given the separation distance between the clusters, noise levels would be similar within close proximity of the excavation site as shown in Tables 5.6-10 and 5.6-11. Therefore, excavation related noise impacts would be significant on adjacent noise sensitive uses and the same mitigation would be required.

Table 5.6-11

Estimate of Noise Levels (L_{eq}) at On-Site Sensitive Receiver Locations During RAP Implementation

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at the Noise Sensitive Receptor by Construction Phase,[a] Hourly L_{eq} (dBA)	Project's Significance Threshold (dBA)[c]	Exceeds Significance Threshold?
N1	Residential Remediation	50	70	65	Yes
	Street Trenching	20	88[b]		Yes
	SVE Well Installation	50	78		Yes
	Paving	20	81[b]		Yes
N2	Residential Remediation	80	74	65	Yes
	Street Trenching	20	88[b]		Yes
	SVE Well Installation	80	74		Yes
	Paving	20	81[b]		Yes
N3	Residential Remediation	67	80	65	Yes
	Street Trenching	20	88[b]		Yes
	SVE Well Installation	67	75		Yes
	Paving	20	81[b]		Yes

[a] *Estimated construction noise levels represent the worst-case condition when noise generators are located closest to the receptors and are expected to last the entire construction duration.*

[b] *Noise reduction by sound blanket/temporary barrier were applied.*

Source: PCR Services Corporation, 2014

Off-Site Roadway Noise

Threshold NOISE 2: Project-generated mobile noise source (i.e., off-site traffic) would cause ambient noise levels to increase by 5 dBA CNEL or more and the resulting noise falls on a land use within an area categorized as either "normally acceptable" or "conditionally acceptable".

Impact Statement NOISE-2: *Construction impacts from off-site construction traffic would be less than significant. Sound levels would not increase ambient noise levels at residential uses along the haul route by 5 dBA or more.*

Haul trucks using regional freeways regardless of their origin/destination would access local streets to and from I-110 at Sepulveda Boulevard. Incoming trucks would access the site via Sepulveda Boulevard eastbound, Wilmington Avenue southbound, Lomita Boulevard westbound, and a right turn on either

Neptune or Lagoon Avenues. Trucks leaving the site would then travel westbound on Lomita, northbound on Main Street, and westbound on Sepulveda to the I-110. **Table 5.6-12**, *Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations,* provides the estimated haul truck noise levels at noise sensitive receptors along the haul truck route where current sound ambient noise levels were recorded and provides a comparison with the noise impact criteria. The table also provides the ambient noise levels and the change in noise levels with the addition of the haul truck noise.

Table 5.6-12

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations

	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, L_{eq}						
Roadway Segment	Existing (A)	Existing with Project [a] (B)	Future No Project [b] (C)	Future with Project [c] (D)	Existing Project Increment [d] (B-A)	Future Project Increment [e] (D – C)	Cumulative Increment [f] (D – A)
Sepulveda Boulevard							
Between Figueroa Street and Main Street	69.2	69.3	69.4	69.5	0.1	0.1	0.3
Between Main Street and Avalon Boulevard	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Avalon Boulevard and Wilmington Avenue	68.1	68.1	68.3	68.3	0.0	0.0	0.2
Figueroa Street							
North of Sepulveda Boulevard	65.6	65.6	66.2	66.2	0.0	0.0	0.6
Wilmington Avenue							
Between Sepulveda Boulevard and Lomita Boulevard	67.1	67.2	67.5	67.5	0.1	0.0	0.4
Lomita Boulevard							
West of Main Street	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Main Street and Neptune Avenue	69.0	69.0	69.2	69.2	0.0	0.0	0.2
Between Neptune Avenue and Lagoon Avenue	69.0	69.1	69.2	69.3	0.1	0.1	0.3
Between Lagoon Avenue and Avalon Boulevard	69.1	69.2	69.2	69.4	0.1	0.2	0.3
Between Avalon Boulevard and Wilmington Avenue	67.3	67.4	67.5	67.6	0.1	0.1	0.3
Main Street							
Between Sepulveda Boulevard and Lomita Boulevard	68.0	68.1	69.0	69.1	0.1	0.1	1.1
Neptune Avenue							
North of Lomita Boulevard	56.2	56.2	56.3	56.3	0.0	0.0	0.1

Table 5.6-12 (Continued)

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations

Roadway Segment	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, L_{eq}						
	Existing (A)	Existing with Project [a] (B)	Future No Project [b] (C)	Future with Project [c] (D)	Existing Project Increment [d] (B-A)	Future Project Increment [e] (D – C)	Cumulative Increment [f] (D – A)
Lagoon Avenue							
North of Lomita Boulevard	51.7	51.7	51.9	51.9	0.0	0.0	0.2
Avalon Boulevard							
Between Sepulveda Boulevard and Lomita Boulevard	68.1	68.1	69.5	69.5	0.0	0.0	1.4

[a] *Include existing plus project-generated traffic.*
[b] *Include future growth plus related (cumulative) projects identified in the Traffic Study.*
[c] *Include future growth plus related (cumulative) projects and project-generated traffic.*
[d] *Increase due to project-related traffic only at existing.*
[e] *Increase due to project-related traffic only at project build-out.*
[f] *Increase due to future growth, related (cumulative) projects, and project-generated traffic.*

Source: PCR Services Corporation, September 2014.

It is estimated that during implementation of the project, there would be a maximum of 90 haul truck trips, an average of nine visitors, and a maximum of approximately 32 workers per day. However, the project would strive for the truck traffic and employee traffic not to occur during the same hour.[19]

For existing conditions, as shown in Table 5.6-12, the maximum increase in project-related traffic noise levels over existing traffic noise levels would be 0.1 dBA, which would occur along Sepulveda Boulevard, between Figueroa Street and Main Street, Wilmington Avenue, between Sepulveda Boulevard and Lomita Boulevard, Lomita Boulevard, between Neptune Avenue and Lagoon Avenue, Lomita Boulevard, between Lagoon Avenue and Avalon Boulevard, Lomita Boulevard, between Lagoon Avenue and Avalon Boulevard, Lomita Boulevard, between Avalon Boulevard and Wilmington Avenue, and Main Street, between Sepulveda Boulevard and Lomita Boulevard. In general a change in sound level of 3 dBA is considered barely perceptible by the human ear.[20] Activities associated with the project would be required to comply with the City's allowable hours as described above and would be temporary in nature. Because the noise levels associated with implementation of the project would be 0.1 dBA increase, which is well below the 5 dBA significance threshold, off-site traffic related noise would result in a less than significant noise impact.

[19] *Traffic Study for the Kast Property Remediation Action Plan (RAP) EIR, Fehr & Peers, October, 2014.*

[20] *U.S. Department of Transportation, Federal Highway Administration, Highway Traffic Noise: Analysis and Abatement Guidance, (2011).*

Expedited Implementation Option

The Expedited Implementation Option would incrementally increase the number of properties to 16 properties actively remediated. Given the overlap in activity with the clusters there could be up to 32 properties in some stage of remediation at one time. The total amount of demolished materials and excavated soils would be the same as under the project. The Option would result in a greater level of activity on the site on a given day but would not change the level of activity at an individual property. An average of approximately 118 trucks per day would be used to transport materials during residential excavation and related activities, street trenching/pipe installation, and well installation. On a peak excavation day, approximately 151 trucks per day would be used. During street paving, approximately 24 trucks per day would be used. PDFs would be the same under the Expedited Implementation Option as under the project.

For existing conditions, as shown in **Table 5.6-13**, *Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations Expected Implementation Option (EIO)*, the maximum increase in project-related traffic noise levels over existing traffic noise levels would be 0.2 dBA, which would occur along Sepulveda Boulevard, between Figueroa Street and Main Street, Lomita Boulevard, between Neptune Avenue and Lagoon Avenue, Lomita Boulevard, between Avalon Boulevard and Wilmington Avenue, and Main Street, between Sepulveda Boulevard and Lomita Boulevard. Activities associated with the project would be required to comply with the City's allowable hours as described above and would be temporary in nature. Because the noise levels associated with implementation of the Expedited Implementation Option would be 0.2 dBA increase, which is well below the 5 dBA significance threshold, off-site traffic related noise would result in a less than significant noise impact

Table 5.6-13

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations
Expedited Implementation Option (EIO)

	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, CNEL						
Roadway Segment	Existing (A)	Existing with EIO [a] (B)	Future No Project [b] (C)	Future with EIO [c] (D)	Existing EIO Increment [d] (B-A)	Future EIO Increment [e] (D – C)	Cumulative EIO Increment [f] (D – A)
Sepulveda Boulevard							
Between Figueroa Street and Main Street	69.2	69.4	69.4	69.5	0.2	0.1	0.3
Between Main Street and Avalon Boulevard	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Avalon Boulevard and Wilmington Avenue	68.1	68.1	68.3	68.3	0.0	0.0	0.2
Figueroa Street							
North of Sepulveda Boulevard	65.6	65.6	66.2	66.2	0.0	0.0	0.6
Wilmington Avenue							
Between Sepulveda Boulevard and Lomita Boulevard	67.1	67.2	67.5	67.5	0.1	0.0	0.4

Table 5.6-13 (Continued)

Estimates of Haul Truck Noise Levels (L_{eq}) at Off-Site Sensitive Receiver Locations
Expedited Implementation Option (EIO)

Roadway Segment	Calculated Traffic Noise Levels at 25 feet from Roadway, dBA, CNEL						
	Existing (A)	Existing with EIO [a] (B)	Future No Project [b] (C)	Future with EIO [c] (D)	Existing EIO Increment [d] (B-A)	Future EIO Increment [e] (D – C)	Cumulative EIO Increment [f] (D – A)
Lomita Boulevard							
West of Main Street	69.2	69.2	69.4	69.4	0.0	0.0	0.2
Between Main Street and Neptune Avenue	69.0	69.0	69.2	69.2	0.0	0.0	0.2
Between Neptune Avenue and Lagoon Avenue	69.0	69.2	69.3	69.3	0.2	0.0	0.3
Between Lagoon Avenue and Avalon Boulevard	69.1	69.2	69.4	69.4	0.1	0.0	0.3
Between Avalon Boulevard and Wilmington Avenue	67.3	67.5	67.7	67.7	0.2	0.0	0.4
Main Street							
Between Sepulveda Boulevard and Lomita Boulevard	68.0	68.2	69.0	69.1	0.2	0.1	1.1
Neptune Avenue							
North of Lomita Boulevard	56.2	56.2	56.3	56.3	0.0	0.0	0.1
Lagoon Avenue							
North of Lomita Boulevard	51.7	51.7	51.9	51.9	0.0	0.0	0.2
Avalon Boulevard							
Between Sepulveda Boulevard and Lomita Boulevard	68.1	68.1	69.5	69.5	0.0	0.0	1.4

[a] *Include existing plus project-generated traffic.*
[b] *Include future growth plus related (cumulative) projects identified in the Traffic Study.*
[c] *Include future growth plus related (cumulative) projects and project-generated traffic.*
[d] *Increase due to project-related traffic only at existing.*
[e] *Increase due to Project-related traffic only at Project build-out.*
[f] *Increase due to future growth, related (cumulative) projects, and project-generated traffic.*

Source: PCR Services Corporation, September 2014.

Stationary Source Noise

Threshold NOISE 3: The project would result in a significant impact if project-related stationary noise sources (e.g., mechanical fans) generate noise levels that would exceed measured ambient noise levels at the designated sensitive receptor locations.

Impact Statement NOISE-3: *Implementation of the RAP and the Expedited Implementation Option would include stationary mechanical noise sources that may increase noise levels adjacent to noise-sensitive receptors in the project vicinity. However, with the implementation of the recommended mitigation measure the noise generation would not exceed established thresholds. Therefore, long-termimpacts from stationary mechanical noise sources would be mitigated to a less than significant level.*

It is not anticipated that stationary mechanical equipment would be installed during the short-term remediation phases. The use of portable equipment has been accounted for in the analyses above. However, because the SVE process involves inducing airflow in the subsurface with an applied vacuum, mechanical equipment capable of creating noise levels audible to sensitive land uses would be installed. Anticipated equipment include a 3,000 standard cubic feet per minute (scfm) positive displacement blower and oxidation equipment (such as a thermal propane or natural gas burner), and are expected to be operational 30 to 40 years, depending on the rate at which results are achieved. The RP is proposing to locate the SVE unit on one of a few potential industrial sites adjacent to the Carousel Tract. The nearest distance to residential receptors would be 6 feet. There is an existing approximately 30 feet sound wall separating the proposed SVE unit and the Carousel Tract.

Mechanical equipment (e.g., mechanical fans and pumps) for long-term use with the SVE/bioventing system would be housed inside a sound attenuated enclosure that would achieve required sound levels outside the enclosure to comply with the City's Noise Ordinance requirement. Mechanical design documentation would be required once the SVE location is selected to demonstrate that noise generated from the mechanical fan and/or other related mechanical components would not exceed the measured ambient noise levels shown in Table 5.6-7 during daytime hours at each corresponding measurement location and 55 dBA during nighttime hours at each measurement location. Mitigation Measure NOISE-3, which would require a qualified acoustical engineer with expertise in design of sound isolations to evaluate to the design of the SVE/bioventing system (i.e., installation of building enclosure) so as to meet the City's exterior noise limits (55 dBA), is prescribed to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Ground-Borne Vibration

Threshold VIB 1: Project construction activities cause a PPV ground-borne vibration level to exceed 0.5 inches per second at a residential structure.

Threshold VIB 2: Short- or long-term vibration impacts result in the exposure of sensitive receptors to vibration levels that exceed the threshold of 0.01 inch per second (in/sec) (in accordance with Section 12.08.560 of the City of Carson's Noise Ordinance).

Impact Statement VIB-1 *Implementation of the RAP and the Expedited Implementation Option would result in sporadic, temporary vibration effects adjacent to the project area, which would exceed established thresholds. Therefore, vibration impacts would be significant and mitigation is proposed.*

The vibratory effect on buildings located in the vicinity of active remediation within the site often varies depending on soil type, ground strata, and project characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. With respect to residential

structures, Caltrans' technical publication titled "Transportation- and Construction-Induced Vibration Guidance Manual" dated June 2004, provides a vibration damage potential threshold criteria of 0.5 inches per second PPV for residential structures. The FTA has published standard vibration velocities for construction equipment operations. Table 12-2 of the FTA guidance provides vibration levels of 0.003 inches per second PPV for a small bulldozer at 25 feet, and 0.035 inches per second from a jack hammer at 25 feet. Vibration velocities from jackhammering would be a maximum of 0.21 inch per second at the shortest distance to an adjacent residence, assumed to be 5 feet from the activity.[21] Thus, the use of jack hammers or other equipment is not expected to exceed the standard for nearby residential structures. As this value does not exceed the 0.5 inches per second PPV significance threshold for residential structures, vibration impacts with regard to building damage resulting from implementation of the RAP would be less than significant.

As noted above, jack hammering would produce the maximum vibration velocities. Residents would be located as close as 5 feet from adjacent remedial activities, and could be exposed to a near-constant vibration velocity of 0.0176 inches per second PPV from a small bulldozer during residential remediation at adjacent properties and periodic peak vibration velocity of 0.21 inch per second from jackhammering. Peak velocities fall below the perception threshold at approximately 10 feet for vibration resulting from the mini excavator and at 60 feet for vibration resulting from a jack hammer. As the peak value would exceed the 0.01 inch per second PPV significance threshold, human perception of vibration impacts associated with implementation of the RAP would be significant and mitigation would be necessary (see Mitigation Measures NOISE-1 and VIB-1).

Expedited Implementation Option

Under the Expedited Implementation Option, an increase in the number of properties being remediated at one time could occur. As discussed in Chapter2, *Project Description*, two clusters under active remediation and restoration would be separated by a minimum distance of 64 meters (105 feet) as measured from the closest site boundary of each cluster. As noted above, the FTA guidance provides vibration levels of 0.003 inches per second PPV for a small bulldozer at 25 feet, and 0.035 inches per second from a jack hammer at 25 feet. At a distance of 5 feet, vibration velocities from jackhammering would be a maximum of 0.21 inch per second. Ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Thus, while both clusters could utilize a small bulldozer or a jack hammer, the separation distance would ensure that vibration levels at nearby residential structures would be similar to the levels described above for the RP's Proposed Remedy and would not exceed the 0.5 inches per second PPV significance threshold for residential structures. As a result, vibration impacts with regard to building damage under the Expedited Implementation Option would be less than significant.

With respect to human perception impacts, the minimum separation distance of 64 meters (105 feet) between two clusters would minimize the combined vibration levels at any common sensitive receptor location. Nonetheless, the peak value would be similar to the levels described above for the RP's Proposed Remedy and would exceed the 0.01 inch per second PPV significance threshold. As a result, human

[21] *Vibrations estimates are based on guidance in the Transportation- and Construction-Induced Vibration Guidance Manual, California Department of Transportation, Environmental Program, Environmental Engineering, Noise, Vibration, and Hazardous Waste Management Office, June 2004:* $PPV_{equip} = PPV_{ref} (25/D)^n$*; where* PPV_{ref} *= reference source vibration, D = Distance, n =factor for soil attenuation (n=1.1).*

perception of vibration impacts under the Expedited Implementation Option would be significant and mitigation would be necessary (see Mitigation Measures NOISE-1 and VIB-1).

5. ALTERNATIVES ANALYSIS

Analysis of Impacts Associated with Alternative 1 (No Project Alternative)

The No Project Alternative would not involve any construction or operation activities at the site and would, therefore, avoid any potential noise-related impacts. Therefore, the No Project Alternative would avoid the significant noise impacts that would occur under the RP's Proposed Remedy.

Analysis of Impacts Associated with Alternative 2 (Excavation Beneath Landscape and Hardscape to 10 Feet Alternative)

This Alternative would entail excavation of soils from landscaped and beneath residential hardscape to a depth of 10 feet bgs at all affected properties. While the implementation of Alternative 2 would be longer than the RP's Proposed Remedy, daily demolition and excavation volumes, and worker commutes are anticipated to be the same as the project. However, truck trips would increase by approximately 10 percent under this Alternative. This Alternative would also implement the same PDFs as described previously.

Short-Term Noise

On-Site Noise Sources

This alternative has the potential to increase noise levels through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the same as the project. Remedial activities would occur for a greater number of days overall to account for the additional excavated material.

During implementation of this Alternative, construction activities would be temporary in nature and would be required to comply with the City's noise limitations during corresponding hours as described above. As shown in Tables 5.6-10 and 5.6-11, noise resulting from implementation of the project during daytime hours would intermittently exceed the significance threshold of 65 dBA, L_{eq} at noise-sensitive receptor locations. Therefore, excavation activity related noise under Alternative 2 would be significant and unavoidable on adjacent residential uses.

Off-Site Roadway Noise

While the duration to implement Alternative 2 would be more than under the RP's Proposed Remedy and would result in a total increase in truck trips, the daily trips would be the same. As such, off-site roadway noise levels under this Alternative would be similar to the project. Therefore, as with the RP's Proposed Remedy the off-site roadway noise levels under this Alternative would be less than significant.

Long-Term Noise

Mechanical equipment (e.g., mechanical fans and pumps) for long-term use with the SVE/bioventing system would be designed housed inside a sound attenuated enclosure that would achieve required sound levels outside the enclosure to comply with the City's Noise Ordinance requirement. Mechanical design documentation would be required once the SVE location is selected to demonstrate that noise generated from the mechanical fan and/or other related mechanical components noise levels would not exceed the measured ambient noise levels shown in Table 5.6-7 during daytime hours at each corresponding measurement location and 55 dBA during nighttime hours at each measurement location. Mitigation Measure NOISE-3 would apply to Alternative 2 to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Short-Term Ground-Borne Vibration

This Alternative would be implemented using typical heavy-duty construction equipment such as excavators, dozers, and trucks. As discussed above, residential buildings are not expected to experience vibration velocities in excess of the structural damage threshold. However, residents immediately adjacent to a property with active remedial activity would experience vibration velocities in excess of the human annoyance threshold from the mini excavator. Thus, impacts would be less than significant for this Alternative, similar to the project.

Analysis of Impacts Associated with Alternative 3 – No Excavation Beneath Hardscape - 5 Feet with Targeted 10 Feet

Alternative 3 would entail excavation of soils from accessible areas of the affected residential properties, leaving any hardscape (patios, walkways, driveways, etc.) and the soil beneath it in place. This Alternative would involve removal of landscaping, fencing, etc. Just as with the RP's Proposed Remedy, excavation under this Alternative would be conducted to 5 feet bgs at properties requiring excavation, and up to 10 feet at some targeted locations. Unlike the project, which would require approximately 6 years, this Alternative would require proportionately shorter years since excavation beneath residential hardscape would not occur. Daily demolition and excavation volumes, truck trips, and worker commutes are anticipated to be the same as the project. This Alternative would also implement the same PDFs as described previously.

Short-Term Noise

On-Site Noise Sources

This alternative has the potential to increase noise levels as compared to the existing environment through the use of heavy-duty construction equipment and through vehicle trips generated from haul trucks, vendor trucks, and construction workers and visitors traveling to and from the site. Daily activity levels under this Alternative would be the similar as the project but concrete saws, jack hammers, and other equipment to remove and replace hardscape would not be utilized during the residential property excavation phase. Therefore, peak construction activity noise levels would be reduced by approximately 10 dBA during the Residential Remediation phase. Remedial activities would occur for a fewer number of days overall as a result of the reduction in the excavated material. Mitigation Measure NOISE-1 would still be required.

However, similar to the project, peak noise impacts under this Alternative are predicted to result during the Street Trenching phase. As shown in Tables 5.6-10 and 5.6-11, noise resulting from this phase would intermittently exceed the significance threshold of 65 dBA, L_{eq} at onsite noise-sensitive receptor locations, even with the use of noise barriers. Therefore, excavation activity related noise would be significant and unavoidable on adjacent residential uses, even with implementation of Mitigation Measure NOISE-2.

Off-Site Roadway Noise

Off-site roadway noise levels under this Alternative would be the same as the project. As a result, impacts related to off-site roadway noise levels under this Alternative would be less than significant.

Long-Term Noise

This Alternative would not materially change the SVE/bioventing system. The SVE/bioventing system under this Alternative would be designed to comply with the City's Noise Ordinance requirement. As with the RP's Proposed Remedy, Mitigation Measure NOISE-3 would apply to Alternative 3 to ensure that the noise impacts associated with the operation of mechanical equipment would be less than significant.

Short-Term Ground-Borne Vibration

Alternative 3 would be implemented using typical heavy-duty construction equipment such as excavators, dozers, and trucks. As discussed above, residential buildings are not expected to experience vibration velocities in excess of the structural damage threshold. Since hardscape would not be removed, equipment which create substantial vibration velocities, such as jack hammers, hydraulic hammers, and the like, would not be used, lessening the peak vibration velocity experienced during residential property remediation. However, the use of a mini excavator within close proximity to neighboring properties would result in vibration velocities in excess of the human annoyance threshold. Thus, impacts would be lessened, but still remain significant for this Alternative, similar to the project.

6. CUMULATIVE IMPACTS

All of the identified related projects (see Chapter 4 of this EIR) have been considered for the purposes of assessing cumulative noise impacts. The potential for noise impacts to occur are specific to the location of each related project as well as the cumulative traffic on the surrounding roadway network. Due to the rapid attenuation characteristics of ground-borne vibration, there is no potential for a cumulative construction- or operational-period impact with respect to ground-borne vibration.

a. Construction-Period Noise

Noise is by definition a localized phenomenon, and significantly reduces in magnitude as the distance from the source increases. As such, only projects and growth due to occur in the immediate project area would be likely to contribute to cumulative noise impacts. The nearest related project is situated over 5,000 feet from the site. All of the related projects are located at a sufficient distance to preclude a cumulative impact on the project or on sensitive receptors near the proposed project. Therefore, cumulative noise impacts on sensitive receptors in the vicinity of the site from concurrent construction of the other development projects would be less than significant. Thus, the RP's Proposed Remedy would not contribute to a cumulative construction noise impact on nearby sensitive receptors.

b. Long-term Noise

The site and surrounding area have been developed with uses that have previously generated, and would continue to generate, noise from a number of community noise sources including vehicle travel, railroad train traffic, mechanical equipment (e.g., HVAC systems), and lawn maintenance activities. Each of the identified related projects that have been identified within the general project vicinity would also generate stationary-source and mobile-source noise due to ongoing day-to-day operations. All related projects are of a residential, retail, commercial, or institutional nature, and these uses are not typically associated with excessive exterior noise; however, each project would produce traffic volumes that are capable of generating a roadway noise impact. As discussed previously, traffic volumes from the proposed project and related projects, combined with ambient growth traffic, were evaluated and presented in Table 5.6-8. Cumulative traffic volumes would result in a maximum increase of 1.4 dBA, L_{eq} along the segment of Wilmington Avenue, between Sepulveda Boulevard and Lomita Avenue for the project and the Expedited Implementation Option. As this noise level increase would be below the 5-dBA significance threshold, roadway noise impacts due to cumulative traffic volumes would be less than significant.

Due to the City's Municipal Code provisions that limit stationary-source noise from items such as mechanical equipment, noise levels would be less than significant at the property line for each related project. For this reason on-site noise produced by any related project would not be additive to project-related noise levels. As the project's composite operational stationary-source impacts would be less than significant, composite stationary-source noise impacts attributable to cumulative development would also be less than significant.

7. MITIGATION MEASURES

Noise from short-term remediation, and long-term operation and maintenance of the SVE system have the potential to result in significant noise impacts at sensitive receptors. Thus, the following mitigation measures are required to minimize construction-related noise impacts for the RP's Proposed Remedy, Alternative 2, and Alternative 3:

MM NOISE-1 Residents of properties shall be offered relocation for the duration of nearby active remediation activities which may create ambient noise levels at their property in excess of 75 dBA, L_{eq}. for 20 days or less or in excess of 65 dBA, L_{eq}. for 21 days or longer. Based on the analyses presented in this EIR, this shall apply to residences located within approximately 90 feet of street trenching or 130 feet from an edge of residential remediation (i.e. a cluster of 4 to 8 homes); these distances may be revised by the Regional Board upon completion of additional monitoring and analysis which could be performed under the direction of an independent acoustician during the implementation of the RAP. Appendix F-8 includes 75 dBA and 65 dBA contours showing the impacted properties surrounding a hypothetical 8-property cluster.

MM NOISE-2 To the maximum extent feasible, the project shall provide noise blanket/temporary noise barriers between the active areas and occupied residential units during street trenching.

MM NOISE-3 The RP shall retain the services of a qualified acoustical engineer with expertise in design of sound isolations to ensure the noise from the SVE/bioventing complies with the City's exterior noise limits (55 dBA).

MM VIB-1 Residents of properties located within 60 feet of the use of jack hammers on private property shall be offered relocation for the duration of jack hammer use.

8. LEVEL OF SIGNIFICANCE AFTER MITIGATION

During remediation of the residential clusters, fencing, landscaping, and hardscape would be removed so that access to impacted soil is unencumbered. Side yards are narrow, and homes are as close as 5 feet from the property line. As such it is infeasible to erect sound barriers to shield the adjacent homes, and traditional temporary sound barriers are not capable of reducing the noise levels sufficiently to levels below the City of Carson's threshold (65 dBA). Erecting noise barriers in the street or on public sidewalks for weeks at a time is not feasible, and those homes with direct line of site to a cluster are predicted to experience high levels of noise. With implementation of Mitigation Measure NOISE-1 for the project, Alternative 2, and Alternative 3, the noise sensitive receptors (single-family residential uses) within 130 feet in all directions from the cluster and areas where noise from active remediation activities would exceed 65 dBA, L_{eq} based on additional noise monitoring during the implementation of the RAP would be offered relocation and, if accepted, those individuals would not be exposed to high noise levels from implementation of the project. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to noise levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the mitigation measure.

During the street trenching phase of RAP implementation, Mitigation Measure NOISE-2 would reduce noise levels by approximately 10 dBA. However impacts during this phase would remain above the 65 dBA thresholds, and are considered significant and unavoidable under the project, Alternative 2, and Alternative 3.

Mitigation Measure NOISE-3 for the project, Alternative 2, and Alternative 3 would ensure that the SVE system is positioned, designed, built, and operated in a manner so that potential noise impacts from stationary mechanical equipment are less than significant.

Peak velocities fall below the threshold for human perception at approximately 10 feet for vibration resulting from the mini excavator and at 60 feet for vibration resulting from a jack hammer. With the implementation of NOISE-1 during residential property remediation and VIB-1 during other phases involving the use of a jack hammer, vibration impacts could be mitigated to less than significant. However, since relocation is voluntary, residents may choose to remain and would potentially be exposed to vibration levels in excess of the thresholds. Thus, the impact is conservatively assumed to remain significant and unavoidable even with implementation of the Mitigation Measures under the project, Alternative 2, and Alternative 3.