3.11 Noise and Vibration

This section describes and evaluates potential noise and vibration impacts that could result from implementation of the Proposed Project. The section contains: (1) a description of the existing noise and vibration environment at, and in the area surrounding, the Project Site; (2) a description of changes under the Adjusted Baseline Environmental Setting to establish baseline conditions; (3) a summary of applicable noise laws, regulations, and policies; (4) estimates of future noise and vibration levels at surrounding noise- and vibration-sensitive land uses resulting from construction and operation of the Proposed Project; and (5) identification of the potential for significant impacts and associated mitigation measures, if required.

Comments received in response to the NOP for the EIR regarding noise and vibration can be found in Appendix B. Any applicable issues and concerns regarding potential impacts related to noise and vibration as a result of implementation of the Proposed Project are analyzed within this section.

The analysis included in this section was developed based on ambient noise measurements taken by ESA on Thursday, May 10, 2018 through Monday, May 14, 2018; Project-specific construction data and assumptions (including construction schedule, phasing, and equipment provided by AECOM Hunt); characteristics of the Proposed Project described in Chapter 2, Project Description, and the transportation analysis presented in Section 3.14, Transportation and Circulation, and Appendix .

3.11.1 Environmental Setting

Background

Noise can be generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). Frequency A-weighting

follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 3.11-1**.

Noise Exposure, Noise Level, and Community Noise

Noise *exposure* is a measure of noise over a period of time. Noise *level* is a measure of noise at a given instant in time. *Community noise* varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise continuously variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual receptor. These successive additions of sound to the community noise environment vary the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts.

This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

Leq: The energy-equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

Lmax: The instantaneous maximum noise level for a specified period of time.

DNL: Also abbreviated Ldn, it is a 24-hour day and night A-weighted noise exposure level which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

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

As a general rule, in areas where the noise environment is dominated by traffic, the Leq during the peak-hour is generally within two decibels of the Ldn at that location.[1]

[1] Federal Highway Administration Office of Environmental Policy, 2016. *Advanced Prediction and Abatement of Highway Traffic Noise*. November 2016. p. 4-20.

Noise Attenuation

Noise attenuates (lessens) with distance between the source and the receiver. Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate at a rate of 6 dBA with a doubling of distance for hard sites and 7.5 dBA for each doubling of distance for soft sites. Hard sites are those with a reflective surface between the source and the receiver such as paved parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate of 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance.[2]

Noise levels may also be reduced by intervening structures, such as a row of buildings, a solid wall, or a berm located between the receptor and the noise source. According to the US Department of Housing and Urban Development (HUD) *Noise Guidebook,*[3] standard building construction results in an exterior-to-interior noise reduction of 20 dBA with windows closed.

Effects of Noise on People

When a new noise is introduced to an environment, human reaction can be predicted by comparing the new noise to the *ambient* noise level, which is the existing noise level comprised of all sources of noise in a given location. In general, the more a new noise exceeds the ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:[4]

- except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- a change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- a 10-dBA change is subjectively heard as approximately doubling in loudness, and can cause adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

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2 California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 5-17.
3 US Department of Housing and Urban Development, 2009. *Noise Guidebook*. March 2009. p. 14.
4 California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5

Health Effects of Noise

Exposure to high levels of noise can cause permanent hearing impairment. The federal Occupational Safety and Health Administration (OSHA) has an established occupational noise exposure program which includes hearing conservation standards for long-term noise exposure. Employers are required to measure noise levels; provide free annual hearing exams, hearing protection, and training; and conduct evaluations of the adequacy of the hearing protectors in use where noise environments exceed 85 dBA for an eight hour daily exposure.

Following the United States Environmental Protection Agency's elimination of its noise investigation and control program in the 1970s, the World Health Organization (WHO) has become a noted source of current knowledge regarding the health effects of noise impacts. In addition to hearing impairment, WHO documents that sleep disturbance is an effect that can affect human health. Excessive noise during sleep periods can result in difficulty falling asleep, awakenings, and alterations in sleep stages and depth (e.g., a reduction in proportion of REM-sleep (REM = rapid eye movement)). Exposure to high levels of noise during sleep can also result in increased blood pressure, increased heart rate, increased finger pulse amplitude, vasoconstriction, changes in respiration, cardiac arythmia, and an increase in body movements. Secondary physiological effects of exposure to excessive noise during sleep can occur the following day, including reduced perception of quality sleep, increased fatigue, depressed mood or well-being, and decreased performance of cognitive tasks.[5] According to WHO, sleep disturbance can occur when interior noise levels exceed 45 dBA Lmax more than 10-15 times per night, particularly if background noise is low. WHO also notes that maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability of people to initially fall asleep.[6]

Other potential health effects of exposure to excessive noise identified by WHO include decreased performance for complex cognitive tasks, such as reading, attention span, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, although shorter-term exposure to very high noise levels, for example, exposure several times a year to concert noise at 100 dBA, can also damage hearing). Finally, while environmental noise is not believed to be a direct cause of mental illness, it can cause annoyance and is known to intensify such symptoms as anxiety, headaches, emotional stress, changes in moods, and the like.[7] WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA.[8]

Vehicle traffic, aircraft noise, and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as truck backup beepers, the crashing of material being loaded or unloaded, contribute very little to 24-hour noise levels but are capable of

5 World Health Organization, *Guidelines for Community Noise, Chapter 3. Adverse Health Effects of Noise*, 1999. p. 26.
6 World Health Organization, *Guidelines for Community Noise, Chapter 3. Adverse Health Effects of Noise*, 1999. p. 28.
7 World Health Organization, *Guidelines for Community Noise, Chapter 3. Adverse Health Effects of Noise*, 1999. p. 30.
8 World Health Organization, *Guidelines for Community Noise, Chapter 3. Adverse Health Effects of Noise*, 1999. p. 38.

causing sleep disturbance and annoyance. The importance of noise to receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels, if they occur at night, can cause sleep disturbance.

Fundamentals of Vibration

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to express RMS. The decibel notation acts to compress the range of numbers required to describe vibration.

Effects of Vibration on Structures

As described in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual,*[9] ground-borne vibration can be a serious concern, causing nearby buildings to shake and rumbling sounds to be heard. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, sheet pile-driving and operating heavy earth-moving equipment. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks on roadways to be perceptible, even in locations close to major roads.[10]

The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and sheet pile-driving during construction.

Effects of Vibration on People

Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance can be well below the damage threshold for normal buildings. As discussed in FTA's *Transit Noise and Vibration Impact Assessment Manual*, the human response to vibration is complex and the degree of annoyance cannot always be explained by the magnitude of the vibration alone.[11] Other factors include the rattling and rumbling sounds caused by vibration, the time of day, and the visual effects such as the moving of hanging objects.

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9 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 112.

10 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 112.

11 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 118.

Vibration Attenuation

Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Factors such as soil and subsurface conditions influence the levels of ground-borne vibration with some of the most important factors being the stiffness and internal damping of the soil and the depth to bedrock.[12] Vibration levels are higher in stiff-clay-type soil and when bedrock is 30 feet or less.[13]

Health Effects of Vibration

According to OSHA, those at risk for vibration-related health effects are workers who conduct physical work activities requiring the use of vibrating powered hand tools (e.g., chain saw, electric drill, chipping hammer, etc.) or equipment (e.g., wood planer, punch press, packaging machine, etc.) and standing or sitting in vibrating environments (e.g., driving a truck over bumpy roads, etc.) or using vibrating equipment that requires whole-body movement (e.g., jackhammers).[14] Off-site vibration-sensitive receptors would not come in physical contact with vibratory construction equipment and would not be at risk for vibration-related health effects.

Groundborne Noise

Groundborne noise specifically refers to the rumbling noise emanating from the motion of building room surfaces due to the vibration of floors and walls; it is perceptible only inside buildings.[15] The relationship between groundborne vibration and groundborne noise depends on the frequency content of the vibration and the acoustical absorption characteristics of the receiving room. For typical buildings, groundborne vibration that causes low frequency noise (i.e., the vibration spectrum peak is less than 30 Hz) results in a groundborne noise level that is approximately 50 decibels lower than the velocity level. For groundborne vibration that causes mid-frequency noise (i.e., the vibration spectrum peak is between 30 and 60 Hz), the groundborne noise level will be approximately 35 decibels lower than the velocity level. For groundborne vibration that causes high-frequency noise (i.e., the vibration spectrum peak is greater than 60 Hz), the groundborne noise level will be approximately 20 decibels lower than the velocity level.[16] Therefore, for typical buildings, the groundborne noise decibel level is lower than the groundborne vibration velocity level at low frequencies.

Surrounding Land Uses

The entire Project Site is comprised of approximately 28 acres and encompasses four specific locations: the Arena Site; the West Parking Garage Site; the East Transportation and Hotel Site;

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12 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 116.

13 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 117.

14 Occupational Safety and Health Administration. Ergonomics Program Section 1910.918. Publication Date November 23, 1999. Available at: [HYPERLINK "https://www.osha.gov/laws-regs/federalregister/1999-11-23"] [Accessed March 2019].

15 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 112.

16 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 146.

and the Well Relocation Site. The Project Site is surrounded by a mix of commercial, industrial, office, retail, and residential uses (see Section 3.10, Land Use and Planning, for detailed descriptions of land uses surrounding each Project Site and Figures 3.10-1, Existing and Surrounding Land Uses: Arena Site, Well Relocation Site, and West Parking Garage Site and 3.10-2, Existing and Surrounding Land Uses: East Transportation and Hotel Site).

Arena Site

Adjacent to the Arena Site to the north along West Century Boulevard is a non-operational structure (formerly the Airport Park View Motel) and a self-storage facility. To the east along South Doty Avenue is a warehousing and shipping company (S.E.S. International Express) and an industrial use (CDs Cabinets). To the north across West Century Boulevard is the area planned for the Hollywood Park Specific Plan (HPSP). Residential uses are located adjacent to the Arena Site to the west automotive body shops, commercial uses, and a religious facility (Being in Power Ministries) are located on the west side of South Prairie Avenue. Adjacent to the Arena Site to the south is a religious facility and residential uses.

West Parking Garage Site

To the north of the West Parking Garage Site across West Century Boulevard are commercial uses, the Holly Crest Hotel, and Motel 6. Commercial uses are located immediately to the east, a religious facility and single family residential uses are located to the south, and a motel, religious facility, and single family residential uses are located to the west.

East Transportation and Hotel Site

The Hollywood Park Casino is located to the north of the East Transportation and Hotel Site, north of and across West Century Boulevard. Adjacent to the East Transportation and Hotel Site to the east is a United Parcel Service (UPS) facility. Adjacent to the East Transportation and Hotel Site to the west is Transworld Aquatic Enterprises, Inc., which is a vendor for aquarium supplies. To the south of the East Transportation and Hotel Site are multi-family residential uses and commercial uses.

Well Relocation Site

To the north of the Well Relocation Site is an occupied warehousing and shipping company (UPS). To the east of the Well Relocation Site are single family residential uses. A vacant lot and multi-family residential uses are located to the south. To the west of the Well Relocation Site is an occupied commercial use.

Noise-Sensitive Receptors

Some land uses are considered more sensitive to noise than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Land uses considered to be noise-sensitive, as identified in the Inglewood General Plan, include residences, schools, hospitals, libraries, and parks. The Inglewood General Plan Noise Element considers residences to be especially sensitive because of the time spent by

individuals at home, occurrence of outdoor activities, and the likelihood of sleep disturbance to occur.[17] The Federal Highway Administration (FHWA) considers uses where people normally sleep, such as hotels and motels, noise-sensitive land uses.[18] See **Figure 3.11-2**, Noise-Sensitive Receptors, for the location of the sensitive receptors that have been evaluated herein. As presented on Figure 3.11-2, the nearest noise-sensitive receptors to the Project Site the following:

- R1 – The single family residential uses to the northwest, located approximately 310 feet from the Arena Site.
- R2 – The single family residential uses to the west, on the north side of West 101st Street, approximately 60 feet of the West Parking Garage Site.
- R3 – The Airport Motel (4054 West Century Boulevard) to the west (adjacent to the West Parking Garage Site).
- R5 – The single family residential uses to the west, between West 101st Street and West 102nd Street (adjacent to the West Parking Garage site).
- R6 – The single family residential uses to the west, located approximately 175 feet from the Arena Site and approximately 50 feet south of the West Parking Garage Site.
- R7 – The single-story religious facility, Being in Power Ministries, along the west side of South Prairie Avenue, approximately 90 feet from the Arena Site and approximately 50 feet south of the West Parking Garage Site.
- R8 - The Airport Park View Motel is non-operational and the structure is currently dilapidated and would require substantial renovation to be reused. In the event that the site is reused, these non-operational use has been considered a sensitive vibration receptor.
- R9 – The self-storage facility adjacent to the Arena Site to the north.
- R11 – The multiple family residential use along the east side of South Prairie avenue between West 102nd Street and West 103rd Street to the west (adjacent to the Arena Site).
- R12 – The single family residential use located along the east side of South Prairie Avenue between West 102nd Street and West 103rd Street to the west (adjacent to the Arena Site).

[17] City of Inglewood General Plan Noise Element. Adopted September 1, 1987.
[18] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 23.

- R14 – The single family and multi-family residential uses to the east adjacent to the Well Relocation Site.

- R15 – The Southside Christian Church along West 104th Street to the south (adjacent to the Arena Site).

- R16 – The multi-family residential use along West 104th Street to the south (adjacent to the Arena Site).

- R17 – The single family residential uses to the southeast, located approximately 90 feet from the Arena Site and approximately 60 feet south of the Well Relocation Site.

- R20 – The multi-family residential uses located approximately 50 feet to the south of the East Transportation and Hotel Site on the south side of West 102nd Street.

Vibration-Sensitive Receptors

Vibration-sensitive receptors include structures (especially older masonry structures), people who spend a lot of time indoors (especially residents, students, the elderly and sick), and vibration-sensitive equipment (such as hospital analytical equipment and equipment used in computer chip manufacturing). Additional sensitive receptors of ground-borne vibration would be historic buildings, which are more susceptible to structural damage from vibration. See **Figure 3.11-3**, Vibration-Sensitive Receptors, for the location of vibration-sensitive receptors (identified as V1 through V18) that have been evaluated herein. As presented on **Figure 3.11-3**, the nearest vibration-sensitive receptors to the Project Site include the following:

- R3 – The Airport Motel (4054 West Century Boulevard) to the west (adjacent to the West Parking Garage Site).

- R4 – The commercial uses adjacent to the West Parking Garage Site to the east.

- R5 – The single family residential uses to the west, between West 101st Street and West 102nd Street (adjacent to the West Parking Garage site).

- R6 – The single family residential uses to the west, located approximately 175 feet from the Arena Site and approximately 50 feet south of the West Parking Garage Site.

- R7 – The single-story religious facility, Being in Power Ministries, along the west side of South Prairie Avenue, approximately 90 feet from the Arena Site and approximately 50 feet south of the West Parking Garage Site.

- R8 - The Airport Park View Motel is non-operational and the structure is currently dilapidated and would require substantial renovation to be reused. In the event that the site is reused, these non-operational use has been considered a sensitive vibration receptor.

- R9 – The self-storage facility adjacent to the Arena Site to the north.
- R10 – The warehousing and shipping structure (S.E.S. International Express) adjacent to the east along South Doty Avenue.
- R11 – The multiple family residential use along the east side of South Prairie avenue between West 102nd Street and West 103rd Street to the west (adjacent to the Arena Site).
- R12 – The single family residential use located along the east side of South Prairie Avenue between West 102nd Street and West 103rd Street to the west (adjacent to the Arena Site).
- R13 – The industrial structure (CDs Cabinets) adjacent to the Arena Site to the east and adjacent to the Well Relocation Site to the west.
- R14 – The single family and multi-family residential uses to the east adjacent to the Well Relocation Site.
- R15 – The Southside Christian Church along West 104th Street to the south (adjacent to the Arena Site).
- R16 – The multi-family residential use along West 104th Street to the south (adjacent to the Arena Site).
- R17 – The single family residential uses to the southeast, located approximately 90 feet from the Arena Site and approximately 60 feet south of the Well Relocation Site.
- R18 – Transworld Aquatic Enterprises, Inc. adjacent to the East Transportation and Hotel Site to the west.
- R19 – The UPS facility adjacent to the East Transportation and Hotel Site to the east.
- R20 – The multi-family residential uses located approximately 50 feet to the south of the East Transportation and Hotel Site on the south side of West 102nd Street.

Existing Noise Setting

The Project Site is comprised of approximately 28 acres of land. More than 85 percent of the Project Site, or approximately 25 acres, is vacant, undeveloped, or streets. The remaining developed parcels include a fast-food restaurant, a hotel, a warehouse and light manufacturing facility, and a groundwater well and related facilities. Operation of these businesses contribute to the overall urban noise environment. As all of these uses will be demolished (other than the groundwater well, which will be replaced elsewhere on the Project Site), the noise sources from the existing businesses will no longer exist when the construction of the Proposed Project commences.

The immediate area surrounding the Project Site is highly urbanized with multiple noise sources including, but not limited to, traffic on local and arterial streets, aircraft arrivals to and departures from the Los Angeles International Airport (LAX), and commercial and industrial activity (e.g., truck loading/unloading).

To quantify the existing noise environment, 6 short-term (ST) 15-minute and 5 long-term (LT) 96-hour noise level measurements were taken near noise-sensitive uses, described above, around the Project Site. The LT measurements were taken Thursday, May 10, 2018 through Monday, May 14, 2018 to capture ambient noise levels of typical weekdays and weekends. Noise measurement locations are shown in **Figure 3.11-4**. Results of the noise measurements are presented in **Table 3.11-1**.

TABLE 3.11-1
AMBIENT NOISE MEASUREMENTS

Receptor	Monitoring Period	dBA CNEL	Daytime Average dBA L_{eq}	Nighttime Average [a] dBA L_{eq}
Long-Term Noise Measurements				
M1	9:00 a.m., Thursday, May 10 to 8:59 a.m., Friday, May 11	70.8	66.0	63.7
	9:00 a.m., Friday, May 11 to 8:59 a.m., Saturday, May 12	68.9	64.9	61.2
	9:00 a.m., Saturday, May 12 to 8:59 a.m., Sunday, May 13	68.9	65.6	60.7
	9:00 a.m., Sunday, May 13 to 8:59 a.m., Monday, May 14	70.0	65.6	62.5
M2	10:00 a.m., Thursday, May 10 to 9:59 a.m., Friday, May 11	68.8	64.0	61.5
	10:00 a.m., Friday, May 11 to 9:59 a.m., Saturday, May 12	66.5	63.8	57.9
	10:00 a.m., Saturday, May 12 to 9:59 a.m., Sunday, May 13	65.7	63.7	56.1
	10:00 a.m., Sunday, May 13 to 9:59 a.m., Monday, May 14	67.0	64.2	58.4
M3	11:00 a.m., Thursday, May 10 to 10:59 a.m., Friday, May 11	69.7	64.8	62.5
	11:00 a.m., Friday, May 11 to 10:59 a.m., Saturday, May 12	67.9	64.5	59.9
	11:00 a.m., Saturday, May 12 to 10:59 a.m., Sunday, May 13	67.4	64.0	59.2
	11:00 a.m., Sunday, May 13 to 10:59 a.m., Monday, May 14	68.1	64.6	59.9
M4	11:00 a.m., Thursday, May 10 to 10:59 a.m., Friday, May 11	68.6	63.7	61.3
	11:00 a.m., Friday, May 11 to 10:59 a.m., Saturday, May 12	66.8	63.5	58.5
	11:00 a.m., Saturday, May 12 to 10:59 a.m., Sunday, May 13	65.9	63.6	56.8
	11:00 a.m., Sunday, May 13 to 10:59 a.m., Monday, May 14	68.0	63.8	60.3
M5	12:00 p.m., Thursday, May 10 to 11:59 a.m., Friday, May 11	69.5	63.9	62.5
	12:00 p.m., Friday, May 11 to 11:59 a.m., Saturday, May 12	67.4	64.0	59.3

	12:00 p.m., Saturday, May 12 to 11:59 a.m., Sunday, May 13	67.1	63.6	58.9
	12:00 p.m., Sunday, May 13 to 11:59 a.m., Monday, May 14	67.3	63.6	59.3
Short-Term Noise Measurements				
M6	8:52 a.m., Thursday, May 10	-	71.8	-
M7	7:53 a.m., Thursday, May 10	-	69.1	-
M8	8:12 a.m., Thursday, May 10	-	69.6	-
M9	8:29 a.m., Thursday, May 10	-	68.7	-
M10	11:57 a.m., Thursday, May 10	-	73.5	-
M11	11:35 a.m., Thursday, May 10	-	65.8	-

NOTE:
[a] Daytime hours are from 7:00 a.m. to 10:00 p.m., and nighttime hours are from 10:00 p.m. to 7:00 a.m.

SOURCE: ESA, 2018.

Existing Traffic-Only Noise

Ambient noise levels measured by ESA and summarized above captures noise from traffic on local and arterial streets, aircraft arrivals to and departures from LAX, and commercial and industrial activity. As recognized by the City of Inglewood General Plan Noise Element, traffic noise is considered to be the most common source of noise in urban areas.[19] As a result, noise levels associated with traffic along individual roadway segments at 50 feet from the roadway centerline have been calculated to establish the existing traffic noise environment along studied roadway segments.

Existing roadway noise levels were calculated for XX segments located in the area surrounding the Project Site. The roadway segments selected for analysis are considered to be those that are expected to be most directly affected by Project-related traffic, most notably the roadways located near and immediately adjacent to the Project Site. These roadways would experience the greatest percentage increase in traffic and therefore mobile source noise generated by the Proposed Project.

Traffic volume count data collected by Fehr and Peers and presented in the Traffic Impact Analysis (TIA) for existing conditions consists of traffic volumes that exist as of the collection of data. This data accounts for existing traffic volumes and trips generated by development that was currently in operation.

Calculation of roadway noise levels under existing conditions was accomplished using the methodology described below in Section 3.11.4, and relies on peak hour traffic volume data provided by the TIA. Existing peak hour traffic noise under the Weekday a.m. Peak Hour (7:00 – 9:00 a.m.), Weekday PM Peak Hour (4:00 – 6:00 p.m.), Weekday Pre-Event Peak Hour (6:00 –

[19] City of Inglewood General Plan Noise Element. Adopted September 1, 1987.

7:00 p.m.), Weekday Post-Event Peak Hour (9:30 – 10:30 p.m.), and Weekend Peak Hour (5:00 – 6:00 p.m.) time periods is shown in Table 3.11-X.

[Will insert "Existing" traffic noise levels upon completion of calculations]

Airport Noise

The Project Site is located approximately 1.5 miles east of LAX and approximately 1.5 miles to the north of the Jack Northrop Field/Hawthorne Municipal Airport (HHR). The Project Site is partially within the Planning Boundary/Airport Influence Area for LAX as designated within the airport land use plan (ALUP) (see further description of the relationship of the Project Site to the ALUP in Section 3.10, Land Use and Planning).

As depicted in Figure 2-6, of Chapter 2, Project Description, the majority of the Project Site is within the 65 dBA CNEL noise contour with a small amount of the southernmost portion of the Project Site within the 70 dBA CNEL noise contour. The 24-hour noise measurements taken for this analysis adequately captured airplane flyover noise.

The Project Site is not located within the designated Airport Influence Area for the Hawthorne Municipal Airport and therefore aircraft noise from this airport does not contribute significantly to the noise environment.

Existing Ground-borne Vibration Setting

The ground-borne vibration level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans, which is around 65 VdB.[20] Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible. Although not sources of ground-borne vibration, noise-induced building responses such as rattling of windows and walls from aircraft flyovers contribute to the existing vibration setting. The primary sources of existing ground-borne vibration in the area surrounding the Project Site would be from adjacent industrial activities, including truck travel, heavy-duty vehicular travel (bus, refuse trucks, delivery trucks, etc.) on local roadways, and aircraft flyovers. A bus traveling at a distance of 50 feet typically generates ground-borne vibration velocity levels of 63 VdB (approximately 0.006 in/sec PPV).[21] Aircraft flyovers would generate vibration levels that would cause human annoyance; however, they would not generate building vibration levels that would cause building damage.[22]

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[20] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 113.

[21] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 113.

[22] National Aeronautics and Space Administration, 1992. *Building Vibrations Induced by Noise from Rotorcraft and Propeller Aircraft Flyovers*. June 1992. [HYPERLINK "https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19920023916.pdf"]. Accessed March 2019.

Existing Groundborne Noise Setting

As stated earlier, ground-borne noise levels would generally be 20 to 50 decibels lower than the velocity level depending on the frequency level of the source.[23] With a background groundborne vibration level in residential areas of 50 VdB or lower, ground-borne noise levels would be approximately 0 to 30 dBA. A bus traveling at a distance of 50 feet would generate groundborne noise levels of approximately 23 to 38 dBA. The approximate level of human perception of groundborne noise is 25 dBA for low frequency vibration (near 30 Hz) and 40 dBA for mid-frequency vibration (near 60 Hz).[24]

3.11.2 Adjusted Baseline Environmental Setting

As described in Chapter 3, Environmental Impacts, Settings, and Mitigation Measures, the analysis in this section assumes the Adjusted Baseline Environmental Setting. Related to Noise, the changes associated with the HPSP Adjusted Baseline project include the operation of an NFL Stadium, residential, commercial, and retail uses.

The NFL Stadium is located at the southeastern corner of Pincay Drive and South Prairie Avenue and designed to provide expandable capacity to accommodate various sporting events, concerts, and activities in addition to NFL games. Although the transparent glass canopy/roof is designed to provide an open-air experience while keeping crowd noise contained, the Stadium is not fully enclosed and any leakage of event noise from the Stadium, including pre- and post-event activities would contribute to the ambient noise environment, as would traffic on local and arterial streets heading to and from events.

The City of Champions Initiative imposed several mitigation measures to limit operational noise from the HPSP Adjusted Baseline project and protect the existing neighborhoods, although it acknowledged that some event noise would be audible outside the boundaries of the property during a limited number of major special events occurring on the property. The key measures to address operational noise that are part of the Adjusted Baseline Environmental Setting include:

> **G-7** The operation of the stadium shall comply with the provisions of Article 2 (Noise Regulations) of Chapter 5 of the Inglewood Municipal Code.
>
> **G-8** The use of vibratory rollers within 150 feet, or impact pile driving within 320 feet, of the Forum property line shall be limited to time periods that do not coincide with events occurring at the Forum.
>
> **G-9** Prior to the issuance of building permits, the Project applicant shall utilize an acoustical engineer to demonstrate to the City of Inglewood that the 45dBA interior noise

[23] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 146.
[24] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 120.

standard has been achieved at residential dwelling units within the Project boundaries, as measured on a typical day, and not with respect to special events at the Stadium.

G-10 All rooftop mechanical equipment shall be enclosed or screened from view from public streets with appropriate screening walls.

G-11 Firework Shows shall be limited to a maximum of 15 events per year, and each event shall not exceed 20 minutes in duration. All such events shall comply with FAA regulations. For purposes of this mitigation measure, Firework Shows shall be defined as a single, coordinated pyrotechnic display continuing for an uninterrupted period of time lasting longer than five minutes and involving pyrotechnic devices that reach more than 100 feet above the Stadium playing field. Separate from the foregoing limit on Firework Shows, the isolated use of pyrotechnic devices during Stadium events shall be allowed.

G-12 Loading dock and trash/recycling areas for the Stadium shall be located in the subterranean level, which shall preclude noise from this source at exterior locations.

G-13 The Project's in-house sound system (including the Stadium and music for retail areas, if any) shall utilize a state of the art distributed speakers system capable of aiming the sound toward the seating areas, or other intended areas within the Project, to minimize sound spillage to the exterior of the Project.

G-14 Building mechanical / electrical equipment shall be designed such that it will not cause an increase in sound levels at any Off-Site residence of 3dBA or greater above the Base Ambient Noise Level.

Further, the stadium and performance venue were located and designed to help reduce noise by locating the stadium away from the northern edge of the property (i.e., south of the stadium location proposed in 1995), and by placing the stadium playing surface well below existing grade, which reduces line-of-sight noise impacts on adjacent uses.

The Initiative modified the City's noise ordinance such that during operation of the Stadium, noise from sporting events and for up to 12 other special events occurring at the Stadium each year (unless a higher number is otherwise permitted by the Permits and Licenses Committee) are exempt from the noise limits provided in Article 2 of the Municipal Code. However, noise exceeding code limits from these few major events is not permitted to extend beyond 12:00 a.m. With the exception of sporting events, up to 12 other special events, and any special events otherwise permitted by the Permits and Licenses Committee, the Stadium must comply with the City of Inglewood noise ordinance.

Charles M. Salter Associates, Inc. prepared an acoustical model which estimated that amplified music and announcements for a professional sporting event at the nearest residential property line (i.e., exterior noise) would be approximately 46 dBA on the west, 50 dBA on the east, and 51 dbA on the north. The model estimated that approximate sound levels from the Stadium at the

property line would range from 65-67 dBA on the east and west, and from 64-69 dBA on the north, depending on the configuration of concert within the Stadium. The acoustical analysis estimates that these levels would drop by 5-10 dBA after the first row of houses.[25]

Retail/restaurant uses within the HPSP area will be constructed immediately northeast of the intersection of West Century Boulevard and South Prairie Avenue and include a mix of retail shops, fine dining, specialty grocery store, and outdoor plazas. A walkable promenade will provide outdoor spaces for conversation, dining, and live amplified music, and will contribute to the ambient noise environment. Based on ESA's experience conducting noise measurements for live concerts, it is assumed that live music and amplified sound would result in a noise level of 95 dBA at 100 feet from the source. Conversation within the open spaces and outdoor dining areas would result in noise levels of 72 dBA at 3.3 feet from each person.[26]

Trip generation associated with the buildout and operation of the HPSP area has been estimated and traffic volumes in the area surrounding the Project Site have been projected to establish the Adjusted Baseline traffic environment. Additionally, trip generation associated with events at the NFL Stadium, The Forum, and overlapping events at both venues has been estimated and traffic volumes projected to establish the combined traffic environment during which one or more events are being held. Adjusted Baseline Environmental Setting and event traffic noise, based on turning movement volumes provided in the TIA, under the following conditions have been calculated and included in Table 3.11-3, Table 3.11-4, Table 3.11-5, and Table 3.11-6.

[Will insert traffic noise levels under following traffic conditions upon receipt of data:]

- Baseline No Project No Event at NFL Stadium or The Forum
- Baseline No Project with NFL Game
- Baseline No Project with Concert at The Forum
- Baseline No Project with NFL Game and with Concert at The Forum

3.11.3 Regulatory Setting

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities. Noise issues relevant to the Proposed Project are addressed in Title 24 of the *California Code of*

25 [insert footnote reference to Salter Report]
26 US Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.*

Regulations, City of Inglewood General Plan policies and the City of Inglewood noise ordinance standards.

Federal

In 1972, the Noise Control Act (42 United States Code section 4901 et seq.) was passed by congress to promote limited noise environments in support of public health and welfare. It also established the US Environmental Protection Agency (US EPA) Office of Noise Abatement and Control to coordinate federal noise control activities. US EPA established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects. **Table 3.11-7**, Summary of Noise Levels Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, presents important noise exposure levels highlighted by the guidelines.

TABLE 3.11-7
SUMMARY OF NOISE LEVELS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY

Effect	Level Needed to Avoid Effect	Area
Hearing loss	< 70 dBA[a] (L_{eq}, 24 hour)	All areas.
Outdoor activity interference and annoyance	< 55 dBA (L_{dn})	Outdoor residential areas and farms as well as other outdoor areas where people spend varying amounts of time and places where quiet is a basis for use.
Outdoor activity interference and annoyance	< 55 dBA (L_{eq}, 24 hour)	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	< 45 dBA (L_{dn})	Indoor residential areas.
Indoor activity interference and annoyance	< 45 dBA (L_{eq}, 24 hour)	Other indoor areas with human activities, such as schools, etc.

NOTE:
a Yearly average equivalent sound levels in decibels; the exposure period that results in hearing loss at the identified level is 40 years.

SOURCE: US Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, 1974, http://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF, accessed March 13, 2019.

US EPA found that to prevent hearing loss over the lifetime of exposure, the yearly average Leq should not exceed 70 dBA. To prevent interference and annoyance, the US EPA found that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors.[27] In 1982, noise control was largely passed to state and local governments.

Federal regulations establish noise limits for medium and heavy trucks (more than 4.8 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 50 feet (approximately 15 meters) from the vehicle pathway centerline under specified test procedures. These requirements are implemented

[27] US Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety,* March 1974.

through regulatory controls on truck manufacturers. There are no comparable federal standards for vibration, which tend to be specific to the roadway surface, the vehicle load, and other factors.

Federal Transit Administration and Federal Railroad Administration

The mission of the Federal Railroad Administration (FRA) is to enable the safe, reliable, and efficient movement of people and goods within the Unite States. With respect to railroad noise emissions, the FRA works in concert with the FTA. FTA has published guidance for assessing noise and vibration impacts from rail sources.[28] Additionally, this guidance provides methodologies for assessing the potential noise impacts from construction.

The FTA's Transit Noise and Vibration Impact Assessment is specifically developed for determining significant noise and vibration impacts for transit projects involving rail or bus facilities, although commonly applied to non-rail and non-bus transit projects, and includes noise impact criteria.

State

The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dBA. The State pass-by standard for light trucks and passenger cars (less than 4.8 tons, gross vehicle rating) is also 80 dBA at 50 feet (approximately 15 meters) from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials.

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

Regional

Los Angeles County Airport Land Use Plan

The Project Site is located approximately 1.5 miles east of the LAX and approximately 1.5 miles to the north of the HHR. Pursuant to Division 9, Part 1, Chapter 4, Article 3.5, Sections 21670 – 21679.5 of the California Public Utilities Code, each county in California in which there is an airport served by a scheduled airline and each county with an airport operated for the benefit of the general public, with certain exceptions, is required to establish an airport land use commission (ALUC). Each ALUC must develop a plan for promoting and ensuring compatibility between each airport in the county and surrounding land uses. In Los Angeles County, the Los Angeles

[28] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018.

County Regional Planning Commission also acts as the ALUC. ALUC's purpose is to coordinate planning for the area around public airports to protect the public health, safety and welfare from land uses that do not minimize the public's exposure to excessive noise and safety hazards. This is achieved through review of proposed development surrounding airports and through policy and guidance provided in the Los Angeles County ALUP, which was adopted on December 19, 1991.[29]

In formulating the Los Angeles County ALUP, the ALUC establishes provisions to ensure safe airport operations, through the delineation of Runway Protections Zones (RPZs) and height restriction boundaries, and to reduce excessive noise exposure to sensitive uses through noise insulation or land reuse. The extent of the planning boundary designated for the airports in the Los Angeles County ALUP is determined by CNEL noise contours. CFR Part 150, Airport Noise Compatibility Planning, sets forth the methodology and procedures to be followed when preparing aircraft noise exposure maps and developing airport /airport environs land use compatibility programs. CFR Part 150 studies typically consist of two primary components: (1) the Noise Exposure Map (NEM) report, which contains detailed information regarding existing and 5-year future airport/aircraft noise exposure patterns, and (2) the Noise Compatibility Program (NCP), which includes descriptions and an evaluation of noise abatement and noise mitigation options/programs applicable to an airport.[30] Per the CFR Part 150 Land Use Compatibility Guidelines, residential uses are identified as non-compatible land uses for parcels exposed to 65 dBA CNEL or higher.[31] Commercial land uses are identified as compatible with 65 and 70 dBA CNEL noise levels. The CFR Part 150 Land Use Compatibility Guidelines does not identify a noise level at which hotel uses would be compatible. According to the LAX *Noise Control and Land Use Compatibility Study*, a noise level of 70 dBA CNEL is normally acceptable for transient lodging uses (e.g., hotel) and 65 dBA CNEL is normally acceptable for sports arenas.[32]

The Project Site is partially located within the Planning Boundary/Airport Influence Area for the LAX Airport as designated within the Los Angeles County ALUP. As depicted in Figure 2-6 in Chapter 2, Project Description, the Project Site falls within the Airport Influence Area and Airport Compatibility Zone for LAX for the southern LAX runway. As shown, the majority of the Project Site is within the 65 dBA CNEL noise contour with a small amount of the southernmost portion of the Arena Site (where an access road and parking structure is proposed) and the Well Relocation Site within the 70 dBA CNEL noise contour. The Project Site is not located within the designated Airport Influence Area for the Hawthorne Municipal Airport.

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29 Los Angeles County Airport Land Use Commission, Los Angeles County Airport Land Use Plan, prepared by the Department of Regional Planning, adopted December 19, 1991. Available: [HYPERLINK "http://planning.lacounty.gov/view/alup/"]. Accessed September 2018.

30 City of Los Angeles, Los Angeles World Airports, Noise Management LAX, LAX Part 150 Noise Exposure Map Update, [HYPERLINK "https://lawa.org/en/lawa-environment/noise-management/lawa-noise-management-lax/lax-part-150-noise-exposure-map-update"]. Accessed September 2018.

31 Federal Aviation Administration, Land Use Compatibility and Airports. Available: [HYPERLINK "https://www.faa.gov/about/office_org/headquarters_offices/apl/noise_emissions/planning_toolkit/media/III.B.pdf"]. Accessed September 2018.

32 Los Angeles County Airport Land Use Commission, Noise Control and Land Use Compatibility Study Phase Two Report, 1983. Available: https://www.lawa.org/-/media/lawa-web/noise-management/files/150-noise-exposure/ancluc-phase-ii.ashx?la=en&hash=F1076F9ED79B75E68F5B84A6C992AE71D011F26F. Accessed March 2019.

Additional discussion of the Los Angeles County ALUP, including consistency with policies related to safety, are addressed in Section 3.8, Hazards and Hazardous Materials. The following policies related to noise from the Los Angeles County ALUP are applicable to the Proposed Project:

ALUP Policies Related to Noise:

> ***Policy N-1***: Use the CNEL method for measuring noise impacts near airports in determining suitability for various types of land uses.
>
> ***Policy N-2***: Require sound insulation to insure a maximum interior 45 db CNEL in new residential, educational, and health-related uses in areas subject to exterior noise levels of 65 CNEL or greater.
>
> ***Policy N-3***: Utilize the Table Listing Land Use Compatibility for Airport Noise Environments in evaluation projects within the planning boundaries.
>
> ***Policy N-4***: Encourage local agencies to adopt procedures to ensure that prospective property owners in aircraft noise exposure areas above a current or anticipate 60 db CNEL are informed of these noise levels and of any land use restrictions associated with high noise exposure.

Consistent with Policy N-1, the analysis herein uses the CNEL method for measuring noise impact near airports in determining suitability for various types of land uses. The Proposed Project does not include residential uses but does include a hotel at the East Transportation and Hotel Site and a medical facility at the Arena Site that would require sound insulation sufficient to ensure a maximum interior noise level of 45 dB. The appropriate sound insulation techniques needed to ensure that the maximum interior noise level is not exceeded would be employed during the design and construction of the proposed medical facility. As a Project Design Feature, the project applicant will submit a report prepared by an acoustical expert demonstrating that the interior standard of 45 dB can be achieved. Consistent with Policy N-3, the Los Angeles County ALUP Land Use Compatibility Chart is used to evaluate projects within airport planning boundaries. Consistent with Policy N-4, prospective property owners would be informed of the Project Site's exposure to noise levels of 60 dB CNEL or above and of any land use restrictions associated with high noise exposure.

Local

City of Inglewood General Plan

The City of Inglewood General Plan Noise Element, adopted September 1, 1987, is designed to manage noise within the City and to protect sensitive uses from excessive noise-related impacts. According to the General Plan, noise-sensitive uses include residential dwellings, schools, churches, and hospitals. **Table 3.11-8** presents the Noise/Land Use Compatibility Matrix from the General Plan Noise Element. Noise levels of up to 70 dBA CNEL for single- and multi-family residential use and 65 dBA CNEL for schools, churches, and hospitals are considered "Normally Compatible".

TABLE 3.11-8
NOISE/LAND USE COMPATIBILITY MATRIX

Land Use Categories		Community Noise Equivalent Level (CNEL)						
Categories	**Uses**	**<55**	**60**	**65**	**70**	**75**	**80>**	
RESIDENTIAL	Single Family, Duplex, Multiple Family	A	A	B	B	C	D	D
RESIDENTIAL	Mobile Home	A	A	B	C	C	D	D
COMMERCIAL Regional, District	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
COMMERCIAL INDUSTRIAL INSTITUTIONAL	Office Building, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
COMMERCIAL Recreation INSTITUTIONAL Civic Center	Amphitheatre, Concert Hall Auditorium, Meeting Hall	B	B	C	C	D	D	D
COMMERCIAL Recreation	Children's Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	B	B	D	D
COMMERCIAL General, Special INDUSTRIAL, INSTITUTIONAL	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL General	Hospital, Church, Library Schools Classroom	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C
AGRICULTURE	Agriculture	A	A	A	A	A	A	A

NOTES:

* Construction of new residential uses will not be allowed in the 65 CNEL for airport noise.

INTERPRETATION

Zone A Clearly Compatible	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
Zone B Normally Compatible	New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Zone C Normally Incompatible	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.
Zone D Clearly Incompatible	New construction or development should generally not be undertaken.

SOURCE: City of Inglewood, 1987. Noise Element of the General Plan. Exhibit 6. Adopted September 1, 1987 per Resolution No. 87-61.

The following goals and policies from the City of Inglewood General Plan Noise Element are applicable to the Proposed Project:

Goal 1: Provide for the reduction of noise where the noise environment represents a threat to public health and welfare. In those areas where the environment represents a threat to the public health and welfare, it is the objective of the City to reduce environmental hazards to levels consistent with the protection of the public health and welfare.

Goal 3: Protect and maintain those areas having acceptable noise environments. In those areas where a quality environment now exists, it is the objective of the City to prevent degradation of that environment.

Goal 4: Provide sufficient information concerning the community noise levels so that noise can be objectively considered in land use planning decisions. Noise and land use incompatibilities can be avoided for new developments when noise is properly considered in the planning and design of the project. It is the objective of the City to prevent future land use and noise conflicts through the planning process.

***Policy 4.2*:** Incorporate noise considerations into land use planning decisions.

- Ensure acceptable noise levels near schools, hospitals, convalescent homes, and other noise sensitive areas.
- Encourage acoustical design in new construction.

***Policy 4.3*:** Develop measures to control non-transportation noise impacts.

- Evaluate noise generated by construction activities.

***Policy 4.4*:** Reduce noise conflicts at the source.

- Actively support the FAR Part 150 Noise Compatibility Program as described in the "Noise Control and Land Use Compatibility Study, Los Angeles International Airport," (March 1984).

***Policy 4.5*:** Reduce noise conflicts at the receiver.

***Policy 4.6*:** Protect those who live and work in the City from dangerous on-the-job noise exposure.

The Proposed Project would generate temporary construction noise and permanent operational noise that would potentially increase ambient noise levels in the area, resulting in potential inconsistencies with Goals 1 and 3 of the Noise Element. Consistent with Goal 4, the analysis in this section of the EIR provides objective information concerning existing and projected future community noise levels to ensure that community noise levels are considered in the design, land use planning and decision-making process for the Proposed Project. Ultimately, it is within the authority of the City Council to determine whether the Proposed Project is consistent with the City of Inglewood General Plan Noise Element.

City of Inglewood Municipal Code

Chapter 5, Article 2 of the City's Municipal Code contains the City's noise regulations. Section 5-27 establishes base ambient noise levels within respective times and zones. Where actual noise measurements exceed base ambient noise levels as designated by Section 5-27, the measured noise level shall be employed as the base ambient noise level.[33] Pursuant to Section 5-30, exterior noise in residential zones may not exceed the base ambient noise level for more than 30 minutes in any hour, 5 dBA above base ambient noise levels for more than 15 minutes in any hour, 10 dBA above base ambient noise levels for more than 5 minutes in any hour, 15 dBA above base ambient noise levels for more than 1 minute in any hour, or 20 dBA above base ambient noise levels for any amount of time.

Section 5-39 of the Code prohibits the operation of any machinery, equipment, device, pump, fan, compressor, air—conditioning apparatus, or similar mechanical devise that would cause the noise level at any property line to exceed the ambient noise level by 5 dBA.

Section 5-41 of the Code prohibits construction or repair work and the operation of any pile driver, pneumatic hammer, derrick, excavation or earth moving equipment, or other construction equipment within a residential zone or within a 500-foot radius of a residential zone between the hours of 8:00 PM and 7:00 a.m. unless a permit is obtained from the Permits and Licenses Committee of the City.

Section 5-43 of the Code prohibits the operation of any motor driven vehicle due to the nature of the operation of the vehicle, condition of the vehicle, or modification made to the vehicle, that would generate noise so that a reasonable person is caused discomfort or annoyance.

Section 5-51 of the Code states that the commercial (for the purpose of advertising any business, goods, or services and/or for the purpose of advertising or attracting the attention of the public to or soliciting patronage for any performance, entertainment, exhibition or event) and noncommercial (other than "commercial purpose" including, but not limited to philanthropic, charitable, political, and patriotic purposes) use of sound amplifying equipment shall be subject to the following regulations:

a. The only sounds permitted shall be either music or human speech, or both.

b. The operation of sound amplifying equipment shall only occur between the hours of eight a.m. and ten p.m. each day. No operation of sound amplifying equipment for commercial purposes shall be permitted on Sundays or legal holidays.

c. No sound emanating from sound amplifying equipment shall exceed fifteen (15) dB(A) above the ambient noise base level as measured at any property line.

d. Notwithstanding the provisions of subsection (c) of this Section, sound amplifying equipment shall not be operated within two hundred (200) feet of churches, schools and hospitals.

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33 City of Inglewood Municipal Code, Chapter 5, Article 2, Section 5-27.

e. In any event, the volume of sound shall be so controlled that it will not be unreasonably loud, raucous, jarring, disturbing, or a nuisance to persons of normal sensitiveness within the area of audibility.

[INSERT DISCUSSION AFTER RECEIPT OF INFORMATION FROM TEAM REGARDING ANY PROPOSED VARIANCES FROM NOISE ORDINANCE]

3.11.4 Analysis, Impacts and Mitigation

Significance Criteria

A significant impact would occur if the Proposed Project would:

1. Result in generation of 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;

2. Generate excessive groundborne vibration or groundborne noise levels; or

3. For a project located within the vicinity of a private air strip 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 region surrounding the Project Site to excessive noise levels.

Methodology and Assumptions

Construction Noise

On-Site Sources of Construction Noise

Construction noise impacts were assessed based on a comparative analysis of the noise levels resulting from operation of specified construction equipment and the noise levels of existing conditions at noise-sensitive off-site land uses. Noise impacts from on-site construction were evaluated by determining the noise levels generated by the different types of construction activity anticipated, calculating the construction-related noise level generated by the mix of equipment assumed for all construction activities at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise) at those receptors.

The analysis accounted for attenuation of those noise levels due to distances between the construction activity and the noise-sensitive receptors in the site vicinity based on the standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance. Figure 3.11-2 identifies the location of noise-sensitive receptors. In some cases, a receptor is identified as a group of residential units. The distanced used to calculate construction noise at each receptor group was measured from the nearest receptor property line to the Project Site. Additional units within each receptor group would be located at greater distances and/or be shielded from construction activity by buildings immediately surrounding the Project Site. Distances to each receptor group may vary accordingly based on the location of construction activity. Construction activity would result in the loudest noise levels at ground level sensitive land uses that have a

direct line-of-sight to the of the Project Site. This is because the first tier of buildings immediately surrounding the Project Site would act as a noise barrier to other sensitive receptors located beyond these buildings. Therefore, construction-related noise levels are only presented for receptors closest to the Project Site.

It is anticipated that construction activity would take place from 7:00 a.m. to 9:00 p.m. on Mondays through Fridays, and on Saturdays. Construction between 8:00 p.m. and 7:00 a.m. the following day requires the approval of a permit from the Permits and Licenses Committee pursuant to Section 5-41 of the Municipal Code.

The specific number of construction equipment and duration of use provided by the project applicant team was utilized for the analysis.[34] Construction noise levels for the Proposed Project were estimated using the FHWA Roadway Construction Noise Model (RCNM) reference noise levels, shown in **Table 3.11-9**, Construction Equipment Reference Noise Levels. The reference noise levels shown in Table 3.11-9 are the instantaneous maximum noise level (Lmax) at 50 feet from the noise source.

During each stage of development, there would be a different mix of equipment. As such, average construction activity noise levels at and near each of the Project Site locations would fluctuate depending on the particular type, number, and duration of use of the various pieces of construction equipment. Over the course of a construction day, the highest noise levels would be generated when multiple pieces of construction equipment are being operated concurrently. The Proposed Project's estimated construction noise levels were calculated for a worst-case noise scenario where all construction equipment for all overlapping phases across each of the Project Site locations were assumed to be operating simultaneously. Half of the total equipment (the loudest pieces) was assumed to be located at the nearest distance from a noise-sensitive receptor, while the other half was assumed to be located at the center of each Project Site location. This assumption is based on the fact that activities would occur throughout each of the Project Site locations, not just along the boundaries of each Project Site location.

[34] AECOM Hunt, 2018. Inglewood Basketball & Entertainment Center Demolition and Construction Assumptions. August 2018.

TABLE 3.11-9
CONSTRUCTION EQUIPMENT REFERENCE NOISE LEVELS

Construction Equipment	Estimated Usage Factor	Noise Level at 50 Feet (dBA, L_{max})
Air Compressor	40%	80
Backhoe	40%	80
Cement and Mortar Mixers	40%	85
Compactor	20%	80
Concrete/Industrial Saw	20%	90
Cranes	16%	85
Crushing/Proc. Equipment	20%	87
Dumpers/Tenders	40%	76
Excavator	40%	85
Forklift	50%	85
Graders	40%	85
Haul Trucks	40%	76
Jackhammer	20%	85
Loader	40%	80
Paver	50%	85
Pumps	100%	82
Roller	20%	85
Rough Terrain Forklift	50%	85
Rubber Tired Loader	40%	80
Scrapers	40%	85
Skid Steer Loaders	40%	80

SOURCE: FHWA, *FHWA Roadway Construction Noise Model User's Guide*, January 2006

The estimated construction noise levels resulting from the Proposed Project at the nearby off-site noise-sensitive receptors were compared to the appropriate base ambient noise level (as described above). That value is either the City's nighttime (10:00 p.m. to 7:00 a.m.) exterior base ambient noise level of 45 dBA Leq, or the City's daytime (7:00 a.m. to 10:00 p.m.) exterior base ambient noise level of 55 dBA Leq, or where measured ambient noise levels exceed the base ambient noise levels, the measured noise level.[35] Exterior noise in residential zones may not exceed the base ambient noise level by 20 dBA Lmax at any time. Therefore, a threshold of a 20 dBA increase over base ambient noise levels measured at sensitive receptors has been used in the analysis herein.

As noted in the 2018 California Supreme Court decision in *Sierra Club v. County of Fresno* (6 Cal. 5th 502) (*Friant Ranch*), in an adequate analysis under CEQA it is essential to make a

35 City of Inglewood Municipal Code Section 5-27.

reasonable effort to substantively connect a project's impacts to likely health consequences or explain in meaningful detail why it is not feasible at the time of drafting to provide such an analysis. For the analysis of potential construction noise impacts of the Proposed Project, the potential health consequences of significant noise impacts associated with construction-related noise impacts on sensitive receptors has been considered in relation to USEPA thresholds for hearing loss as show in Table 3.11-7.

Off-Site Sources of Construction Noise (Construction-related Traffic)

Noise impacts to noise-sensitive uses along routes that Project-related construction traffic is expected to travel have been evaluated using a spreadsheet model developed based on the methodologies provided in the FHWA Traffic Noise Model (TNM) Technical Manual. This method considers Project-specific data such as truck trips (delivery and export) and construction worker trips and allows for the definition of roadway configurations, barrier information (if any), and the location of noise-sensitive receptors. Construction traffic is assumed to utilize designated haul route(s). Trips using the I-110 would travel to and from the Project Site via Manchester Avenue and South Prairie Avenue. Trips using the I-405 would travel to and from the Project Site via Manchester Boulevard and Prairie Avenue or West Century Boulevard. Trips using the I-105 would travel to and from the Project Site via South Prairie Avenue.

Roadway noise attributable to construction of the Proposed Project was calculated and compared to baseline noise levels. As discussed above in Section 3.11.2, the Adjusted Baseline Environmental Setting accounts for the operation of the HPSP Adjusted Baseline project, currently under development and anticipated to be operational prior to construction of the Proposed Project. Trip generation associated with the HPSP Adjusted Baseline project would result in increased traffic volumes, resulting in a higher baseline traffic noise level from which to compare Project-related noise. Determining Project impacts based on the Proposed Project's contribution to the higher Adjusted Baseline Environmental Setting would potentially make impacts of the Proposed Project less noticeable. Traffic volumes under existing conditions, as described above in Section 3.11.1, do not account for traffic associated with future HPSP uses and would be lower than the Adjusted Baseline Environmental Setting. Therefore, to provide a worst-case analysis, construction traffic noise impacts have been determined by comparing Project construction traffic noise to the lower baseline traffic noise level under Existing conditions. Caltrans considers an increase in noise level of 3 dBA a just-perceivable increase in noise. Therefore, an increase in traffic noise of 3 dBA has been considered a significant increase in noise level from construction-related traffic.[36]

Operational Noise

Off-Site Operational Traffic Noise

Similar to the method used to evaluate impacts from construction traffic noise, noise impacts from operational off-site, on-road traffic sources have been evaluated using a spreadsheet model developed based on the methodologies provided in the FHWA TNM Technical Manual based on

[36] California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.

operational trip generation and turning movements presented in the Project TIA. Traffic analysis time periods include Weekday a.m. Peak Period (7:00 – 9:00 a.m.), Weekday p.m. Peak Period (4:00 – 6:00 p.m.), Weekday Pre-Event (6:00 – 7:00 p.m.), Weekday Post-Event (9:30 – 10:30 p.m.), and Weekend Peak Period (5:00 – 6:00 p.m.). The TIA analyzed trip generation conditions for four Project-related event conditions summarized below.

- Baseline Plus Project (Non-Event Day) condition includes weekday traffic during the a.m. and p.m. peak hours under existing conditions, operations of HPSP land uses that do not involve an event at the NFL Stadium, and operations of non-event related Project uses (e.g., hotel, commercial, sports medicine clinic, and commercial uses) on a non-event day.

- Baseline Plus Project (Day-Time Corporate/Community Event) condition includes weekday traffic during the a.m. peak hour under existing conditions, operations of HPSP land uses that do not involve an event at the NFL Stadium, operations of non-event related Project uses (e.g., hotel, commercial, sports medicine clinic, and commercial uses), and a day-time corporate/community event at the IBEC with approximately 2,000 persons in attendance.

- Baseline Plus Project (Other Sporting Event or Gathering) condition includes weekday traffic during the PM peak hour under existing conditions, operations of HPSP land uses that do not involve an event at the NFL Stadium, operations of non-event related Project uses (e.g., hotel, commercial, sports medicine clinic, and commercial uses), and a sporting event or gathering at the IBEC with approximately 7,500 persons in attendance.

- Baseline Plus Project Major Event condition includes weekday pre- and post-event traffic and weekend peak hour traffic. Weekday events are assumed to start at 7:00 p.m. and weekend events are assumed to start at 6:00 p.m.

Caltrans considers an increase in noise level of 3 dBA a just-perceivable increase in noise. Therefore, an increase in traffic noise of 3 dBA Leq has been considered a significant increase in noise level from operational-related traffic.[37] The Adjusted Baseline No-Event traffic conditions include consideration of non-event uses within the HPSP area. These future foreseeable uses result in greater baseline No Project traffic volumes than under Existing conditions because HPSP uses are not currently operational. Determining impacts of the Proposed Project based on the Proposed Project's contribution to the higher Adjusted Baseline Environmental Setting would potentially make noise impacts from the Proposed Project less noticeable, because Project-related noise would occur against the backdrop of a "noisier" environment. Therefore, increases in baseline traffic noise associated with developments within the HPSP area are not considered as part of the Adjusted Baseline Environmental Setting from which to determine impacts of the Proposed Project in order to ensure a conservative impact analysis. The traffic noise analysis included herein utilizes projected traffic volumes from the TIA to determine Project-related operational traffic impacts for Plus Project event conditions by evaluating the increase in Project-related traffic under all four Project-related event conditions over Existing conditions.

Traffic noise has been calculated for all roadway segments with traffic turning movement data (up to 155 segments) and calculation spreadsheets are included in Appendix X of this EIR.

[37] California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.

However, only segments that would experience an increase in traffic-related noise greater than 1 dBA has been summarized and included herein.

Overlapping Event Traffic Noise

The TIA analyzed trip generation conditions based on potential concurrent events at The Forum, the NFL Stadium, and/or the Proposed Project as well as under a "no event" condition with consideration of ambient growth in traffic and full project development. The worst-case overlapping event conditions, based on attendance, for weekdays is the Baseline with a Mid-Sized Event at the NFL Stadium and with a Concert at The Forum Plus an IBEC Major Event. The worst-case overlapping event conditions for weekends was determined to be the Baseline with a NFL Game, a Concert at The Forum, Plus an IBEC Major Event. Roadway noise under these worst case weekday and weekend overlapping event days has been calculated and compared to Existing conditions to determine the Proposed Project's contribution to the traffic noise environment. **Table 3.11-10** summarizes the studied event conditions.

Traffic noise has been calculated for all roadway segments with traffic turning movement data (up to 155 segments) and calculation spreadsheets are included in Appendix X of this EIR. However, only segments that would experience an increase in traffic-related noise greater than 1 dBA has been summarized and included herein.

As noted in the 2018 California Supreme Court decision in *Sierra Club v. County of Fresno* (6 Cal. 5th 502) (*Friant Ranch*), in an adequate analysis under CEQA it is essential to make a reasonable effort to substantively connect a project's impacts to likely health consequences or explain in meaningful detail why it is not feasible at the time of drafting to provide such an analysis. For the analysis of potential traffic noise impacts of the Proposed Project, the potential health consequences of noise impacts associated with Project-related traffic noise impacts on sensitive receptors has been considered by determining whether any significant increases in traffic noise (3 dBA or more) would expose noise-sensitive receptors to traffic noise levels greater than Normally Compatible noise levels of up to 70 dBA CNEL for single- and multi-family residential use and 65 dBA CNEL for schools, churches, and hospitals.

TABLE 3.11-10
TRAFFIC NOISE ANALYSIS CONDITIONS

Condition[1]	Weekday				Weekend
	A.M. Peak Period (7 – 9 a.m.)	P.M. Peak Period (4 – 6 p.m.)	Pre-Event Peak Period (6 – 7 p.m.)	Post-Event Peak Period (9:30 – 10:30 p.m.)	Peak Period (5 – 6 p.m.)
Existing					
No Event at NFL Stadium or The Forum	X	X	X	X	X
Baseline					
No Project Conditions					
No Project (No Event at NFL Stadium or The Forum)	X	X	X	X	X

Condition[1]	Weekday				Weekend
	A.M. Peak Period (7 – 9 a.m.)	P.M. Peak Period (4 – 6 p.m.)	Pre-Event Peak Period (6 – 7 p.m.)	Post-Event Peak Period (9:30 – 10:30 p.m.)	Peak Period (5 – 6 p.m.)
No Project with NFL game (1:25 PM start time with 70,000 persons)					X
No Project with Concert at The Forum (18,000 persons)			X	X	X
No Project with Mid-Sized Event (25,000 persons) at NFL Stadium and with Concert at The Forum (18,000 persons)			X	X	
Plus Project-Only Conditions					
Plus IBEC (Non-Event Day)	X	X			
Plus IBEC (Day-Time Corporate/Community Event w/ 2,000 persons)	X				
Plus IBEC (Other Sporting Event or Gathering w/ 7,500 persons)		X			
Plus IBEC Major Event (Weekday starts at 7 PM; Weekend starts at 6 PM)			X	X	X
Cumulative Plus Project and Overlapping Event Conditions					
With Mid-Sized Event (25,000 persons) at NFL Stadium and with Concert at The Forum (18,000 persons) Plus IBEC Major Event (starts at 7 PM)			X	X	
With NFL Game (1:25 start time with 70,000 persons) and with Concert at The Forum (18,000 persons that starts at 7 PM) Plus IBEC Major Event (starts at 6 PM)					X

NOTES:
Event Conditions consistent with those studied in the TIA.

SOURCE: Fehr & Peers, 2019

On-site Operational Noise Sources

Non-vehicular on-site sources of noise are called stationary point-sources and include outdoor activities (such as amplified sound and crowd noise), rooftop mechanical equipment, loading area activity, and parking lot/structure activity. Potential noise impacts from stationary point-sources were evaluated by identifying the noise levels generated by these sources and calculating the hourly L_{eq} noise level from each noise source at Project Site property lines, and comparing such noise levels to existing ambient noise levels.

As noted in the 2018 California Supreme Court decision in *Sierra Club v. County of Fresno* (6 Cal. 5th 502) (*Friant Ranch*), in an adequate analysis under CEQA it is essential to make a reasonable effort to substantively connect a project's impacts to likely health consequences or explain in meaningful detail why it is not feasible at the time of drafting to provide such an analysis. For the analysis of potential traffic noise impacts of the Proposed Project, the potential health consequences of noise impacts associated with operation of the Proposed Project (amplified music, event noise, etc.) on noise-sensitive receptors has been considered. Noise from other sources such as mechanical equipment and truck loading are addressed by the City's noise

ordinance which has established noise exposure standards that would reasonably be expected to be sufficient to preclude potential health impacts.

Assumptions associated with stationary noise sources are described below.

Open Space and Outdoor Activities

Amplified Sound in the Plaza

The Proposed Project includes an outdoor plaza within the Arena Site with an approximate area of 80,000 square feet (sf) including landscaped areas and outdoor community gathering space. The plaza would connect the surrounding sidewalks to the arena and would include approximately 48,000 sf of retail/restaurant uses, up to 15,000 sf of community uses that would accommodate community and youth-oriented educational programing, and an event stage. The outdoor stage would have amplified sound and could be used for musical performances, LA Clippers-related events, or community events.

The Computer Aided Noise Abasement (CadnaA) noise propagation program (Version 2019) was used to estimate the propagation of noise from speakers within the plaza. CadnaA is a Windows-based software program that predicts and assesses noise levels in the vicinity of noise sources based on International Organization for Standardization 9613-2 algorithms for noise propagation calculations. The calculations account for classical sound wave divergence plus attenuation factors resulting from air absorption, basic ground effects, and barriers/shielding. The model runs accounted for the proposed speaker locations provided by the project applicant and the location and mass of proposed buildings.

Noise contours from amplified sound (like music through speakers) has been calculated at nearby noise-sensitive receptors. Based on noise measurement data for live concerts, a reference noise level of 95 dBA at 100 feet from the speakers has been utilized in this analysis.[38] Amplified sound noise has been estimated at each noise-sensitive receptor using the CadnaA program and compared against the significance threshold of a 15 dBA or greater noise level over ambient conditions pursuant to City of Inglewood Municipal Code Section 5-51(c).

Crowd Noise in the Plaza

The plaza would facilitate pedestrian movement to and from the arena before and after events. The plaza is also anticipated to be utilized seven days per week with pedestrian flows associated with the commercial and community uses as well as other activities independent of events hosted within the arena. The plaza would have two levels. An escalator would connect the ground level plaza uses to the upper-level plaza uses, and ultimately to the pedestrian bridge, that would span South Prairie Avenue, and connect the plaza to the West Parking Garage Site.

Noise from human conversation and cheering, without consideration of amplified sound, has been calculated based on a reference noise level of 72 dBA at 3.3 feet from the source.[39] The occupant

[38] City of Santa Clara, 2009. *49ers Santa Clara Stadium Project Environmental Impact Report – Volume I*, July 2009.
[39] Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.*

load of the plaza was estimated based on the occupancy load factor of 15 sf per person for an assembly area without fixed seats, according to the California Building Code Table 1004.1.2, Maximum Floor Area Allowances per Occupancy. The CadnaA program has been used to calculate crowd noise within the plaza, accounting for barrier-insertion loss from Proposed Project buildings and compared against a significance threshold of a 3 dBA increase over ambient conditions, which is considered a just-perceivable increase in noise level.[40]

Arena Noise

The exterior of the arena building shall be comprised of metal and/or perforated metal, glass with tinting, and precast concrete with stone aggregate. When the arena entrance doors are opened during an event, noise from interior sound systems and crowd cheering could be audible at nearby noise-sensitive receptors. The CadnaA program was used to calculate the maximum instantaneous noise levels from interior sources that could transmit through open doors to nearby noise-sensitive uses and compared against a significance threshold of a 20 dBA Lmax increase over ambient conditions.

Rooftop Mechanical Equipment

The operation of mechanical equipment for the Proposed Project, such as air conditioners, fans, generators, and related equipment, would generate audible noise levels at the Arena Site, West Parking Garage Site, and the East Transportation and Hotel Site. However, mechanical equipment associated with the Proposed Project would be located on rooftops or within buildings, and would be shielded from nearby land uses to attenuate noise and avoid conflicts with adjacent uses. All mechanical equipment would be designed with appropriate noise control devices, such as sound attenuators, acoustic louvers, or sound screen/parapet walls, to ensure that increases in ambient noise would not occur. A conservative exterior noise level reference for air condenser units, the primary source of noise from fixed mechanical equipment, is 81.9 dBA Leq measured at a distance of 5 feet based on a review of noise data from several large shopping center projects in Southern California.[41,42] The specific location of mechanical equipment is not yet known. Therefore, as a worst-case noise analysis, noise levels have been estimated based on the distance of the noise-sensitive receptor (accounting for barrier-insertion loss [minimum 10 dBA noise level reduction] by existing and Proposed Project buildings and distance attenuation [at a rate of 6 dBA for hard surfaces for each doubling of distance from the reference distance]) to the nearest Proposed Project building. Pursuant to Section 5-39 of the Inglewood Municipal Code, operation of such equipment shall not cause noise levels at the Project Site property line to exceed the ambient noise level by 5 dBA or more.

Service and Delivery Access and Loading

Small service and delivery vehicles providing services or materials for retail and food service venues would enter the Project Site via a site access road accessed from West Century Boulevard,

[40] California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.
[41] City of Moreno Valley, Moreno Valley Walmart Noise Impact Analysis, Table 9-1, p. 71, February 10, 2015.
[42] City of Pomona, Pomona Ranch Plaza Walmart Expansion Project, Table 4.4-5, p. 4.4-33, August 2014.

approximately 350 feet east of South Prairie Avenue, and immediately west of the existing Airport Park View Motel parcel.

Large delivery vehicles such as semi-trucks, trash collection trucks, and large food service trucks would access the Arena Site from a new, gated service ramp from West Century Boulevard, approximately 200 feet west of South Doty Avenue, between two existing commercial buildings. This service ramp would slope downward, providing access to a loading and staging area, at the below-grade event level of the Arena Structure. The Arena Structure would include loading docks to provide easy loading and unloading of materials and supplies at the event level, with truck staging capacity for up to 22 trucks on site.

Due to loading activities being located below grade and fully enclosed by the Arena Structure, loading area noise associated with truck movements/idling and loading/unloading operations would not result in increases in ambient noise levels. Therefore, noise associated with deliveries has been analyzed based on noise levels from 22 heavy-duty trucks accessing the West Century Boulevard entrance and compared against a significance threshold of a 3 dBA increase over ambient conditions, which is considered a just-perceivable increase in noise level.[43]

Parking Lot and Parking Garage Activity

The Proposed Project would include several parking structures and surface lots. A parking garage with 650 spaces immediately south of the Arena Structure would be located on the Arena Site. A pedestrian bridge would span South Prairie Avenue, connecting the plaza to the West Parking Garage Site. The West Parking Garage Site would include approximately 3,110 parking spaces.

The East Transportation and Hotel Site, located approximately 1,300 feet east of the Arena Structure between West Century Boulevard and West 102nd Street, would include a three story parking garage with the first floor serving as a transportation hub. The transportation hub includes a staging area for private or charter buses and a drop-off, staging, and pick-up area for Transportation Network Company (TNC) vehicles and taxis serving the Arena Site. The second and third floors of the garage would provide parking for patrons of the Arena Site. The garage at the East Transportation and Hotel Site would provide approximately 365 parking spaces. The east side of the East Transportation and Hotel Site includes a limited service hotel of up to 150 guest rooms with associated parking facilities.

Sources of noise associated with parking facilities typically include vehicle engines and accelerating, doors slamming, car alarms, and people talking. Noise levels at Proposed Project parking lots and structures would fluctuate throughout the day depending on the amount of vehicle and human activity. Noise levels would generally be the highest when the largest number of people would enter and exit the parking facility.

Parking related noise levels were estimated using the methodology recommended by FTA for the general assessment of stationary transit noise sources. Using FTA methodology and the equations

[43] California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.

listed below, the Proposed Project's peak hourly traffic volumes at parking entrance driveways under the worst-case Project condition (IBEC Major Event) has been used to estimate parking-related noise levels.[44] Parking-related noise has been estimated at each noise-sensitive receptor accounting for barrier-insertion loss by existing and Proposed Project buildings (minimum 10 dBA noise level reduction) and distance attenuation (at a rate of 6 dBA for hard surfaces for each doubling of distance from the reference distance). Section 5-43 of the Inglewood Municipal Code prohibits the operation of any motor driven vehicle within the City that would cause discomfort or annoyance to a reasonable person. Because the Municipal Code does not designate an acceptable increase in noise level for vehicular sources, a 3 dBA increase over ambient conditions, which is considered a just-perceivable increase in noise level, has been considered a significant increase in noise level from parking lot and parking garage activity.[45]

$L_{eq}(h) = SEL_{ref} + 10\log(N_A/1000) - 35.6$ [Parking Garage]

$L_{eq}(h) = SEL_{ref} + 10\log(N_A/2000) - 35.6$ [Parking Lot]

Where:

$L_{eq}(h)$ = hourly L_{eq} noise level at 50 feet

SEL_{ref} = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet (101 dBA SEL) and

N_A = number of automobiles per hour;

Media Truck/Broadcast Access and Parking

Media/broadcast trucks that are a feature of NBA basketball games require parking in areas that provide clear access to the southern sky for satellite connections. Media and associated truck parking would be provided on a designated media parking area located east of the Arena Structure. Media trucks would access the Project Site from the internal roadway accessed from West Century Boulevard.

Truck movements/idling and loading/unloading of media equipment would generate noise levels that have the potential to adversely impact adjacent land uses during long-term operations of the Proposed Project. ESA facilitated a noise survey at a loading dock that indicated loading/ unloading activity (specifically the idling of semi-trucks and back-up alarm beeps) from one loading dock would generate noise levels of approximately 70.5 dBA Leq at a reference distance of 50 feet from the noisiest portion of the truck (i.e., to the side behind the cab and in line with the engine and exhaust stacks).[46] The Proposed Project includes capacity for XX media trucks. Based on a reference level of 70.5 dBA Leq for each loading dock, a reference level of XX dBA Leq is

44 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, FTA Report No. 0123, September 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

45 California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.

46 The loading dock facility noise measurements were conducted at a loading dock facility at a Wal-Mart store using the Larson-Davis 820 Precision Integrated Sound Level Meter ("SLM") in May 2003. The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of approximately 5 feet above the local grade.

assumed for loading/unloading activities of XX media trucks at the same time. Media truck noise has been estimated at each noise-sensitive receptor accounting for barrier-insertion loss by existing and Proposed Project buildings (minimum 10 dBA noise level reduction) and distance attenuation (at a rate of 6 dBA for hard surfaces for each doubling of distance from the reference distance). Because the Inglewood Municipal Code does not specifically regulate loading activity noise, a 3 dBA increase over ambient conditions, which is considered a just-perceivable increase in noise level, has been considered a significant increase in noise level from media truck loading activities.[47]

Composite Operational Noise

An evaluation of the combined noise levels from the Proposed Project's various on- and off-site operational noise sources was conducted to conservatively ascertain the potential maximum Project-related noise level increase that may occur at the noise-sensitive receptors considered herein. Noise sources associated with operation of the Proposed Project would include: amplified sound and crowd noise from the plaza, arena noise, rooftop mechanical equipment, service and delivery access and loading, parking lot and parking garage activity, and media truck/broadcast access and parking. Traffic noise levels for the segments nearest each associated noise-sensitive receptor have been used in this composite noise analysis. All of the above-described noise-generating elements of the Proposed Project would occur during various times with some. For example, maximum plaza noise may not occur at the same time as maximum service and delivery noise. Conservatively assuming that all noise elements occur within the same time period, peak noise levels (L_{eq}) from each of the above-described noise elements of the Proposed Project have been combined logarithmically and compared against a significance threshold of a 3 dBA increase over ambient conditions, which is considered a just-perceivable increase in noise level.[48].

Vibration

FTA has published data on vibration levels in its *Transit Noise and Vibration Impact Assessment*[49] that are used to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by FTA and applied herein are shown in **Table 3.11-11,** *Construction Vibration Damage Criteria*.

47 California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.
48 California Department of Transportation, 2013. *Technical Noise Supplement*. September 2013. p. 6-5.
49 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, September 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

TABLE 3.11-11
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

SOURCE: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, September 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

In addition, FTA has also adopted standards associated with human annoyance for ground-borne vibration impacts for the following three land-use categories: Category 1, High Sensitivity; Category 2, Residential; and Category 3, Institutional. FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. The vibration thresholds associated with human annoyance for these three land-use categories are shown in **Table 3.11-12**, *Groundborne Vibration Impact Criteria for General Assessment*. No vibration thresholds have been adopted or recommended for commercial and office uses.

To determine the potential for building damage at off-site land uses resulting from vibration, the following vibration propagation equation is used:[50]

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

[50] Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 185.

TABLE 3.11-12
GROUNDBORNE VIBRATION IMPACT CRITERIA FOR GENERAL ASSESSMENT

Land Use Category	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

NOTES:
a "Frequent Events" is defined as more than 70 vibration events of the same source per day.
b "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
c "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
d This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

SOURCE: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, September 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

Where PPV (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance, PPV (ref) is the reference vibration level in in/sec at 25 feet, and D is the distance from the equipment to the receiver. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration and is often used in monitoring of vibration because it is related to the stresses experienced by structures. The building damage thresholds that are applied are 0.2 PPV for non-engineered timber and masonry buildings (historic buildings) and 0.5 PPV for reinforced-concrete, steel, or timber buildings (non-historic buildings).[51]

In order to determine the potential for human annoyance from exposure to the Proposed Project's vibration levels, the following calculation was performed:[52]

$$L_v(D) = L_v(25\text{ ft}) - 30\log(D/25)$$

$L_v(D)$ represents the vibration level of the equipment in decibels (VdB), $L_v(25\text{ ft})$ represents the reference vibration level at 25 feet for the construction equipment, and D is the distance from the equipment to the receiver. The FTA considers a vibration level of 85 VdB in a residence as resulting in strong annoyance.[53]

On-Site Sources of Construction Vibration

Sources of on-site construction vibration include heavy-duty construction equipment such as forklifts, bulldozers, excavators, and loaded trucks. Ground-borne vibration levels resulting from construction activities at the Project Site were estimated using data and equations published by the FTA as described above. Potential vibration levels resulting from Proposed Project construction are identified for land uses that are sensitive to vibration, including existing

51 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 186.
52 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 185.
53 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 113

residences, hotels, and historical buildings located nearby, accounting for their distance from construction activities.

Off-Site Sources of Construction Vibration

Sources of off-site construction vibration include heavy-duty trucks delivering construction supplies and materials, concrete trucks, and haul trucks. As described above, it is unusual for vibration from sources such as trucks on roadways to be perceptible, even in locations close to major roads.[54] Nonetheless, ground-borne vibration resulting from heavy-duty construction truck travel along area roadways has been estimated and impacts determined based on FTA guidance described above.

Operational Vibration

Operational sources of vibration include heavy-duty vehicle travel along area roadways. According to the FTA's *Transit Noise and Vibration Impact Assessment*, it is unusual for vibration from vehicular sources (including buses and trucks) to be perceptible, even in locations close to major roads.[55] As such, no sources of "excessive" ground-borne vibration or noise levels are anticipated during operations of the Proposed Project.

Groundborne Noise

According to the FTA, airborne noise levels would be higher than groundborne noise levels.[56] Unless indoor receptors have substantial sound insulation (e.g, recording studio) and would be exposed to vibration velocities great enough to cause substantial levels of groundborne noise, groundborne noise does not need to be assessed. There are no substantially insulated indoor receptors located within the area surrounding the Project Site therefore the effects of airborne noise would still be higher than groundborne noise levels. Impacts related to groundborne noise have not been discussed herein.

Impacts and Mitigation Measures

54 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 112.
55 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 112.
56 Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018. p. 124.