

## 4.5 NOISE

### 4.5.1 Introduction

This section evaluates the potential short-term and long-term noise and vibration impacts associated with the construction and operation of potential development that would be allowed under the proposed General Plan Land Use and Urban Design Elements (LUE/UDE) Project (proposed project). This analysis evaluates potential noise and vibration impacts within the planning area by evaluating the effectiveness of the proposed Land Use Element (LUE)/Urban Design Element (UDE) Goals, Strategies, and Policies. This section is based on information provided in the Noise Element (1975) of the City of Long Beach's (City) General Plan (which is currently going through the process of updating), the Noise Ordinance of the City's Municipal Code (adopted 1977, most recent revision 2009) and the *Noise and Vibration Impact Analysis* (LSA Associates, Inc. [LSA], 2019) (Appendix D) prepared for the project.

### 4.5.2 CEQA Baseline

Although the Notice of Preparation (NOP) was published in May 2015, the baseline for noise is 2018 when the analysis for the Recirculated Draft Environmental Impact Report (EIR) was initiated. This provides an updated baseline that reflects current conditions related to noise at the time the Recirculated Draft EIR was prepared.

### 4.5.3 Methodology

This analysis describes existing noise and vibration conditions, discusses the characteristics of sound, sets forth criteria for determining the significance of noise and vibration impacts, and estimates the potential noise and vibration impacts resulting from the implementation of the proposed project. Noise monitoring was conducted using the Larson Davis SoundTrack LxT sound level meter at 11 locations in order to assess the ambient noise environment within the City. The *City of Long Beach General Plan Land Use and Urban Design Elements Traffic Impact Analysis* (LSA 2019) prepared for the proposed project provides total traffic volume by City section. LSA used the projected increase in overall daily traffic on major roadway segments in the City to provide a quantitative assessment of the potential increases in noise associated with the proposed project.

#### 4.5.3.1 Characteristics of Sound

Noise is usually defined as unwanted sound and consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally related to annoyance, while loudness can affect our ability to hear through hearing damage. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound pressure refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be measured precisely with instruments. The project analysis defines the noise environment of the planning area in terms of sound pressure levels and the project's effect on sensitive land uses.

#### 4.5.3.2 Measurement of Sound

Sound pressure is measured through the A-weighted scale to correct for the relative frequency response of the human ear. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve. For example, 10 decibels (dB) are 10 times more intense than 1 dB; 20 dB are 100 times more intense than 1 dB; and 30 dB are 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dBA for each doubling of distance over hard surfaces, and the sound decreases 4.5 dBA for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to measure noise for various time periods; an appropriate ambient noise metric affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level ( $L_{eq}$ ) is the total sound energy of time-varying noise over a sample period. However, the predominant metrics for communities in the State of California are the  $L_{eq}$  and the Community Noise Equivalent Level (CNEL) or the day-night average level ( $L_{dn}$ ) based on dBA. The CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly  $L_{eq}$  for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). The  $L_{dn}$  is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. The CNEL and the  $L_{dn}$  are normally within 1 dBA of each other and are considered interchangeable.

Other noise level metrics that are important when assessing the annoyance factor include the maximum noise level ( $L_{max}$ ), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by  $L_{max}$ , which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with percentile noise levels, in noise ordinances for enforcement purposes. For example, the  $L_{10}$  noise level represents the noise level exceeded 10 percent of the time during a stated period. The  $L_{50}$  noise level represents the median noise level. Half of the time, the noise level exceeds this median noise level, and half of the time, it is less than this median noise level. The  $L_{90}$  noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the  $L_{eq}$  and  $L_{50}$  are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally

refer to changes of 3 dBA or greater since this level has been found to be the lowest audible change perceptible to humans in outdoor environments. The second category, potentially audible, refers to changes in the noise level between 1 and 3 dBA, which are only noticeable in laboratory environments. The last category includes changes in noise levels of less than 1 dBA, which are inaudible to the human ear.

#### 4.5.3.3 Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure (typically more than 8 hours, as defined by the Occupational Safety and Health Administration [OSHA]) to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions (thereby, affecting blood pressure and functions of the heart and the nervous system). In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium.

#### 4.5.3.4 Vibration

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as motion of building surfaces, rattling of items on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Building damage is not a factor for normal transportation projects, including rail projects, with the occasional exception of blasting and pile driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

To distinguish vibration levels from noise levels, the unit is written as “vibration velocity decibels” (VdB). Human perception to vibration starts at levels as low as 67 VdB and sometimes lower. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Ground-borne vibrations are almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) of the vibration source, although there are examples of

ground-borne vibration causing interference out to distances greater than 200 ft.<sup>1</sup> When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path usually will be greater than ground-borne noise.

Ground-borne vibration has the potential to disturb people as well as damage buildings. Although it is very rare for train-induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitudes to damage nearby buildings.<sup>2</sup> Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV).

Factors that influence ground-borne vibration and noise include the following:

- **Vibration Source:** Vehicle suspension, wheel types and condition, track/roadway surface, track support system, speed, transit structure, and depth of vibration source
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Experience with ground-borne vibration indicates that: (1) vibration propagation is more efficient in stiff, clay soils than in loose, sandy soils; and (2) shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of ground-borne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

In extreme cases, excessive ground-borne vibration has the potential to cause structural damage to buildings. For buildings considered of particular historical significance or that are particularly fragile structures, the damage threshold is approximately 96 VdB; the damage threshold for other structures is 100 VdB.<sup>3</sup>

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<sup>1</sup> Federal Railroad Administration. 2012. *High-Speed Ground Transportation Noise and Vibration Impact Assessment*. September.

<sup>2</sup> Ibid.

<sup>3</sup> Harris, C.M., 1998. *Handbook of Acoustical Measurements and Noise Control*.

## 4.5.4 Existing Environmental Setting

### 4.5.4.1 Existing Planning Area

The existing planning area includes the entire area within the City's jurisdictional limits, as the project involves an update to the City's General Plan and is intended to guide growth and future development through the horizon year 2040. Specifically, the project proposes to update the City's current 1989 Land Use Element (LUE) and adopt an entirely new Urban Design Element (UDE) into its General Plan. Through implementation of the LUE, the City is looking to target future growth in a few specific transit-rich corridors and districts in order to address existing overcrowding, increase housing and job density in commercial and industrial areas, improve the corridors, and maintain and improve the existing established neighborhoods. The LUE will replace land use designations with "PlaceTypes" that are more flexible and comprehensive, and will lead to a subsequent comprehensive Zoning Code update. Major land use changes proposed as part of the LUE are identified as "Major Areas of Change" and are illustrated on previously referenced Figure 3.6 in Chapter 3.0, Project Description.

The City is also proposing to adopt a new UDE as part of its General Plan to replace its existing Scenic Routes Element (SRE). The UDE would work toward shaping the continued evolution of the urban environment in Long Beach while also allowing for a balance between the existing natural environment and new development. The UDE is interconnected with the LUE and will provide minimum design standards for the PlaceTypes and their respective component development types and patterns.

The planning area is currently developed and consists of a mix of residential, commercial, medical, institutional, industrial, and open space and recreation uses.

### 4.5.4.2 Sensitive Uses in the Project Vicinity

Noise-sensitive receptors in the City include residences, schools, hospitals, churches, and similar uses that are sensitive to noise. Construction and operation of development allowed under the LUE could adversely affect nearby noise-sensitive land uses and could place new sensitive receptors in areas of unacceptable noise exposure. Although CEQA generally does not require analysis or mitigation of the impact of existing environmental conditions on a project, including a project's future users or residents, the City, as the lead agency, has the authority to require measures to protect public health and safety. Therefore, this section includes a discussion of the project's potential to introduce new sensitive receptors to areas where conditions would be exacerbated by project implementation.

### 4.5.4.3 Overview of the Existing Noise Environment

In the City of Long Beach, the dominant source of noise is transportation noise, including vehicular traffic, rail, and airport noise. Industrial and mechanical equipment are also contributors to the noise environment in the City, as are intermittent sources such as construction equipment and leaf blowers. Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust systems. Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. Existing noise sources are further discussed below.

**Ambient Noise Levels.** To assess existing noise levels, LSA conducted eleven short-term (15-minute) noise measurements in the City on February 11, 2016. The noise measurements were recorded at different locations within the City based on the Major Areas of Change identified in the LUE. Noise monitoring locations are shown in Figure 4.5.1. Noise measurement data collected during monitoring are summarized in Table 4.5.A. The meteorological conditions at the time of the noise monitoring are shown in Table 4.5.B. The short-term noise measurements indicate that ambient noise in the City ranges from approximately 62.0 dBA to 76.2 dBA  $L_{eq}$ . Traffic on surrounding roadways was reported as the primary noise source.

**Existing Roadway Noise Levels.** Motor vehicles with their distinctive noise characteristics are one of the primary sources of noise in Long Beach. The amount of noise varies according to many factors, such as volume of traffic, vehicle mix (percentage of cars and trucks), average traffic speed, and distance from the observer. Major contributing roadway noise sources include Interstates 710 (I-710) and 405 (I-405), State Route 91 (SR-91), Pacific Coast Highway (PCH), and local roadways including Long Beach Boulevard, Santa Fe Avenue, Atlantic Avenue, Alamitos Avenue, 7<sup>th</sup> Street, 2<sup>nd</sup> Street, Ocean Boulevard, and other arterial and collector roadways throughout the City.

**Existing Rail Noise Levels.** Currently, three freight rail lines pass through the City, which are operated by Burlington Northern Santa Fe (BNSF) Railway, the Union Pacific Railroad (UPRR), and Pacific Harbor Line Incorporated (PHL). The rail lines run north-south through the west side of the City, and through the northwest corner of the City, around the neighborhood of North Long Beach.

The City is also subject to operational rail noise. The Los Angeles County Metropolitan Transportation Authority (Metro) Rail Blue line (Blue line) passes north to south through Long Beach along Long Beach Boulevard. The Metro service hours are from approximately 4:45 a.m. until 1:00 .m. on weekdays and from 4:45 a.m. until 2:00 a.m. on weekends. Land uses surrounding the rail line include multi- and single-family residential, and commercial uses, the Senior Arts Colony, high-rise office towers, the Pacific Coast Campus of Long Beach City College, and the Long Beach Transit Mall. Seven different Metro stations serve local neighborhoods throughout the City. Activity on the Blue line affects the ambient noise environment along the railroad alignment.

Based on Federal Railroad Administration crossing inventories for various crossings in the City, typical operations along the main rail line include up to 74 trains per day that range in speed from 5 to 25 miles per hour (mph).

**Existing Stationary Source Noise Levels.** A wide variety of existing stationary sources contribute to noise throughout the City of Long Beach, which include heating ventilation and cooling (HVAC) mechanical systems, delivery truck idling and loading/unloading activities, and recreational and parking lot activities (such as slamming car doors and people talking). Of these noise sources, noise generated by delivery truck activity typically generates the highest maximum noise levels. Delivery truck loading and unloading activities can result in maximum noise levels of 75 dBA to 85 dBA  $L_{max}$  at 50 ft. Typical parking lot activities, such as people conversing or doors slamming, generate approximately 60 dBA to 70 dBA  $L_{max}$  at 50 ft. Other sources of noise include commercial centers and industrial zones that emit noise during operation. Domestic noise sources, such as leaf blowers,

**Areas of Change Description**

- 1 More Open Space
- 2 Convert to Neo-Industrial Uses
- 3 Promote Regional-Serving Uses
- 4 Transition from Industrial to Commercial Uses
- 5 Promote Transit-Oriented Development Uses
- 6 Continue Downtown Development
- 7 Promote Infill and Redevelopment to Support Transit
- 8 Redevelop to Highest and Best Use



**Legend**

**PlaceTypes**

OS - Open Space

**Neighborhoods**

N - Founding and Contemporary Neighborhood

MFR - L - Multi-Family Residential - Low

MFR - M - Multi-Family Residential - Moderate

**Mixed Use**

NSC-L - Neighborhood-Serving Center or Corridor - Low

NSC-M - Neighborhood-Serving Center or Corridor - Moderate

TOD-L - Transit-Oriented Development - Low

TOD-M - Transit-Oriented Development - Moderate

**Employment**

CC - Community Commercial

I - Industrial

NI - Neo-Industrial

**Unique**

RSF - Regional-Serving Facility

DT - Downtown

WF - Waterfront

**Light Rail Transit**

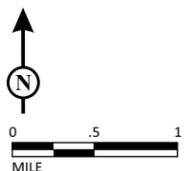


Metro Blue Line Station and 1/4 Mile Radius

**LSA**

**LEGEND**

# - Noise Monitoring Locations



SOURCE: Proposed Land Use Element, City of Long Beach, March 2018

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FIGURE 4.5.1

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**Table 4.5.A: Existing Ambient Noise Monitoring Results (dBA)**

Location Number	Location Description	Start Time	L <sub>eq</sub> <sup>1</sup>	L <sub>max</sub> <sup>2</sup>	L <sub>min</sub> <sup>3</sup>	Primary Noise Sources
ST-1	6857–6909 Atlantic Avenue	7:27 a.m.	66.6	82.1	59.6	Traffic on Atlantic Avenue, faint traffic on I-710, trucks with trailers turning in nearby lot
ST-2	3114 South Street – Church of Latter Day Saints	7:58 a.m.	70.3	80.8	53.6	Traffic on South Street, birds
ST-3	3115 Long Beach Boulevard	8:58 a.m.	63.6	73.6	49.2	Traffic on Long Beach Boulevard, back up beeper across Long Beach Boulevard, birds
ST-4	1940 Long Beach Boulevard	9:35 a.m.	65.7	80.9	45.0	Traffic on Long Beach Boulevard, birds, distant music
ST-5	614 Locust Avenue in parking lot adjacent to 6 <sup>th</sup> Street	10:13 a.m.	63.3	77.3	47.7	Traffic on 6 <sup>th</sup> Street, birds
ST-6	600 Redondo Avenue in parking lot	10:51 a.m.	64.0	81.5	45.5	Traffic on Redondo Avenue, car with loud music
ST-7	5800–6462 E. Marina Drive adjacent to 2 <sup>nd</sup> Street, near bus stop	2:11 p.m.	62.3	81.5	49.0	Traffic on 2 <sup>nd</sup> Street, birds
ST-8	California State University Long Beach near Bellflower Boulevard and Beach Drive	1:15 p.m.	66.0	74.8	49.3	Traffic on Bellflower Boulevard, birds, music in car, horn
ST-9	3500 Hathaway Avenue apartment complex open grass area	11:42 a.m.	62.0	75.0	42.4	Traffic on Hathaway Avenue, distant music in apartment
ST-10	3245 Cherry Avenue in parking area	8:31 a.m.	76.2	99.3	61.3	Traffic on Cherry Avenue
ST-11	3401 Studebaker Road in parking lot adjacent to Wardlow Road	2:47 p.m.	62.5	79.2	46.9	Traffic on Wardlow Road=

Source: *Noise and Vibration Impact Analysis* (LSA Associates, Inc. [LSA], 2019) (Appendix D)

<sup>1</sup> L<sub>eq</sub> represents the average of the sound energy occurring over the measurement time period.

<sup>2</sup> L<sub>max</sub> is the highest sound level measured during the measurement time period.

<sup>3</sup> L<sub>min</sub> is the lowest sound level measured during the measurement time period.

dBA = A-weighted decibels

I-710 = Interstate 710

mph = miles per hour

**Table 4.5.B: Meteorological Conditions During Ambient Noise Monitoring**

Location Number	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (°F)	Relative Humidity (%)
ST-1	0.8	0.0	63.2	38.8
ST-2	0.0	0.0	69.4	38.4
ST-3	3.4	1.6	68.6	29.6
ST-4	0.0	0.0	80.9	22.3
ST-5	3.5	2.3	75.7	27.1
ST-6	2.3	1.5	78.5	29.8
ST-7	1.3	1.0	81.0	27.9
ST-8	4.1	1.8	81.3	33.3
ST-9	3.7	1.0	85.1	27.5
ST-10	1.2	0.9	67.1	35.1
ST-11	4.9	3.1	83.6	17.1

Source: *Noise and Vibration Impact Analysis* (LSA 2019) (Appendix D)  
 mph = miles per hour

and gas-powered lawn equipment, etc., are common stationary noise sources and can produce noise levels measured at 70 dBA to 75 dBA at 50 ft.<sup>4</sup>

**Existing Port of Long Beach Noise Levels.** Port of Long Beach operations noise levels are generally limited to the areas within the perimeter of the Port. Noise associated with the Port includes cranes, vessel horns, forklifts, and truck activities. Due to the distance between the nearest sensitive receptors from daily Port operations on the coast within the Port boundaries, noise is rarely audible at such a large distance. Heavy truck traffic associated with the transport of cargo along the I-710 corridor is the primary source of noise associated with the Port. Impacts associated with the Port of Long Beach, including noise, were assessed in the *Port of Long Beach Community Impact Study* in July 2016.

**Existing Airport Noise Levels.** Long Beach Airport is a public airport centrally located in the City, approximately 3 miles northeast of Downtown. This airport has limited passenger flights and is restricted by ordinances that minimize airport-related noise. Although commercial flights are restricted, several charters, private aviation, flight schools, law enforcement flights, helicopters, advertising blimps, and planes towing advertising banners still frequently operate from this airport.

Operations at the Long Beach Airport typically occur within the daytime hours of 7:00 a.m. to 10:00 p.m., with the exception of occasional unscheduled landings that occur after 10:00 p.m., and emergency and police helicopter activities. *The Long Beach Airport Community Guide to Aircraft Noise* presents factual information on the City of Long Beach Airport Noise Compatibility Ordinance (Long Beach Municipal Code Chapter 16.43) and Long Beach Airport’s efforts to minimize aircraft noise over nearby neighborhoods. While the City is not able to control the flight paths, typical operations include approaches from the southeast of the airport and departures taking off in a northwest direction.

<sup>4</sup> Noise Free America. *Citizens for a Quieter Sacramento Rebuttal to the CLCA Position on Leaf Blowers*. Website: <https://noisefree.org/sources-of-noise/lawn-and-garden-equipment/> (accessed March 2019).

Other airports with aircraft activity that affect the ambient noise environment within the City limits include Los Angeles International Airport and John Wayne Airport. Los Angeles International Airport is located approximately 20 miles northwest of the City, and John Wayne Airport is located approximately 30 miles southwest of the City. Although noise from aircraft activity is occasionally audible throughout the City, the City is not located within the 65 dBA CNEL noise contour of these airports.

#### 4.5.4.4 Existing Vibration Sources

**Vibration Sources.** Major vibration sources in the City include construction activities, rail operations, and heavy vehicle traffic. Other sources which have the potential to cause vibration impacts are aircraft operations, low-frequency music and some stationary sources. Similar to noise standards, cities can adopt vibration exposure standards regarding the sensitivity of land uses which may be affected. In relation to vibration impacts, there are two factors that are considered to assessing the level of impact expected: the potential for damage to a building or structure and the potential of annoyance to people. Also similar to potential noise impacts, the most efficient actions to help reduce vibration impacts occur during the planning and permitting phases of any project or development.

**Construction Activity Vibration.** Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans. The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.2 to 0.3 millimeters per second (0.008 to 0.012 inches per second), PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels (e.g., people in an urban environment) may tolerate a higher vibration level. Structural damage can be classified as cosmetic only (e.g., minor cracking of building elements) or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to a building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity (e.g., impact pile driving) occurs immediately adjacent to the structure.

**Rail Activity Related Vibration.** Rail operations are potential sources of substantial ground-borne vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground-borne vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is  $1 \times 10^{-6}$  inches per second. RMS, which equals 0 VdB, and 1 inch per second equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

One of the problems with developing suitable criteria for ground-borne vibration is the limited research into human response to vibration and, more importantly, human annoyance inside buildings. The United States Department of Transportation Federal Transit Administration has developed rational vibration limits that can be used to evaluate human annoyance to ground-borne vibration. These criteria are primarily based on experience with passenger train operations (e.g., rapid transit and commuter rail systems). The main difference between passenger and freight operations is the time duration of individual events; a passenger train lasts a few seconds whereas a long freight train may last several minutes, depending on speed and length.

**Heavy Vehicles and Buses.** Ground-borne vibration levels from heavy trucks and buses are not normally perceptible, especially if roadway surfaces are smooth. Buses and trucks typically generate ground-borne vibration levels of about 63 VdB at a distance of 25 ft when traveling at a speed of 30 mph. Higher vibration levels can occur when buses or trucks travel at higher rates of speed or when the pavement is in poor condition. Vibration levels below 65 VdB are below the threshold for human perception.

**Other Sources of Vibration Annoyance.** In addition to sources that have vibration impacts which translate through the ground surface between source and receptor, sources which generate high levels of low-frequency noise may generate vibration through air. These sources may include aircraft and helicopter operations, low-frequency music and other large stationary sources.

#### 4.5.5 Regulatory Setting

The following section summarizes the regulatory framework related to noise, including federal, State and City of Long Beach plans, policies, and standards.

##### 4.5.5.1 Federal Regulations

**United States Environmental Protection Agency.** In 1972, Congress enacted the United States Noise Control Act. This act authorized the United States Environmental Protection Agency (USEPA) to publish descriptive data on the effects of noise and establish levels of sound “requisite to protect the public welfare with an adequate margin of safety.” These levels are separated into health (hearing loss levels) and welfare (annoyance levels). For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to 70 dBA during a 24-hour period of time. At 55 dBA  $L_{dn}$ , 95 percent sentence clarity (intelligibility) may be expected at 11 ft, with no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance. The USEPA cautions that these identified levels are guidelines, not standards.

**Federal Vibration Impact Standards.** Vibration impact criteria included in the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (September 2018) are used in this analysis for ground-borne vibration impacts on human annoyance, as shown in Table 4.5.C. The criteria presented in Table 4.5.C account for variation in project types as well as the frequency of events, which differ widely among projects. It is intuitive that when there will be fewer events per day, it should take higher vibration levels to evoke the same community response.

**Table 4.5.C: Ground-Borne Vibration and Noise Impact Criteria**

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 micro-inch/sec)		Ground-Borne Noise Impact Levels (dB re 20 micro-Pascals)	
	Frequent <sup>1</sup> Events	Infrequent <sup>2</sup> Events	Frequent <sup>1</sup> Events	Infrequent <sup>2</sup> Events
<b>Category 1:</b> Buildings in which low ambient vibration is essential for interior operations (i.e., vibration-sensitive manufacturing, hospitals with vibration sensitive equipment, and university research operation).	65 VdB <sup>3</sup>	65 VdB <sup>3</sup>	-- <sup>4</sup>	-- <sup>4</sup>
<b>Category 2:</b> Residences and buildings in which people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
<b>Category 3:</b> Institutional land uses with primarily daytime uses.	75 VdB	83 VdB	40 dBA	48 dBA

Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual* (September 2018).

<sup>1</sup> Frequent events are defined as more than 70 events per day.

<sup>2</sup> Infrequent events are defined as fewer than 70 events per day.

<sup>3</sup> This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

<sup>4</sup> Vibration-sensitive equipment is not sensitive to ground-borne noise.

dB = decibels

dBA = A-weighted decibels

HVAC = heating, ventilation, and air conditioning

inch/sec = inch(es) per second

re = relative

VdB = vibration velocity decibels

This is accounted for in the criteria by distinguishing between projects with frequent and infrequent events, in which the term “frequent events” is defined as more than 70 events per day.

#### 4.5.5.2 State Regulations

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the *State Noise Insulation Standard*, it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor-ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

In addition, Chapter 5, Section 5.507 of the California Green Building Standards Code includes nonresidential mandatory measures, which require that buildings exposed to a noise level of 65 dB L<sub>eq</sub>-1-hour during any hour of operation shall have building, addition, or alteration exterior wall and

roof-ceiling assemblies exposed to the noise source meeting a composite Sound Transmission Class (STC) rating of at least 45 (or Outdoor/Indoor Transmission Class [OITC] 35) with exterior windows of a minimum STC of 40 (or OITC 30).

The State has established land use compatibility guidelines for determining acceptable noise levels for specified land uses in the State of California General Plan Guidelines as shown in Table 4.5.D.<sup>5</sup>

#### 4.5.5.3 Local and Regional Policies and Regulations

**City of Long Beach Municipal Code.** The City of Long Beach addresses noise impacts in Title 8: Health and Safety, Chapter 8.80, Noise, and sets regulations to minimize airport noise in Title 16: Public Facilities and Historical Landmarks, Chapter 16.43, Airport Noise Compatibility.<sup>6</sup> The Municipal Code establishes exterior and interior noise standards at receiving land uses and establishes permitted hours of construction activity noise as described below.

Chapter 8.80, Noise, establishes exterior and interior noise limits for the generation of sound within the City. The maximum noise levels vary based on the receiving land use type and the cumulative duration of noise. The ordinance also limits noise generated by construction. The Municipal Code restricts construction activities to weekdays and federal holidays between the hours of 7:00 a.m. and 7:00 p.m. and on Saturdays, restricts construction to between the hours of 9:00 a.m. and 6:00 p.m., except for emergency work. Construction work on Sundays is prohibited unless the City's Noise Control Officer issues a permit. The permit may allow work on Sundays between 9:00 a.m. and 6:00 p.m. Additionally, Chapter 16.43, Airport Noise Compatibility, establishes cumulative noise limits and noise budgets for properties in the vicinity of the Airport. The Municipal Code establishes a goal that incompatible property in the vicinity of the airport shall not be exposed to noise above 65 dBA CNEL.

Loading and unloading activities are also regulated under the noise ordinance. The ordinance states that loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 p.m. and 7:00 a.m. is restricted to the noise level provisions of Exterior Noise Limits shown in Table 4.5.E and the Interior Noise Limits shown in Table 4.5.F.

Additionally, the ordinance states that operating or permitting the operation of any device that creates vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at 150 ft from the source if on a public space or public right-of-way, is prohibited.

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<sup>5</sup> State of California Governor's Office of Planning and Research, 2017. *State of California General Plan Guidelines*. Appendix D: Noise Element Guidelines. July.

<sup>6</sup> City of Long Beach. 2019. Municipal Code. February.

**Table 4.5.D: Community Noise Exposure  $L_{dn}$  or CNEL (dB)**

Land Use Category	Community Noise Exposure $L_{dn}$ or CNEL, dB						
	55	60	65	70	75	80	85
Residential - Low Density Single Family Duplex, Mobile Homes	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Residential - Multi-Family	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Transient Lodging - Hotels, Motels	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Schools, Libraries, Churches, Hospitals, Nursing Homes	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Auditoriums, Concert Halls, Amphitheaters	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Sports Arena, Outdoor Spectator Sports	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Playgrounds, Neighborhood Parks	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Golf Courses, Riding Stables, Water Recreation, Cemeteries	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Office Buildings - Business, Commercial & Professional	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
Industrial, Manufacturing, Utilities, Agriculture	[Normal]		[Normal]		[Unacceptable]		[Unacceptable]
<b>Normally Acceptable</b>	<i>Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.</i>						
<b>Conditionally Acceptable</b>	<i>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.</i>						
<b>Normally Unacceptable</b>	<i>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.</i>						
<b>Clearly Unacceptable</b>	<i>New construction or development should generally not be undertaken.</i>						
<i>Source: California Office of Planning and Research, General Plan Guidelines (2017), Appendix D.</i>							

**Table 4.5.E: Maximum Exterior Local Noise Criteria**

Receiving Land Use District	Maximum Noise Criteria (dB L <sub>max</sub> )	
	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
District One — Predominantly residential with other land use types also present	50	45
District Two — Predominantly commercial with other land use types also present	60	55
District Three <sup>1</sup> — Predominantly industrial with other land use types also present	65	65
District Four <sup>1</sup> — Predominantly industrial with other land types use also present	70	70
District Five — Airport, freeways, and waterways regulated by other agencies	Regulated by other agencies and laws	

Source: City of Long Beach Municipal Code (adopted 1977, most recent revision 2009).

<sup>1</sup> Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within those districts.  
 dB = decibel(s)

L<sub>max</sub> = maximum instantaneous noise level

**Table 4.5.F: Interior Noise Limits**

Receiving Land Use District	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 p.m.–7:00 a.m.	35
		7:00 a.m. –10:00 p.m.	45
All	School	7:00 a.m. –10:00 p.m. (while school is in session)	45
Hospital, designated quiet zones, and noise-sensitive zones		Any time	40

Source: City of Long Beach Municipal Code (adopted 1977, most recent revision 2009).

dBA = A-weighted decibel(s)

**City of Long Beach General Plan Noise Element.** The adopted City of Long Beach General Plan addresses noise in the Noise Element, which was adopted in 1975 and is currently in the process of being updated.<sup>7</sup> The Noise Element contains goals and policies for noise control and abatement in the City. The goals and policies contained in the Noise Element address noise in relation to land use planning, the noise environment, transportation noise, construction and industrial noise, population and housing noise, and public health and safety. General noise goals for Long Beach aim to attain a

<sup>7</sup> City of Long Beach. 1975. Long Beach General Plan Noise Element. Website: <http://www.lbds.info/civica/filebank/blobload.asp?BlobID=3051> (accessed June 3, 2019).

Please also note that the City is currently in the process of updating the General Plan Noise Element. Information regarding this process can be found at the following website: [http://www.lbds.info/noise\\_element\\_update/](http://www.lbds.info/noise_element_update/).

healthier and quieter environment for all citizens while maintaining a reasonable level of economic progress and development.<sup>8</sup>

The following goals and categorical recommendations (i.e., policies) of the City's Noise Element are applicable to the proposed project:

- GOAL 1:** To improve and preserve the unique and fine qualities of Long Beach and eliminate undesirable or harmful elements.
- GOAL 2:** To develop a well-balanced community offering planned and protected residential districts..., well distributed commercial districts, planned and restricted industrial districts, and a coordinated circulation system for fast, safe, and efficient movement of people and commodities.
- GOAL 3:** To improve the urban environment in order to make Long Beach a more pleasant place to live, work, play, and raise a family.
- GOAL 5:** To develop specific neighborhood noise plans with the participation of resident citizen groups.

#### **Goals Related to Land Use Planning**

- GOAL 1:** Provide the City with limited maximum noise levels by judicious land use planning policies.
- GOAL 2:** Develop standards for local fixed point (stationary) noise sources.
- GOAL 3:** Set measurable goals for the reduction of noise in problem areas.
- GOAL 4:** Propose land uses or activities that would act as buffer zones between incompatible land uses.
- GOAL 5:** Consider existing ambient noise levels before establishing specific permitted levels of sound.
- GOAL 6:** Locate and mitigate noise impacts from highways and freeways on residential land uses and institutional, recreational, and school facilities.
- GOAL 7:** Identify and anticipate existing or proposed land uses that cause (directly and indirectly) noise-generating activities.

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<sup>8</sup> City of Long Beach. 1975. Long Beach General Plan Noise Element. Website: <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=3051> (accessed June 3, 2019).

Please also note that the City is currently in the process of updating the General Plan Noise Element. Information regarding this process can be found at the following website: [http://www.lbds.info/noise\\_element\\_update/](http://www.lbds.info/noise_element_update/).

**GOAL 8:** Promote the health and well-being of the people of Long Beach by adopting standards for the proper balance, relationship, and distribution of the various types of land uses

**GOAL 9:** Protect business and industrial areas against intrusions of non-business or non-industrial land uses which are highly sensitive to noise.

#### **Goals Related to the Noise Environment**

**GOAL 1:** To prevent the loss of relatively quiet areas of Long Beach by regulating potential noise sources.

**GOAL 6:** To describe the noise problem areas which are within local control.

**GOAL 7:** To continue to take restorative measures to remedy and reduce high noise areas within the City.

#### **Goals Related to Transportation Noise**

**GOAL 1:** Recommending a plan for compatible land uses for those portions of Long Beach within transportation noise zones.

**GOAL 2:** Discouraging within transportation noise zones the development of noise sensitive uses that cannot be sufficiently insulated against externally generated noise at reasonable cost.

**GOAL 3:** Developing long range re-allocation of noise sensitive land uses away from transportation noise impact areas.

**GOAL 4:** Providing standards and criteria for noise emissions from transportation facilities.

**GOAL 8:** Reducing the level of noise exposure from surface transportation in problem areas not preempted by State or Federal law.

**GOAL 9:** Reducing the level of noise exposure from air operations and aircraft ground maintenance in problem areas no preempted by State and Federal law.

#### **Goals Related to Construction and Industrial Noise**

**GOAL 1:** To reduce the level of noise exposure to the population caused by demolition and construction activities.

**GOAL 2:** To reduce the level of outdoor noise exposure to the population generated by industries.

#### **Goals Related to Population and Housing Noise**

**GOAL 1:** To reduce the level of outdoor noise exposure the population is subjected to.

**GOAL 2:** To achieve greater indoor quietness in multiple dwelling residential buildings.

- GOAL 3:** To reduce the level of noise generated by the population into the environment of the City.
- GOAL 5:** To stimulate the redevelopment or refurbishment of blighted housing to create quieter neighborhoods and better soundproofed dwellings.
- GOAL 6:** To require better sound deadening design on new housing units where acoustical problems could develop.
- GOAL 7:** To reduce the level of incoming and outgoing noise into and from residential dwellings within the City.
- GOAL 9:** To facilitate wherever feasible, noise standards that shall be employed in a manner consistent with proposed land uses, population densities, and building types.

#### **Goals Related to Public Health and Safety**

- GOAL 1:** To inform citizens of real and potential noise hazards, both physical (to the hearing system) and psychological (to the nervous system).
- GOAL 2:** To regulate and control noise which is injurious to health or psychological well-being.
- GOAL 3:** To continue to reduce excessive traffic noise in problem areas by the construction of sound barriers, further synchronization of traffic lights, and posting of “Quiet Zone” signs around hospitals and other highly noise sensitive land uses.
- GOAL 7:** To advise citizens on noise-related problems, complaints and to suggest solutions on an individual basis.

#### **Recommendations Related to Development Policies**

- Policy 4.1:** Where incompatibility exists at present, action shall first be taken to change the noise environment.
- Policy 4.2:** Where incompatibility exists at present and future projections indicate that the noise environment cannot be reduced to create compatibility, every effort shall be made to change the development to achieve compatibility.
- Policy 4.3:** No future development shall be allowed which is incompatible with the existing or future noise environment unless the developer can show:
- a. The development can reasonably be expected to be compatible at some time in the near future; and
  - b. Other factors favoring the development (social, environmental, for example) outweigh factors against the development.
- Policy 4.4:** No future development shall be allowed which causes other developments to become incompatible with their noise environments.

#### 4.5.6 Thresholds of Significance

**Threshold 4.5.1:** Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

**Threshold 4.5.2:** Generate excessive ground-borne vibration or ground-borne noise levels; or

**Threshold 4.5.3:** For a project located within the vicinity of a private airstrip or 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, expose people residing or working in the project area to excessive noise levels.

A 3 dBA increase is considered to be perceptible by the human ear in an outdoor environment. Therefore, the significance criteria define a significant impact to occur if the project would result in a substantial (3 dBA or greater) permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

CEQA generally does not require analysis or mitigation of the impact of existing environmental conditions on a project, including a project's future users or residents. However, as with other laws and regulations enforced by other agencies that protect public health and safety, the City, as the lead agency, has the authority other than CEQA to require measures to protect public health and safety. Therefore, this document includes an evaluation of the environment's impacts on the project and includes an assessment of the project's potential to introduce new sensitive receptors to areas where conditions would be exacerbated by project implementation.

#### 4.5.7 Compliance Measures and Project Design Features

The proposed project would not be required to adhere to any compliance measures and would not include any project design features related to noise. Although there are no compliance measures and project design features related to noise, the LUE and UDE Goals, Strategies, and Policies are intended to reduce noise and vibration impacts of future development envisioned under the proposed project. In addition, development allowed under the proposed project would be subject to compliance with the City's Noise Ordinance.

##### 4.5.7.1 Proposed Land Use Element Strategies and Policies

The following proposed Goals, Strategies, and Policies are applicable to the analysis of Noise and would replace existing goals, strategies, and policies outlined in the City's existing LUE and SRE following project approval:

##### Land Use Element.

- **LU Policy 9-1:** Protect neighborhoods from the encroachment of incompatible activities or land uses that may have negative impacts on residential living environments.

- **LU Policy 16-6:** Work with regional agencies, residents, and businesses to preserve established homes, businesses, and open spaces. Limit the exposure of toxic pollutants and vehicle noise. Minimize traffic issues impacting residential neighborhoods resulting from freeway expansion and other similar large-scale projects.
- **LU Policy 16-8:** Require an acoustical analysis prior to project approval for projects subject to CEQA review, for all noise sensitive projects located in an area with noise levels greater than 60 dBA CNEL and/or within 500 feet of a freeway. All new residential land uses shall be designed to maintain a standard of 45 dBA CNEL or less in building interiors, consistent with the General Plan. Noise reduction measures to achieve this noise level could include, but are not limited to, forced air ventilation so that windows can remain closed and/or upgraded wall and window assemblies.
- **LU Policy 16-9:** The Los Angeles County Metropolitan Transportation Authority (Metro) shall be notified of any planned development or construction activities on properties that are within 100 feet of Metro right-of-way (ROW). Metro must be provided the opportunity early in the development process to review plans and comment, if necessary, to ensure that the project does not impact the safe operation of Metro transit service and/or compromise Metro infrastructure. As the project design advances, Metro may review construction drawings and work plans for potential impacts to the Metro system and to ensure safe operation of cranes, overhead loads, excavation, drainage, worker safety, and other construction activities. Projects immediately adjacent to Metro ROW may be required to include a setback from the Metro property line and to accommodate construction and maintenance activities on private property. Developers should not assume that Metro will grant a right-of-entry permit for construction or maintenance activities on Metro property. For this reason, Metro recommends a minimum five (5) foot setback from the adjacent Metro property line. At the City's discretion and Metro's request, a noise easement may be required to deed Metro the right to cause in said easement noise, vibrations and other effects that may be caused by the operation of transit vehicles.
- **LU Policy 16-10:** Locate schools and other sensitive receptors at least 500 feet away from freeways as feasible.

#### **Urban Design Element.**

- **Policy UD 14-2:** Acknowledge transitions between commercial and residential uses by transitioning in height, scale, and intensity in a thoughtful way to provide a buffer to lower density residential development and transition from higher to lower density.
- **Policy UD 14-4:** Protect neighborhoods from the encroachment of incompatible activities or land uses that may have negative impacts on the residential living environment.
- **Policy UD 14-5:** Promote commercial center and corridor development compatibility with adjacent residential uses, including ensuring that project design and function minimizes the potential adverse impacts of vehicle access, parking and loading facilities, building massing, signage, lighting, trash enclosures and noise generating uses and areas.

- **Policy UD 19-2:** Ensure that project site design and function minimizes the potential adverse impacts of vehicle access, parking and loading facilities, signage, lighting, trash enclosures, and sound systems.
- **Policy UD 22-1:** Encourage the massing of buildings and setbacks behind the Long Beach Boulevard light rail corridor to transition from moderate to low, in order to gracefully handle the transition from more intense to less intense development.
- **Policy UD 23-1:** Provide adequate setbacks, along with visual and noise buffers, to separate automobile-oriented developments from adjacent residential neighborhoods.
- **Policy UD 24-3:** Promote the incorporation of buffers between residential and industrial uses, such as surface parking, landscaped open space buffers, and lower buildings.
- **Policy UD 24-5:** Encourage incompatible land uses and operations to be located away from and screened from view of residential neighborhoods.
- **Policy UD 26-2:** Encourage separation of incompatible land uses with site planning strategies and appropriate design treatments.

#### 4.5.8 Project Impacts

**Threshold 4.5.1:** **Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

**Short-Term Construction-Related Noise Impacts: Significant and Unavoidable Impact.**

**Short-Term Construction-Related Noise Impacts.** Construction associated with implementation of the proposed project would occur over a period of approximately 21 years. Construction activities associated with development allowed under the proposed project could result in substantial temporary or periodic increases in ambient noise levels at development sites throughout the City.

Two types of short-term noise impacts would occur during demolition, site preparation, and construction of projects that would be anticipated by the proposed plan. The first type would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers, construction equipment, and materials to the project site would incrementally increase noise levels on access roads leading to the site. The second type would result from equipment use and activities associated with demolition, site preparation, and construction of proposed projects. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These phases would change the character of the noise generated on project sites and, therefore, the noise levels surrounding the sites as construction progresses.

Table 4.5.G lists typical maximum noise levels for various pieces of construction equipment, as measured at a distance of 50 ft from the operating equipment. Despite the variety in the type and

size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. The site preparation phase, which includes excavation and grading, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as pile driving, backhoes, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings. Typical maximum noise levels during the site preparation phase of construction can range up to 86 dBA  $L_{max}$  at 50 ft from multiple pieces of operating equipment.

**Table 4.5.G: Noise Emission Reference Levels and Usage Factors**

Equipment Description	Acoustical Usage Factor <sup>1</sup>	Predicted $L_{max}$ at 50 feet (dBA, slow) <sup>2</sup>	Actual Measured $L_{max}$ at 50 feet (dBA, slow) <sup>3</sup>
All Other Equipment > 5 HP	50	85	N/A <sup>4</sup>
Backhoe	40	80	78
Compactor (ground)	20	80	83
Compressor (air)	40	80	78
Crane	16	85	81
Dozer	40	85	82
Dump Truck	40	84	76
Excavator	40	85	81
Flat Bed Truck	40	84	74
Front-End Loader	40	80	79
Generator	50	82	81
Gradall	40	85	83
Grader	40	85	N/A
Impact Pile Driver	20	95	101
Man Lift	20	85	75
Paver	50	85	77
Pickup Truck	40	55	75
Roller	20	85	80
Scraper	40	85	84
Tractor	40	84	N/A

Source: Federal Highway Administration (FHWA). *Construction Noise Handbook*, Table 9.1 (August 2006).

Note: Noise levels reported in this table are rounded to the nearest whole number.

- <sup>1</sup> Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
- <sup>2</sup> Maximum noise levels were developed based on Specification (Spec.) 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
- <sup>3</sup> The maximum noise level was developed based on the average noise level measured for each piece of equipment during the CA/T program in Boston, Massachusetts.
- <sup>4</sup> Since the maximum noise level based on the average noise level measured for this piece of equipment was not available, the maximum noise level developed based on Spec 721.560 would be used.

dBA = A-weighted decibel

$L_{max}$  = maximum instantaneous noise level

N/A = not applicable

Construction anticipated under the proposed project is expected to require the use of earthmoving equipment, dozers, and water and pickup trucks. Besides pile driving, which is not common on most construction sites, a scraper is one of the loudest pieces of construction equipment. The estimated noise level generated by each scraper on future project sites would be approximately 84 dBA  $L_{max}$  at 50 ft from the scraper. Each dozer, another common piece of construction equipment, would generate approximately 82 dBA  $L_{max}$  at 50 ft. The estimated noise level generated by water and pickup trucks would be approximately 75 dBA  $L_{max}$  at 50 ft from these vehicles. Each doubling of the sound

sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of anticipated future construction would be 86 dBA  $L_{max}$  at a distance of 50 ft from the active construction area. In addition, some construction projects could require pile driving, which would have an estimated noise level of approximately 101 dBA  $L_{max}$  at 50 ft.

Noise-sensitive receptors include residences, schools, hospitals, churches, and similar uses that are sensitive to noise. Construction and operation of development allowed under the proposed project could adversely affect nearby noise-sensitive land uses. Construction noise is permitted by the City Municipal Code when activities occur between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and federal holidays, and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction would be permitted on Sundays. Construction noise impacts are currently exempt from specific noise levels limits.

Construction activities associated with development anticipated under the LUE/UDE would be subject to compliance with the City's Noise Ordinance to ensure that noise impacts from construction sources are reduced. Specific construction project data that may occur with implementation of the LUE/UDE, including location and noise levels at surrounding sensitive receptors, are unknown at this time. Some projects may have unusual or extremely loud construction activities (e.g., pile driving, nighttime construction work, or unusually long construction duration, etc.). Therefore, construction projects may result in a substantial increase in ambient noise levels, and mitigation would be required. Mitigation Measure MM NOI-1 would require future construction projects implemented under the LUE/UDE to implement construction best management practices to reduce potential construction-period noise impacts for nearby sensitive receptors. Although Mitigation Measure MM NOI-1 would reduce construction noise associated with future projects, since the location, the proximity to sensitive receptors, and the types of construction equipment associated with new construction projects are all unknown at this time, this impact is considered significant and unavoidable in an abundance of caution.

#### **Long-Term Stationary-Source Noise Impacts: Less than Significant Impact.**

**Long-Term Stationary-Source Noise Impacts.** Development allowed under the proposed project may include the installation or creation of new stationary sources of noise, or could include the development of new sensitive land uses in the vicinity of existing noise sources. For commercial or industrial uses, these noise sources could include loading/unloading operations, generators, and outdoor speakers; for residential uses, stationary noise sources may include air conditioners or pool pumps. These stationary sources of noise would have the potential to disturb adjacent sensitive receptors. However, noise generation would continue to be limited by the City's Noise Ordinance, Chapter 8.80.

Implementation of the proposed project is not anticipated to result in increased railroad operations within the City. However, the project proposes the TOD PlaceType, which would allow future multi-family developments to be located along the Metro Blue Line fixed rail route. Locating multi-family developments near the light-rail corridor could expose sensitive land uses to operational rail noise.

The City's Municipal Code addresses noise in Title 8: Health and Safety, Chapter 8.80, Noise. The primary objective of Chapter 8.80 is to establish exterior and interior noise standards at receiving land uses. In addition to the policies identified in the Noise Element of the General Plan to minimize the effects of noise on noise-sensitive uses, the LUE/UDE include the following policies and land use strategies to protect sensitive receptors from stationary noise sources and encourage land use compatibility: LU Policy 9-1, LU Policy 16-6, LU Policy 16-8, LU Policy 16-10, Bixby Knolls Land Use Strategy 1, Westside and Wrigley Land Use Strategy 6, Eastside Land Use Strategy 4, Central Land Use Strategy 3, Traffic Circle Land Use Strategy 3, Midshore Land Use Strategy 5, Downtown Land Use Strategy 7, Policy UD 14-2, Policy UD 14-4, Policy UD 14-5, Policy UD 19-2, Policy UD 22-1, Policy UD 23-1, Policy UD 24-3, Policy UD 24-5, and Policy UD 26-2 (refer to Subsection 4.5.7.1).

Development allowed by the proposed project may include the development of new sensitive land uses in the vicinity of existing noise sources and could potentially subject sensitive land uses to long-term noise impacts. However, several of the LUE and UDE policies, specifically Policy UD 26-2, require new development projects to incorporate site planning and project design strategies to separate or buffer neighborhoods from incompatible activities or land uses. Furthermore, to ensure that new development will meet the interior noise standards identified by the State, the LUE has incorporated LU Policy 16-8. LU Policy 16-8 requires that all new developments in areas with noise levels greater than 60 dBA CNEL prepare an acoustical analysis and requires new residential land uses to be designed to maintain a standard of 45 dBA  $L_{dn}$  or less in building interiors. Policy UD 19-2 ensures that project site design and function minimizes potential adverse impacts of vehicle access, parking and loading facilities, signage, lighting, trash enclosures, and sound systems. In addition, any new noise-generating sources would be subject to compliance with Chapter 8.80, Noise (including Table A: Exterior Noise Limits), of the City's Municipal Code (Table 4.5.E of this Recirculated Draft EIR), which sets exterior noise standards for the various land uses within the City. As discussed above, implementation of the proposed project would include policies and strategies that would ensure new development projects incorporate site planning and project design strategies to separate or buffer neighborhoods from incompatible activities or land uses, which would protect sensitive receptors from stationary noise sources in excess of acceptable levels. Therefore, implementation of the proposed project would not expose persons to noise levels in excess of the City's Municipal Code, and no mitigation would be required.

#### **Long-Term Traffic Noise Impacts: Less than Significant Impact.**

**Long-Term Traffic Noise Impacts.** Potential sources of permanent increase in ambient noise include noise resulting from increased traffic on roadways in the planning area. It is projected that traffic volumes on some streets within the City would increase due to the growth envisioned under the proposed project. This increase in traffic volumes would result in increased traffic noise levels compared to existing conditions.

The significance criteria define a significant impact to occur if the project would result in a substantial (3 dBA or greater) permanent increase in ambient noise levels in the project vicinity above levels existing without the project. For traffic noise to increase by 3 dBA, traffic volumes would have to double. As noted in the Setting section of this analysis, noise increases of 3 dBA or more are generally considered to be the smallest increases in noise levels readily perceptible in suburban or urban

outdoor environments. The average daily traffic (ADT) volumes were used to determine the CNEL change. The following formula was used to calculate the change in noise levels with traffic volumes:

$$(\Delta) = 10 \log \left( \frac{a}{b} \right)$$

where:             $(\Delta)$  = change in noise level (dBA) due to implementation of the project  
                      a = future ADT volume with the project  
                      b = future ADT volume without project

Table 4.5.H shows the ADT and project-related traffic noise level change under the existing and 2040 with and without project conditions for roadway segments in the City. As shown in Table 4.5.H, the project-related traffic noise increase would be up to 2.1 dBA, which is considered less than the threshold of perceptibility for humans (i.e., 3 dBA). Therefore, implementation of the proposed project is not expected to result in the generation of substantial traffic noise increases. This would be considered less than significant, and no mitigation would be required.

**Threshold 4.5.2:            Would the project generate excessive ground-borne vibration or ground-borne noise levels?**

**Less than Significant Impact with Mitigation.** As previously described, common sources of ground-borne vibration and noise include trains and construction activities such as blasting, pile driving, and operating heavy earthmoving equipment. Typically, the main effect of ground-borne vibration and noise is to cause annoyances for occupants of nearby buildings.

Chapter 8.80 of the City’s Noise Ordinance limits the operation of any device that creates vibration, including pile driving, that is above the vibration perception threshold. Any construction activities associated with implementation of the proposed project would be required to comply with the Noise Ordinance requirements. However, because the construction of future projects associated with implementation of the proposed project could result in the generation of ground-borne vibration, mitigation would be required. Specifically, Mitigation Measure MM NOI-1 would require future construction projects implemented under the LUE/UDE to implement construction best management practices to minimize vibration impacts for nearby sensitive receptors. Compliance with Mitigation Measure MM NOI-1 would serve to reduce impacts related to the exposure of sensitive receptors to excessive ground-borne vibration or noise levels to a less than significant level.

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Avalon Boulevard	North of PCH	16,820	16,820	0.0	19,440	19,440	0.0	0.6
	PCH to Anaheim Street	16,410	16,360	0.0	18,542	18,492	0.0	0.5
	South of PCH	9,700	9,700	0.0	10,004	10,004	0.0	0.1
Wilmington Avenue	North of I-405	26,420	25,685	-0.1	30,832	30,097	-0.1	0.6
	I-405 to Sepulveda Boulevard	17,670	17,670	0.0	20,422	20,422	0.0	0.6
Terminal Island Freeway	South of Willow Street	12,620	12,760	0.0	14,818	14,958	0.0	0.7
Santa Fe Avenue	North of Wardlow Road	27,140	26,948	0.0	31,367	31,175	0.0	0.6
	Wardlow Road to Willow Street	21,670	21,569	0.0	24,455	24,354	0.0	0.5
	Willow Street to PCH	14,570	14,662	0.0	16,473	16,565	0.0	0.6
	PCH to Anaheim Street	12,470	12,687	0.1	14,056	14,273	0.1	0.6
Magnolia Avenue	North of Ocean Boulevard	9,190	9,190	0.0	10,621	10,621	0.0	0.6
Pacific Avenue	North of 7th Street	8,180	8,180	0.0	9,454	9,454	0.0	0.6
	7th Street to 6th Street	8,320	8,310	0.0	9,959	9,949	0.0	0.8
	6th Street to 3rd Street	8,670	8,680	0.0	10,127	10,137	0.0	0.7
	3rd Street to Broadway	7,730	7,900	0.1	8,994	9,164	0.1	0.7
	Broadway to Ocean Boulevard	11,840	12,000	0.1	13,124	13,284	0.1	0.5
Long Beach Boulevard	North of Alondra Boulevard	20,440	20,400	0.0	23,296	23,256	0.0	0.6
	Alondra Boulevard to Artesia Boulevard	19,810	20,025	0.0	22,681	22,896	0.0	0.6
	Artesia Boulevard to Market Street	23,110	23,528	0.1	25,623	26,041	0.1	0.5
	Market Street to Del Amo Boulevard	21,670	21,800	0.0	24,202	24,332	0.0	0.5
	Del Amo Boulevard to San Antonia Drive	21,550	21,590	0.0	25,147	25,187	0.0	0.7
	Carson Street to Wardlow Road	25,160	25,292	0.0	28,947	29,079	0.0	0.6
	Wardlow Road to Spring Street	46,210	47,186	0.1	52,902	53,878	0.1	0.7
	Spring Street to Willow Street	44,340	44,340	0.0	51,246	51,246	0.0	0.6
	Willow Street to PCH	18,010	18,732	0.2	20,093	20,815	0.2	0.6
	PCH to Anaheim Street	14,890	15,020	0.0	17,022	17,152	0.0	0.6
	Anaheim Street to 7th Street	21,250	19,715	-0.3	23,169	21,634	-0.3	0.1
	7th Street to 6th Street	22,970	21,889	-0.2	24,725	23,644	-0.2	0.1
	6th Street to 3rd Street	9,720	9,860	0.1	10,586	10,726	0.1	0.4
	3rd Street to Broadway	7,910	8,396	0.3	8,562	9,048	0.2	0.6
Broadway to Ocean Boulevard	7,060	6,804	-0.2	7,886	7,630	-0.1	0.3	

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Atlantic Avenue	North of Alondra Boulevard	21,120	21,230	0.0	23,829	23,939	0.0	0.5
	Alondra Boulevard to Artesia Boulevard	25,990	26,080	0.0	29,658	29,748	0.0	0.6
	Artesia Boulevard to South Street	21,630	21,700	0.0	25,040	25,110	0.0	0.6
	South Street to Del Amo Boulevard	17,830	18,014	0.0	20,423	20,607	0.0	0.6
	Del Amo Boulevard to I-405	22,200	20,387	-0.4	25,712	23,899	-0.3	0.3
	I-405 to Willow Street	25,000	25,836	0.1	27,499	28,335	0.1	0.5
	Willow Street to PCH	16,480	16,475	0.0	18,378	18,373	0.0	0.5
	PCH to Anaheim Street	15,970	16,180	0.1	19,640	19,850	0.0	0.9
	Anaheim Street to 7th Street	13,740	13,160	-0.2	17,850	17,270	-0.1	1.0
	7th Street to 6th Street	14,450	14,400	0.0	16,145	16,095	0.0	0.5
	6th Street to 3rd Street	9,380	9,467	0.0	12,733	12,820	0.0	1.4
	3rd Street to Broadway	5,820	5,926	0.1	7,101	7,207	0.1	0.9
Broadway to Ocean Boulevard	6,260	6,320	0.0	6,961	7,021	0.0	0.5	
Orange Avenue	North of Wardlow Road	13,760	13,350	-0.1	16,112	15,702	-0.1	0.6
	Wardlow Road to PCH	13,610	13,596	0.0	15,631	15,617	0.0	0.6
	PCH to Anaheim Street	15,430	15,430	0.0	17,833	17,833	0.0	0.6
Alamitos Avenue	Anaheim Street to 7th Street	11,990	12,090	0.0	13,569	13,669	0.0	0.6
	7th Street to 6th Street	18,220	17,797	-0.1	20,247	19,824	-0.1	0.4
	6th Street to 3rd Street	16,140	15,927	-0.1	18,894	18,681	0.0	0.6
	3rd Street to Broadway	17,460	17,368	0.0	20,389	20,297	0.0	0.7
	Broadway to Ocean Boulevard	14,650	14,640	0.0	17,036	17,026	0.0	0.7
Cherry Avenue	North of Artesia Boulevard	22,030	21,766	-0.1	25,461	25,197	0.0	0.6
	Artesia Boulevard to Market Street	23,550	23,320	0.0	27,758	27,528	0.0	0.7
	Market Street to Del Amo Boulevard	25,490	25,490	0.0	29,460	29,460	0.0	0.6
	Del Amo Boulevard to Carson Street	31,340	30,910	-0.1	36,222	35,792	-0.1	0.6
	Carson Street to Wardlow Road	40,570	37,989	-0.3	46,173	43,592	-0.2	0.3
	Wardlow Road to Willow Street	36,570	33,722	-0.4	41,990	39,142	-0.3	0.3
	Willow Street to PCH	24,680	24,547	0.0	28,524	28,391	0.0	0.6
	PCH to 7th Street	12,450	12,520	0.0	14,170	14,240	0.0	0.6
South of 7th Street	7,080	7,194	0.1	8,005	8,119	0.1	0.6	

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Paramount Boulevard	North of Artesia Boulevard	19,830	19,601	-0.1	22,919	22,690	0.0	0.6
	Artesia Boulevard to South Street	18,950	18,960	0.0	21,771	21,781	0.0	0.6
	South Street to Del Amo Boulevard	19,070	19,300	0.1	22,025	22,255	0.0	0.7
	Del Amo Boulevard to Carson Street	19,520	19,540	0.0	22,410	22,430	0.0	0.6
Redondo Avenue	Spring Street to Willow Street	18,390	27,536	1.8	20,754	29,900	1.6	2.1
	Willow Street to PCH	24,120	24,916	0.1	27,393	28,189	0.1	0.7
	PCH to Anaheim Street	22,860	22,510	-0.1	25,941	25,591	-0.1	0.5
	Anaheim Street to 7th Street	22,900	22,731	0.0	26,467	26,298	0.0	0.6
	7th Street to 3rd Street	20,390	20,390	0.0	23,566	23,566	0.0	0.6
	3rd Street to Ocean Boulevard	13,120	12,228	-0.3	15,117	14,225	-0.3	0.4
Lakewood Boulevard	North of Del Amo Boulevard	27,340	27,370	0.0	31,304	31,334	0.0	0.6
	Del Amo Boulevard to Carson Street	27,480	26,942	-0.1	31,760	31,222	-0.1	0.6
	Carson Street to Spring Street	46,730	51,330	0.4	52,590	57,190	0.4	0.9
	Spring Street to Willow Street	37,450	38,570	0.1	43,167	44,287	0.1	0.7
Ximeno Avenue	PCH to 7th Street	19,650	19,700	0.0	22,599	22,649	0.0	0.6
	7th Street to 4th Street	9,160	9,255	0.0	10,256	10,351	0.0	0.5
	South of 4th Street	6,090	6,090	0.0	7,039	7,039	0.0	0.6
Park Avenue	7th Street to 4th Street	10,970	10,970	0.0	12,679	12,679	0.0	0.6
	South of 4th Street	5,750	5,750	0.0	6,646	6,646	0.0	0.6
Pacific Coast Highway	Ximeno Avenue to Anaheim Street	21,870	21,995	0.0	24,191	24,316	0.0	0.5
	Anaheim Street to 7th Street	29,970	30,049	0.0	32,799	32,878	0.0	0.4
	7th Street to Bellflower Boulevard	22,220	22,380	0.0	25,754	25,914	0.0	0.7
	Bellflower Boulevard to 2nd Street	33,390	33,320	0.0	38,084	38,014	0.0	0.6
Los Coyotes Diagonal	Studebaker Road to Spring Street	19,650	19,650	0.0	22,711	22,711	0.0	0.6
	Spring Street to Bellflower Boulevard	24,630	22,237	-0.4	28,466	26,073	-0.4	0.2
	South of Bellflower Boulevard	27,480	26,135	-0.2	31,278	29,933	-0.2	0.4
Bellflower Boulevard	North of Del Amo Boulevard	18,400	18,400	0.0	21,266	21,266	0.0	0.6
	Del Amo Boulevard to Carson Street	21,270	20,552	-0.1	24,955	24,237	-0.1	0.6
	Carson Street to Spring Street	22,650	21,032	-0.3	26,178	24,560	-0.3	0.4
	Spring Street to Los Coyotes Diagonal	31,010	29,964	-0.1	33,983	32,937	-0.1	0.3
	Los Coyotes Diagonal to Atherton Street	36,160	35,029	-0.1	39,453	38,322	-0.1	0.3
	Atherton Street to PCH	26,570	26,570	0.0	30,709	30,709	0.0	0.6

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Studebaker Road	Carson Street to Spring Street	17,680	17,680	0.0	20,434	20,434	0.0	0.6
	Spring Street to Willow Street	22,510	22,291	0.0	26,016	25,797	0.0	0.6
	Willow Street to 2nd Street	32,340	30,990	-0.2	38,727	37,377	-0.2	0.6
Norwalk Boulevard	North of Carson Street	16,480	16,480	0.0	19,047	19,047	0.0	0.6
	Carson Street to Cerritos Street	20,910	20,930	0.0	24,086	24,106	0.0	0.6
	Cerritos Street to Katella Avenue	27,160	27,440	0.0	31,434	31,714	0.0	0.7
	Katella Avenue to Westminster Road	35,900	35,900	0.0	41,492	41,492	0.0	0.6
Campus Drive	North of 7th Street	6,740	6,740	0.0	7,478	7,478	0.0	0.5
Alondra Boulevard	West of Long Beach Boulevard	17,310	17,260	0.0	19,426	19,376	0.0	0.5
	Long Beach Boulevard to Atlantic Avenue	23,520	23,430	0.0	26,418	26,328	0.0	0.5
	East of Atlantic Avenue	26,110	26,130	0.0	28,830	28,850	0.0	0.4
Artesia Boulevard	West of Long Beach Boulevard	21,480	20,953	-0.1	24,539	24,012	-0.1	0.5
	Long Beach Boulevard to Atlantic Avenue	22,160	22,140	0.0	25,462	25,442	0.0	0.6
	Atlantic Avenue to Cherry Avenue	21,020	20,840	0.0	24,484	24,304	0.0	0.6
	Cherry Avenue to Paramount Boulevard	20,390	20,240	0.0	22,901	22,751	0.0	0.5
South Street	Atlantic Avenue to Paramount Boulevard	21,160	21,160	0.0	24,456	24,456	0.0	0.6
	East of Paramount Boulevard	21,810	22,120	0.1	25,240	25,550	0.1	0.7
Market Street	Long Beach Boulevard to Cherry Avenue	13,520	13,460	0.0	15,787	15,727	0.0	0.7
	East of Cherry Avenue	16,200	16,030	0.0	19,102	18,932	0.0	0.7
Del Amo Boulevard	West of Long Beach Boulevard	26,440	26,253	0.0	30,410	30,223	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	29,460	29,634	0.0	33,667	33,841	0.0	0.6
	Atlantic Avenue to Cherry Avenue	26,810	26,810	0.0	30,986	30,986	0.0	0.6
	Cherry Avenue to Paramount Boulevard	26,860	26,430	-0.1	31,044	30,614	-0.1	0.6
	Paramount Boulevard to Bellflower Boulevard	28,720	28,780	0.0	32,770	32,830	0.0	0.6
	East of Bellflower Boulevard	30,840	30,840	0.0	35,644	35,644	0.0	0.6
Carson Street	West of Cherry Avenue	21,190	21,256	0.0	24,241	24,307	0.0	0.6
	Cherry Avenue to Paramount Boulevard	29,660	29,660	0.0	34,280	34,280	0.0	0.6
	Paramount Boulevard to Lakewood Boulevard	30,930	30,900	0.0	35,761	35,731	0.0	0.6
	Lakewood Boulevard to Bellflower Boulevard	28,160	28,160	0.0	32,546	32,546	0.0	0.6

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Carson Street	Bellflower Boulevard to Los Coyotes Diagonal	30,060	29,549	-0.1	34,855	34,344	-0.1	0.6
	Los Coyotes Diagonal to I-605	40,090	32,162	-1.0	54,262	46,334	-0.7	0.6
	I-605 to Norwalk Boulevard	47,280	46,556	-0.1	54,644	53,920	-0.1	0.6
223rd Street	West of Wilmington Avenue	21,360	20,715	-0.1	24,687	24,042	-0.1	0.5
	Wilmington Avenue to Santa Fe Avenue	21,940	21,720	0.0	24,903	24,683	0.0	0.5
Wardlow Road	Santa Fe Avenue to Long Beach Boulevard	25,460	25,068	-0.1	29,426	29,034	-0.1	0.6
	Long Beach Boulevard to Orange Avenue	19,900	20,082	0.0	22,606	22,788	0.0	0.6
	Orange Avenue to Cherry Avenue	12,330	11,859	-0.2	14,251	13,780	-0.1	0.5
	Lakewood Boulevard to Palo Verde Avenue	18,450	18,450	0.0	21,324	21,324	0.0	0.6
	East of Palo Verde Avenue	20,980	20,980	0.0	24,248	24,248	0.0	0.6
Spring Street	Long Beach Boulevard to Redondo Avenue	38,020	39,201	0.1	42,436	43,617	0.1	0.6
	Redondo Avenue to Lakewood Boulevard	31,130	36,341	0.7	33,889	39,100	0.6	1.0
	Lakewood Boulevard to Bellflower Boulevard	27,850	27,341	-0.1	31,634	31,125	-0.1	0.5
	Bellflower Boulevard to Los Coyotes Diagonal	24,350	24,095	0.0	28,143	27,888	0.0	0.6
	Los Coyotes Diagonal to Studebaker Road	23,840	23,840	0.0	27,553	27,553	0.0	0.6
	Studebaker Road to Norwalk Boulevard	25,780	25,780	0.0	29,795	29,795	0.0	0.6
Sepulveda Boulevard	Wilmington Avenue to Terminal Island Freeway	20,250	19,850	-0.1	27,016	26,616	-0.1	1.2
Willow Street	Terminal Island Freeway to Santa Fe Avenue	20,530	19,990	-0.1	25,885	25,345	-0.1	0.9
Willow Street	Santa Fe Avenue to Long Beach Boulevard	31,500	32,030	0.1	34,909	35,439	0.1	0.5
	Long Beach Boulevard to Atlantic Avenue	30,170	30,752	0.1	33,191	33,773	0.1	0.5
	Atlantic Avenue to Cherry Avenue	29,350	29,063	0.0	32,962	32,675	0.0	0.5
	Cherry Avenue to Redondo Avenue	32,900	33,456	0.1	37,701	38,257	0.1	0.7
	Redondo Avenue to Lakewood Boulevard	37,530	37,990	0.1	41,753	42,213	0.0	0.5
Pacific Coast Highway	Avalon Boulevard to Santa Fe Avenue	28,730	28,740	0.0	33,055	33,065	0.0	0.6
	Santa Fe Avenue to I-710	30,590	29,341	-0.2	36,043	34,794	-0.2	0.6
	I-710 to Pacific Avenue	29,280	28,171	-0.2	33,736	32,627	-0.1	0.5
	Pacific Avenue to Long Beach Boulevard	26,600	26,700	0.0	29,961	30,061	0.0	0.5
	Long Beach Boulevard to Atlantic Avenue	26,000	26,190	0.0	29,862	30,052	0.0	0.6
	Atlantic Avenue to Orange Avenue	26,840	27,714	0.1	30,089	30,963	0.1	0.6
	Orange Avenue to Cherry Avenue	30,130	30,200	0.0	34,604	34,674	0.0	0.6

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Pacific Coast Highway	Cherry Avenue to Redondo Avenue	30,390	30,390	0.0	35,124	35,124	0.0	0.6
	Redondo Avenue to Ximeno Avenue	32,640	32,290	0.0	37,244	36,894	0.0	0.5
Anaheim Street	Avalon Boulevard to Santa Fe Avenue	20,520	20,650	0.0	23,724	23,854	0.0	0.7
	Santa Fe Avenue to Pacific Avenue	22,110	22,600	0.1	24,445	24,935	0.1	0.5
	Pacific Avenue to Long Beach Boulevard	23,470	23,450	0.0	25,844	25,824	0.0	0.4
	Long Beach Boulevard to Atlantic Avenue	24,180	24,020	0.0	27,258	27,098	0.0	0.5
	Atlantic Avenue to Alamitos Avenue	24,480	24,540	0.0	28,109	28,169	0.0	0.6
	Alamitos Avenue to Redondo Avenue	24,730	24,770	0.0	28,477	28,517	0.0	0.6
	Redondo Avenue to PCH	24,520	24,520	0.0	28,339	28,339	0.0	0.6
7th Street	West of Pacific Avenue	6,950	6,830	-0.1	7,559	7,439	-0.1	0.3
	Pacific Avenue to Long Beach Boulevard	17,050	16,960	0.0	17,470	17,380	0.0	0.1
	Long Beach Boulevard to Atlantic Avenue	17,310	17,473	0.0	17,814	17,977	0.0	0.2
	Atlantic Avenue to Alamitos Avenue	17,060	16,746	-0.1	18,860	18,546	-0.1	0.4
	Alamitos Avenue to Cherry Avenue	24,940	24,836	0.0	28,474	28,370	0.0	0.6
	Cherry Avenue to Redondo Avenue	25,580	25,580	0.0	29,564	29,564	0.0	0.6
	Redondo Avenue to Ximeno Avenue	27,900	27,985	0.0	32,161	32,246	0.0	0.6
	Ximeno Avenue to Park Avenue	30,100	30,087	0.0	34,742	34,729	0.0	0.6
7th Street	Park Avenue to PCH	34,330	34,400	0.0	39,590	39,660	0.0	0.6
	PCH to Bellflower Boulevard	39,530	38,522	-0.1	45,557	44,549	-0.1	0.5
	Bellflower Boulevard to Campus Drive	42,830	42,830	0.0	49,190	49,190	0.0	0.6
6th Street	Campus Drive to Studebaker Road	45,630	45,767	0.0	52,600	52,737	0.0	0.6
	West of Pacific Avenue	16,120	16,120	0.0	19,208	19,208	0.0	0.8
	Pacific Avenue to Long Beach Boulevard	17,510	17,510	0.0	20,237	20,237	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	17,000	17,010	0.0	20,283	20,293	0.0	0.8
	Atlantic Avenue to Alamitos Avenue	16,520	16,520	0.0	19,093	19,093	0.0	0.6
3rd Street	West of Pacific Avenue	5,020	5,020	0.0	5,802	5,802	0.0	0.6
	Pacific Avenue to Long Beach Boulevard	5,300	5,340	0.0	5,991	6,031	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	4,950	4,950	0.0	5,721	5,721	0.0	0.6
	Atlantic Avenue to Alamitos Avenue	4,060	4,015	0.0	4,919	4,874	0.0	0.8
	Alamitos Avenue to Redondo Avenue	5,850	5,735	-0.1	6,876	6,761	-0.1	0.6

**Table 4.5.H: Traffic Noise Levels Assessment for the Proposed Project**

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Broadway	West of Pacific Avenue	9,410	9,400	0.0	10,805	10,795	0.0	0.6
	Pacific Avenue to Long Beach Boulevard	12,730	12,720	0.0	14,813	14,803	0.0	0.7
	Long Beach Boulevard to Atlantic Avenue	12,560	12,560	0.0	14,239	14,239	0.0	0.5
	Atlantic Avenue to Alamitos Avenue	13,040	13,040	0.0	15,071	15,071	0.0	0.6
Ocean Boulevard	West of Magnolia Avenue	30,620	30,520	0.0	34,828	34,728	0.0	0.5
	Magnolia Avenue to Pacific Avenue	58,900	59,240	0.0	60,955	61,295	0.0	0.2
	Pacific Avenue to Long Beach Boulevard	57,010	57,310	0.0	59,213	59,513	0.0	0.2
	Long Beach Boulevard to Atlantic Avenue	29,270	28,744	-0.1	31,916	31,390	-0.1	0.3
	Atlantic Avenue to Alamitos Avenue	27,840	27,880	0.0	29,750	29,790	0.0	0.3
	Alamitos Avenue to Redondo Avenue	29,400	29,363	0.0	31,949	31,912	0.0	0.4
Livingston Drive	Redondo Avenue to 2nd Street	25,260	22,735	-0.5	28,400	25,875	-0.4	0.1
	2nd Street to PCH	38,370	38,520	0.0	44,227	44,377	0.0	0.6
2nd Street	PCH to Studebaker Road	40,090	32,162	-1.0	54,262	46,334	-0.7	0.6
	Studebaker Road to Seal Beach Boulevard	29,770	20,493	-1.6	43,684	34,407	-1.0	0.6

Source: *Noise and Vibration Impact Analysis* (LSA 2019) (Appendix D).

ADT = average daily traffic

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibels

I = Interstate

PCH = Pacific Coast Highway

**Threshold 4.5.3:** For a project located within the vicinity of a private airstrip or 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?

**No Impact.** As previously described, aircraft noise in the City of Long Beach is primarily related to aircraft operations at Long Beach Airport, Los Angeles International Airport, and John Wayne Airport. Long Beach Airport is located centrally within the City, approximately 3 miles northeast of downtown. As stated in Section 16.43.050 of the Municipal Code, it is the goal of the City that Incompatible Property in the vicinity of the Airport shall not be exposed to noise above 65 dBA CNEL. The LUE/UDE includes the following policies and land use strategies to encourage land use compatibility: LU Policy 9-1, LU Policy 16-6, LU Policy 16-8, Policy UD 14-2, Policy UD 14-4, Policy UD 14-5, Policy UD 23-1, Policy UD 24-3, Policy UD 24-5, and Policy UD 26-2 (refer to Subsection 4.5.7.1). Therefore, implementation of the LUE and UDE would locate business parks and airport-related land uses surrounding the airport and would not introduce any new noise-sensitive receptors within the 65 dBA noise contour. Therefore, the proposed project would not result in the exposure of sensitive receptors to excessive noise levels from aircraft noise sources. No mitigation measures are required.

#### 4.5.9 Mitigation Measures

The proposed project could result in a substantial temporary increase in noise and vibration due to construction activities, and mitigation would be required.

**MM NOI-1** Project contractors shall implement the following construction best management practices during construction activities:

- Schedule high-noise and vibration-producing activities to a shorter window of time during the day outside early morning hours to minimize disruption to sensitive uses.
- Grading and construction contractors shall use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment.
- Construction haul trucks and materials delivery traffic shall avoid residential areas whenever feasible.
- The construction contractor shall place noise- and vibration-generating construction equipment and locate construction staging areas away from sensitive uses whenever feasible.
- Locate equipment staging in areas that would create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the active project site during all project construction.
- Prohibit extended idling time of internal combustion engines.

- Ensure that all general construction related activities are restricted to 7:00 a.m. and 7:00 p.m. on weekdays and federal holidays, and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction would be permitted on Sundays. Construction activities occurring outside of these hours may be permitted with authorization by the Building Official and/or permit issued by the Noise Control Officer.
- All residential units located within 500 feet of a construction site shall be sent a notice regarding the construction schedule. A sign legible at a distance of 50 feet shall also be posted at the construction site. All notices and the signs shall indicate the dates and durations of construction activities, as well as provide a telephone number for a “noise disturbance coordinator.”
- A “noise disturbance coordinator” shall be established. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early or bad muffler, etc.) and shall be required to implement reasonable measures to reduce noise levels.
- For all projects determined to have unusual or extremely loud construction activities (e.g., pile driving, nighttime construction work, or unusually long construction duration, etc.) that would generate noise levels over 90 dBA  $L_{eq}$  at nearby sensitive receptors, temporary noise control blanket barriers shall be installed in a manner to shield sensitive receptors land uses.

#### 4.5.10 Cumulative Impacts

As defined in the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects. A cumulative noise or vibration impact would occur if multiple sources of noise and vibration combine to create impacts in close proximity to a sensitive receptor. Therefore, the cumulative area for noise impacts is the City’s General Plan planning area and any sensitive receptors within the planning area.

Cumulative growth within the City could result in temporary or periodic increases in ambient noise levels at development sites throughout the City. However, construction-related noise would be temporary and would no longer occur once construction of individual projects is completed. In addition, construction activities associated with development anticipated under the proposed project would be subject to compliance with the City’s Noise Ordinance to ensure that noise impacts from construction sources are reduced. In addition, with implementation of Mitigation Measure MM NOI-1, individual projects would be required to implement construction best management practices to reduce potential construction-period noise impacts for nearby sensitive receptors. Although Mitigation Measure MM NOI-1 would reduce construction noise associated with future projects, since the location, the proximity to sensitive receptors, and the types of construction equipment associated with new construction projects are all unknown at this time, in an abundance of caution, cumulative construction noise impacts would be considered to have a significant and unavoidable cumulatively contribution to the total noise environment in the City.

The proposed project would not create a cumulatively considerable contribution to regional noise conditions. For traffic noise to increase by 3 dBA, traffic volumes would have to double. Implementation of the proposed project would not result in a doubling of average daily trips, and therefore, implementation of the proposed project would not result in a 3 dBA increase in traffic noise level in the City and would not generate a significant impact under long-term cumulative noise conditions.

Additionally, as shown in the traffic noise impact discussion above, implementation of the LUE/UDE policies and land use strategies would require the City to consider noise and land use compatibility issues when evaluating individual development proposals. As described above, implementation of the proposed project would not result in a substantial cumulative increase in long-term noise.

#### **4.5.11 Level of Significance after Mitigation**

Potential impacts related to construction noise associated with future development projects that would be implemented as part of the LUE/UDE would be reduced with implementation of Mitigation Measure MM NOI-1. Although Mitigation Measure MM NOI-1 would reduce construction noise associated with future projects, since the location, the proximity to sensitive receptors, and the types of construction equipment associated with new construction projects are all unknown at this time, this impact is considered significant and unavoidable in an abundance of caution (Threshold 4.5.1).

Potential impacts related to the construction vibration associated with future development projects that would be implemented as part of the LUE/UDE would be reduced with implementation of Mitigation Measure MM NOI-1. Therefore, the proposed project would not generate excessive ground-borne vibration or ground-borne noise levels (Threshold 4.5.2).