4.10 NOISE AND VIBRATION

4.10.1INTRODUCTION

This section of the Draft Environmental Impact Report (Draft EIR) addresses construction and operational noise and vibration impacts associated with the proposed Project. This includes temporary impacts associated with operation of construction equipment and associated activities, as well as long-term impacts from transit operations and roadway traffic.

Prior to the preparation of this EIR, a Revised Initial Study (included as **Appendix 2.0.2** of this EIR) was prepared using the California Environmental Quality Act (CEQA) Environmental Checklist Form to assess potential environmental impacts associated with noise and vibration. The Initial Study found that the proposed Project would result in "No Impact" on the following issue and does not require any additional analysis in this EIR:

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

Impacts found to be less than significant are further discussed in **Section 6.0: Other Environmental Considerations**.

The following data was used in completing the analyses:

- Ambient Noise Measurements - **Appendix 4.10.1**:
  - *Long-Term (24-hour) Ambient Noise Measurements – **Appendix 4.10.1-1***
  - *Short-Term (1-hour) Ambient Noise Measurements (Daytime) – **Appendix 4.10.1-2***
  - *Short-Term (15-minute) Ambient Noise Measurements (Nighttime) – **Appendix 4.10.1-3***
- Roadway Noise Levels – **Appendix 4.10.2**:
  - *Traffic Turning Movement Counts Conversions – **Appendix 4.10.2-1***
  - *Adjusted Baseline Conditions During Typical Non-Event Weekdays Without ITC Project Count Conversions – **Appendix 4.10.2-2***
  - *Adjusted Baseline Conditions During Typical Non-Event Weekdays With ITC Project Count Conversions – **Appendix 4.10.2-3***
  - *Opening Year (2026) Conditions With NFL Event Without ITC Project Count Conversions – **Appendix 4.10.2-4***
  - *Opening Year (2026) Conditions With NFL Event With ITC Project Count Conversions – **Appendix 4.10.2-5***

  - *Future Horizon Year (2045) Conditions With NFL Event Without ITC Project Count Conversions* – ***Appendix 4.10.2-6***
  - *Future Horizon Year (2045) Conditions With NFL Event With ITC Project Count Conversions* – ***Appendix 4.10.2-7***
  - *Roadway Noise Level Tables* – ***Appendix 4.10.2-8***
- Vibration Monitoring Data Sheets – **Appendix 4.10.3**
- Construction Noise Worksheets- **Appendix 4.10.4:**
  - *Construction Sound Power Level Worksheets* – ***Appendix 4.10.4-1***
  - *Construction Noise (Phase 1) Worksheets* – ***Appendix 4.10.4-2***
  - *Construction Noise (Phase 2) Worksheets* – ***Appendix 4.10.4-3***
  - *Construction Noise (Phase 3) Worksheets* – ***Appendix 4.10.4-4***
  - *Construction Noise (Phase 4) Worksheets* – ***Appendix 4.10.4-5***
- Construction Vibration Worksheets – **Appendix 4.10.5**
- Operational Noise Worksheets – **Appendix 4.10.6:**
  - *Maintenance and Storage Facility (MSF) Stationary Source Worksheets* – ***Appendix 4.10.6-1***
  - *Guideway Worksheets* – ***Appendix 4.10.6-2***

Please see **Section 8.0** for a glossary of terms, definitions, and acronyms used in this Draft EIR.

4.10.2 OVERVIEW OF NOISE AND VIBRATION

4.10.2.1 Noise Descriptors

Noise levels are measured using a variety of scientific metrics. As a result of extensive research into the characteristics of noise and human response, standard noise descriptors have been developed for noise exposure analyses. All noise levels provided in this analysis are for outdoor conditions, unless otherwise stated specifically to be interior noise levels.

A-Weighted Sound Pressure Level (dBA): The decibel (dB) is a unit used to describe sound pressure level. When expressed in dBA, the sound has been filtered to reduce the effect of very low and very high frequency sounds, much as the human ear filters sound frequencies. Without this filtering, calculated and measured sound levels would include events that the human ear cannot hear (e.g., dog whistles and low-frequency sounds, such as the groaning sounds emanating from large buildings with changes in temperature and wind). With A-weighting, calculations and sound-monitoring equipment approximate the sensitivity of the human ear to sounds of different frequencies.

Maximum Noise Level (Lmax): Lmax is the maximum or peak sound level during a noise event. The metric accounts only for the instantaneous peak intensity of the sound, and not for the duration of the event. As a vehicle passes by an observer, the sound level increases to a maximum level and then decreases. Some sound level meters measure and record the maximum or Lmax level.

Sound Exposure Level (SEL): SEL, expressed in dBA, is a time-integrated measure, expressed in decibels, of the sound energy of a single noise event at a reference duration of 1 second. The sound level is integrated over the period that the level exceeds a threshold. Therefore, SEL accounts for both the maximum sound level and the duration of the sound. The standardization of discrete noise events into a 1-second duration allows calculation of the cumulative noise exposure of a series of noise events that occur over a period of time.

Equivalent Continuous Noise Level (Leq): Leq is the sound level, expressed in dBA, of a steady sound that has the same A-weighted sound energy as the time-varying sound over the averaging period. Unlike SEL, Leq is the average sound level for a specified time period (e.g., 24 hours, 8 hours, 1 hour). Leq is calculated by integrating the sound energy from all noise events over a given time period and applying a factor for the number of events. Leq can be expressed for any time interval; for example, the Leq representing an averaged level over an 8-hour period would be expressed as Leq(8).

Community Noise Equivalent Level (CNEL): CNEL, expressed in dBA, is the standard metric used in California to represent cumulative noise exposure. The metric provides a single-number description of the sound energy to which a person or community is exposed over a period of 24 hours similar to DNL. CNEL includes penalties applied to noise events occurring after 7:00 PM and before 7:00 AM, when noise is considered more intrusive. The penalized time period is further subdivided an evening period (7:00 PM through 10:00 PM) with an addition of 5 dBA to measured noise levels and a nighttime period (10:00 PM to 7:00 AM) with an addition of 10 dB to measured noise levels. The evening weighting is the only difference between CNEL and DNL.

4.10.2.2 Groundborne Noise

Groundborne noise refers to noise generated by groundborne vibration. More specifically, groundborne noise is the low-frequency rumbling noise emanating from the motion of building room surfaces due to the vibration of floors and walls; it is perceptible only inside buildings.[1] The relationship between groundborne vibration (discussed in section 4.10.2.3, directly below) and groundborne noise depends on the frequency content of the vibration and the acoustical absorption characteristics of the receiving room.

1 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 112, September 2018, accessed October 2020, 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

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 levels 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 dB 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 dB lower than the velocity level.[2] Therefore, for typical buildings, the groundborne noise decibel level is lower than the groundborne vibration velocity level at low frequencies.

4.10.2.3 Groundborne Vibration

Ground-borne vibration is the perceptible movement of building floors, rattling windows, and doors, shaking of items on shelves or walls, and rumbling sounds. The root mean square (RMS) amplitude of a motion over a 1-second period is commonly used to predict human response to vibration. The motion due to ground-borne vibration is described in vibration velocity levels, measured in decibels referenced to 1 microinch per second and expressed as vibration decibels (VdB). Ground-borne vibration is not a common environmental problem unlike roadway noise or transit noise. The vibration source levels for various types of construction equipment would be based on data provided in Table 7-4 of the FTA *Transit Noise and Vibration Impact Assessment Manual*.

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration.

4.10.2.4 Effects of Noise on Humans

Human response to sound is highly individualized. Annoyance is the most common issue associated with community noise levels. Many factors influence the response to noise including the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as individual opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence the response to noise. These factors result in the reaction to noise being highly subjective, with the perceived effect of a particular noise varying widely among individuals in a community. The effects of noise can be grouped into three general categories:

3 City of Inglewood, IMC, Chapter 5 Offenses, Miscellaneous, "Article 2. Noise Regulations," Section 5-26. Noise Level Measurement Criteria.

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as starting hearing loss.

Noise-induced hearing loss usually takes years to develop. Hearing loss is one of the most obvious and easily quantifiable effects of excessive exposure to noise. While the loss may be temporary at first, it can become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly due to the environment is difficult to quantify. Although the major cause of noise induced hearing loss is occupational, nonoccupational sources may also be a factor.

Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. Interference with communication has proved to be one of the most important components of noise-related annoyance.

Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern or level of sleep. It can produce short-term effects, with the possibility of more serious effects on health if it continues over long periods.

Annoyance can be defined as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above.

Some common sounds on the dBA scale, relative to ordinary conversation, are provided in **Table 4.10-1: Common Sounds on the A-Weighted Decibel Scale**. As shown, the relative perceived loudness of sound doubles for each increase of 10 dBA, although a 10 dBA change corresponds to a factor of 10 in relative sound energy. Generally, sounds with differences of 3 dBA or less are not perceived to be noticeably different by most listeners.

Table 4.10-1
Common Sounds on the A-Weighted Decibel Scale

Sound	Sound Level (dBA)	Subjective Evaluations
Near Jet Engine	140	Deafening
Threshold of Pain	130	
Rock music, with amplifier	120	
Thunder, snowmobile (operator)	110	Very Loud
Boiler shop, power mower	100	
Orchestral crescendo at 25 feet, noisy kitchen	90	
Busy street	80	Loud
Interior of department store	70	
Ordinary conversation, 3 feet away	60	Moderate
Quiet automobiles at low speed	50	
Average office	40	Faint
City residence	30	
Quiet country residence	20	Very Faint
Rustle of leaves	10	
Threshold of hearing	0	

Source: U.S. Department of Housing and Urban Development, Aircraft Noise Impact – Planning Guidelines for Local Agencies, 1972
Note:
[1] Continuous exposure above 85 dB is likely to degrade the hearing of most people (hearing protection recommended).
[2] Range of Speech: 50 – 70 dB

4.10.3 METHODOLOGY

4.10.3.1 Noise Measurements

Noise measurements were collected pursuant to Section 5-26 of the Inglewood Municipal Code (IMC),[3] which states that sound level meters (SLMs) shall meet the American National Standard Institute's (ANSI) standard S1.4-1971[4] for Type 1 sound level meters, or by using an instrument with associated recording and analyzing equipment that would provide equivalent data. The SLMs were field calibrated before the measurements and have annual calibration records traceable to the National Institute of Standards and Technology.[5]

3 City of Inglewood, IMC, Chapter 5 Offenses, Miscellaneous, "Article 2. Noise Regulations," Section 5-26. Noise Level Measurement Criteria.

4 American Institute of Physics for the Acoustical Society of America, American National Standard Specification for Sound Level Meters (1992).

5 NIST Handbook, State Weights and Measures Laboratories Program Handbook, March 2003, accessed August 2020, https://www.nist.gov/system/files/documents/2017/04/28/hb143-03-final.pdf

A Type 1 (precision) Larson Davis Model 831 SLM[6] was used to conduct the noise monitoring survey. This meter meets all requirements of ANSI S1.4-1983 and ANSI 1.43-1997 Type 1 standards,[7] as well as International Electrotechnical Commission (IEC)[8] and IEC 60804 Type 1, Group X standards.[9] The SLM was located approximately 5 feet aboveground and covered with a Larson Davis windscreen. The SLM was field calibrated with an external calibrator prior to operation.

Noise measurements were taken to establish ambient noise conditions for three time periods. Locations and data measurements are discussed in section 4.10.5.2 and shown in **Figure 4.10-5**. 24-hour ambient noise measurements were collected between November 14, 2018 to November 16, 2018, (refer to **Appendix 4.10-1.1**). Short-term (1-hour) ambient noise measurements were collected between November 26, 2018, to January 23, 2019, during the morning peak hours (7:00 AM to 10:00 AM) and evening peak hours (4:00 PM – 7:00 PM) (refer to **Appendix 4.10-1.2**). Short-term (15-minute) ambient noise measurements were collected between August 3, 2020 to August 5, 2020 during the nighttime period after 8:00 PM (refer to **Appendix 4.10-1.3**). It is important to note, short-term ambient noise measurements were collected during the "Safer at Home" order that took into effect in March 2020 due to the COVID-19 pandemic. For quality assurance, gathered nighttime noise measurements were compared to the results of the existing average daily traffic volumes that occurred prior to "Safer at Home". As shown in data sets provided later in this section, nighttime noise measurements taken along the study intersections were similar to the conditions calculated from the existing average daily traffic volumes that were calculated before the COVID-19 pandemic.

4.10.3.2 Construction Noise and Vibration

This section addresses the methodology to assess potential noise and vibration impacts associated with operating equipment and construction-related traffic during the various phases of construction. The construction traffic and equipment assumptions are provided in the **Appendix 3.0.4: ITC Construction Scenarios for the EIR, June 2020**. The construction footprint for each phase is described in *Section 4.10.7* of this topical section.

Federal methodologies for assessing noise and vibration impact assessment methodology are defined in the FTA's Transit Noise and Vibration Impact Assessment Manual. As updated in 2018, the FTA Assessment

6 Larson Davis Model 831 SLM, http://www.larsondavis.com/support/slmsupport/model831.
7 American Institute of Physics for the Acoustical Society of America, American National Standard Specification for Sound Level Meters (1992).
8 International Electrotechnical Commission (IEC), IEC 61672-1 Ed. 1.0, IEC 60651. Ed 1.2.
9 Larson Davis, 831 Advanced Sound Level Meter for Architectural, Environmental, & Product Noise Analysis, http://www.larsondavis.com/contentstore/mktg/LD_Downloads/831_Lowres.pdf.

Manual provides procedures and impact criteria for noise and vibration from transit sources and the criteria apply to transit projects that seek federal funds.

These criteria include procedures for evaluating transit projects, including guidelines for evaluating the impact of operational noise on sensitive land uses as shown in **Table 4.10-2: FTA Land Use Categories and Metrics for Transit Noise Impact Criteria.**

The FTA Assessment Manual also provides guidance on how to evaluate the impact of noise levels from transit projects, as shown in **Table 4.10-3: FTA Levels of Impact**.

Table 4.10-2
Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Land Use Type	Noise Metric, dBA	Description of Land Use Category
1	High Sensitivity	Outdoor Leq (1hr)[1]	Land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and national historic landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.
2	Residential	Outdoor DNL	This category is applicable all residential land use and buildings where people normally sleep, such as hotels and hospitals.
3	Institutional	Outdoor Leq (1hr)[1]	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also included in this category.

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018
Note:
[1] Leq(1hr) for the loudest hour of project-related activity during hours of noise sensitivity.

The FTA Assessment Manual identifies noise significance thresholds which are a function of existing ambient noise levels and the land use category of sensitive receptors. As illustrated in **Figure 4.10-1: FTA Noise Impact Criteria for Transit Projects**, the thresholds at which a moderate or severe impact occur vary as the existing noise environment changes. The Assessment Manual also provides guidance on evaluating cumulative noise impacts.

No standardized criteria have been developed for assessing construction noise impact. Consequently, criteria must be developed on a project-specific basis unless local ordinances apply. Local noise ordinances

are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing impacts during construction. According to the FTA Assessment Manual, project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of construction, and the adjacent land use. As such, the FTA Assessment Manual provides the following reasonable criteria for assessment for residential, commercial, and industrial land uses:

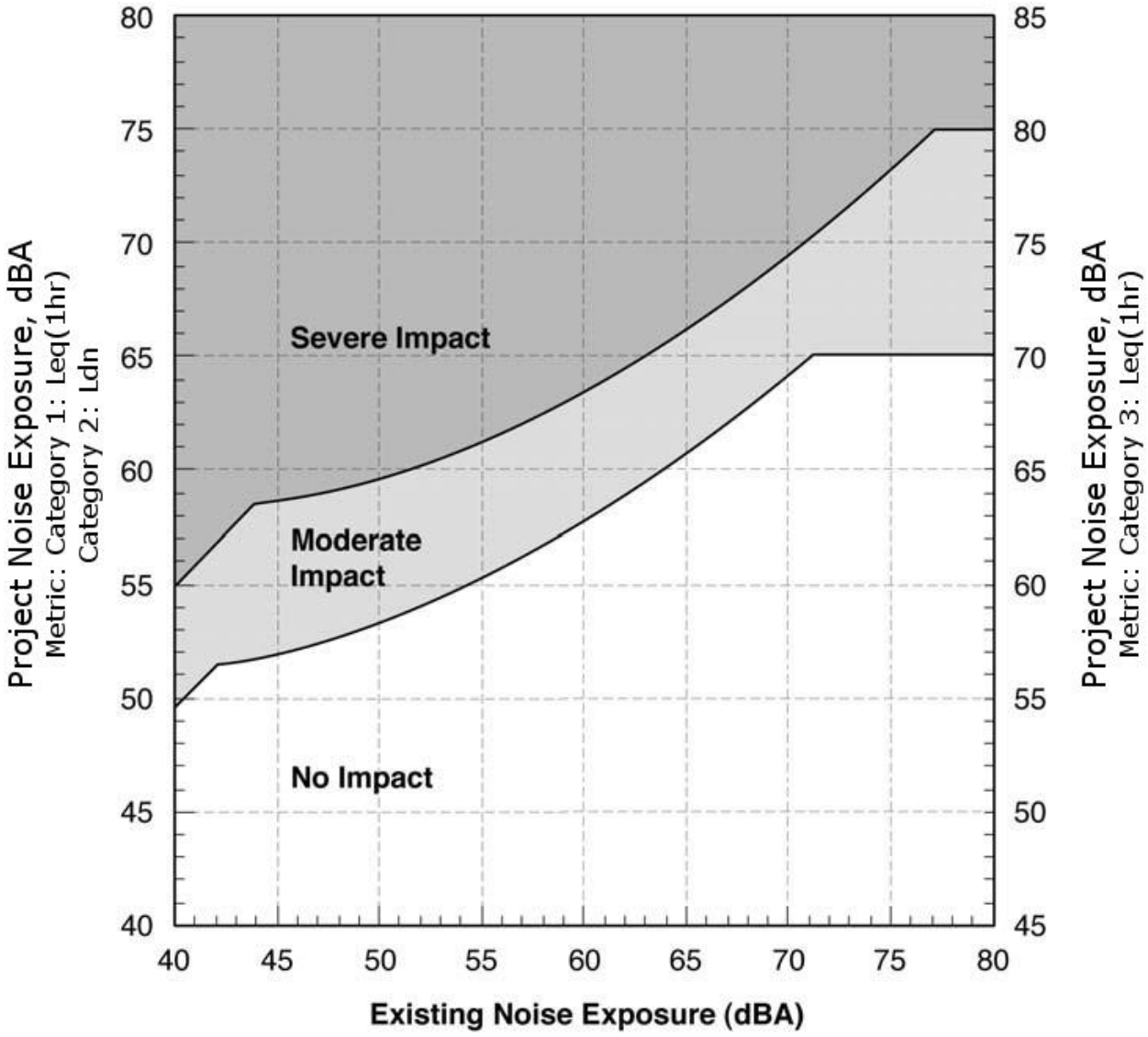
- Residential: 80 dBA Leq (8-hour) during the daytime; 70 dBA Leq (8-hour) during the nighttime
- Commercial: 85 dBA Leq (8-hour) during the daytime; 85 dBA Leq (8-hour) during the nighttime
- Industrial: 90 dBA Leq (8-hour) during the daytime; 95 dBA Leq (8-hour) during the nighttime

The FTA Assessment Manual also provides guidelines for evaluating the vibration impacts of constructing and operating transit projects.

Table 4.10-3
FTA Levels of Impact

Level of Impact	Description
No Impact	Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable by FTA and mitigation is not required.
Moderate Impact	Project-generated noise in this range is considered to cause impact at the threshold of measurable annoyance. Moderate impacts serve as an alert to project planners for potential adverse impacts and complaints from the community. Mitigation should be considered at this level of impact based on project specifics and details concerning the affected properties.
Severe Impact	Project-generated noise in this range is likely to cause a high level of community annoyance. The project sponsor should first evaluate alternative locations/alignments to determine whether it is feasible to avoid severe impacts altogether. In densely populated urban areas, evaluation of alternative locations may reveal a trade-off of affected groups, particularly for surface rail alignments. Projects that are characterized as point sources rather than line sources often present greater opportunity for selecting alternative sites. This guidance manual and FTA's environmental impact regulations both encourage project sites which are compatible with surrounding development when possible. If it is not practical to avoid severe impacts by changing the location of the project, mitigation measures must be considered.

_____
Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018.



SOURCE: TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT MANUAL, FEDERAL TRANSIT ADMINISTRATION

FIGURE **4.10-1**

FTA Noise Impact Criteria for Transit Project

Construction Equipment Noise

Construction activities typically generate noise from the operation of equipment required for demolition, site preparation, grading, construction, paving, and application of architectural coatings. Noise impacts from construction and staging of construction equipment were evaluated by determining cumulative noise levels generated by construction activity, calculating the construction-related noise level at nearby noise-sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without Project-related construction noise). The actual noise level would vary, depending upon the equipment type, model, the type of work activity being performed, and the condition of the equipment. Over the course of construction, activities would occur over a 16 hour/day schedule with two shifts, either a morning shift from approximately 7:00 AM to 3:00 PM and an evening shift from approximately 3:00 PM to 11:00 PM, or a morning shift from approximately 7:00 AM to 3:00 PM and a night shift from approximately 11:00 PM to 7:00 AM. The night shift would be used for material deliveries, export of soil and debris and other light construction activities. Construction during the nighttime period would require a permit from the Permits and Licenses Committee of the City.

The Construction Scenario (see **Appendix 3.0.4** of the EIR) identifies the anticipated construction equipment for on- and off-site construction activities and is shown in **Table 4.10-4: Proposed Project Anticipated Construction Equipment by Phase**.

Off-Road On-Site Equipment: Off-road construction equipment includes dozers, loaders, sweepers, and other heavy-duty construction equipment that is not licensed for travel on public highways.

On-Road On-Site Equipment: On-road on-site equipment on-site water trucks, dump trucks, haul trucks and other on-road vehicles licensed to travel on public roadways.

On-Road Off-Site Equipment: On-road on-site equipment includes shuttle vans transporting construction employees to and from the site(s), on-site pick-up trucks, and crew vans.

Table 4.10-4
Proposed Project Anticipated Construction Equipment by Phase

Equipment	Quantity[a]				Usage Factor (%)	Lmax at 50 feet
	Phase 1	Phase 2	Phase 3	Phase 4		
Off-Road On-Site Equipment						
Impact Pile Driver	1	1	1	0	20	101
Crane	1	2	2	1	16	85
Backhoe	5	5	5	0	40	80
Loader	5	3	2	0	40	80
Auger Drill Rig	1	1	1	0	20	85
Compressor (air)	6	6	6	3	40	80
Excavator	3	2	2	0	40	85
Bobcat	3	3	4	1	40	85
Impact Hammer	6	3	3	2	20	90
Jackhammer	7	4	4	2	20	89
Pneumatic Tools	15	20	20	8	50	85
Generator	3	3	3	1	50	82
Warning Horn	2	2	2	1	5	85
Drum Mixer	0	3	3	0	50	80
Drill Rig Truck	1	1	1	0	20	84
Concrete Saw	4	2	2	1	20	90
Compactor (ground)	3	3	4	0	20	83
Portable Light Towers	4	4	6	3	N/A	55
MKN Lifts	9	9	10	5	20	75
On-Road On-Site Equipment						
Demo Dump Trucks (Total)	1,343	0	0	0	40	76
Asphalt Removal Trucks (Total)	172	0	0	0	40	76
Asphalt Placement Trucks (Total)	209	0	0	0	40	76
Soil Spoils Dump Trucks (Total)	1,607	1,503	2,395	10	40	76
Utility Trucks	28	39	35	39	N/A	75
Welder/Torch	5	5	6	4	40	73
Water Truck	2	2	2	0	N/A	74
Street Sweeper	1	2	2	1	N/A	74
Flat Bed Trucks	48	61	65	10	40	74
Pneumatic Tools	10	20	20	8	50	85
Concrete Trucks (Total)	10,284	9,477	3,516	50	40	85
Concrete Pump Trucks	2	2	2	2	20	84
On-Road Off-Site Equipment						
Pickup Trucks	60	73	80	52	40	75
Delivery Trucks	52	65	65	35	N/A	80

Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) Version 1.1
*a - **Appendix 3.0.4**, Construction Scenarios for the EIR.*
Note:
Usage Factor (%): An acoustical usage factor to assume for modeling purposes.
Exposure Limit: The time that the equipment is predicted to produce noise.
Lmax at 50 feet: Noise emission level at 50 feet from the piece of equipment.

Construction of the proposed Project would occur in four phases over an approximate five-year period between 2022 and 2026,with preconstruction activities occurring in 2021 and demolition beginning in 2022. A summary description of construction phasing is provided below:

- **Phase 1** would include, but not limited to, demolition of buildings and site improvements on properties acquired for construction of the Project and the beginning of construction of the MSF. The properties where existing buildings and site improvements will be demolished include at the existing retail commercial center at Market Street and Regent Street (CVS plaza), the commercial buildings located at 500 and 501 E. Manchester Avenue (retail commercial site and gas station buildings), and the commercial building at 150 S. Market Street on the northeast corner of Manchester and Market Street. Phase 1 would include utility relocations, if required, construction of cast-in-place (CIP) columns and slabs, foundations for the initial construction of the MSF facility. After demolition, the remaining asphalt flatwork areas at 500 E. Manchester (retail commercial site), the commercial plaza at Market Street and Regent Street (CVS Plaza) and the commercial building at 150 S. Market Street will provide suitable space for construction staging, including but not limited to, space for equipment storage, material staging and storage, contractor jobsite trailers, and on-site parking for construction staff throughout the entire project duration. The first phase of construction would occur in 2022 and 2023.
- **Phase 2** would include activities to enable the construction sequence of the guideway along Prairie Avenue from the Hardy Street intersection to Manchester Boulevard including the demolition of sidewalks, roadways and landscaping as needed, utility relocations, if necessary, foundations, CIP columns, straddle bents and the precast trapezoidal troughs and girders, and the construction of the MSF. The second phase of construction would occur in 2023 through 2025.
- **Phase 3** would include construction of an above-ground passenger access walkway from the Market Street/Florence Avenue Station to the Metro Crenshaw/LAX Line Downtown Inglewood Station, property acquisitions, building demolition, utility relocation (if necessary), foundations, CIP columns, straddle bents and the precast trapezoidal troughs and girders. This phase includes site work completion of the MSF. The third phase of construction would occur in 2024 through 2026.
- **Phase 4** would include completion of the aerial guideway construction elements including the installation of the operation and control systems, track work, station platform equipment and systems, completion of the TPSSs, testing and commissioning of the APM trains, completion of all surface construction activities including electrical, mechanical and utilities energizations, and all surface parking lots. Phase 4 will also include final roadway improvements and modifications, and re-striping of streets as required. The fourth phase of construction would occur in 2022 through 2026.

The following were used to calculate construction noise levels:

- Ambient noise levels at surrounding noise-sensitive receptor locations were modeled based on existing noise in proximity to the nearby noise-sensitive receptors.

- Typical noise levels for each type of construction equipment were obtained from the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM). A sample of typical construction equipment noise levels is shown in **Table 4.10-4**.

An inventory of possible construction equipment, including number and types of equipment, was identified for each phase/component of construction and all equipment was assumed to operate simultaneously. Although it is unlikely that all pieces of construction equipment identified in **Table 4.10-4** above would be operating simultaneously at a single location during each phase, this is considered a conservative approach to calculate the maximum noise levels that would be generated. The calculated average sound power levels (refer to **Appendix 4.10-4.1**) were inputted as area sources into the SoundPLAN model[10] each for the four construction phases:

a) Phase 1: Sound power level of 88.6 dBA per square meter (dB/m, m^2) with an Lmax of 90.0 dBA
b) Phase 2: Sound power level of 88.2 dBA per square meter (dB/m, m^2) with an Lmax of 89.8 dBA
c) Phase 3: Sound power level of 88.6 dBA per square meter (dB/m, m^2) with an Lmax of 89.8 dBA
d) Phase 4: Sound power level of 83.3 dBA per square meter (dB/m, m^2) with an Lmax of 85.0 dBA

Distances between construction activities for each of the phases and staging area locations (noise source), and surrounding noise-sensitive receptors were measured using concept plans for the proposed Project and aerial imagery.

Construction traffic and equipment noise levels were calculated for noise-sensitive receptor locations (see **Section 4.0: Environmental Impact Analysis**, *4.0.7 Sensitive Receptors*) based on the conventional standard point source noise-distance attenuation factor of 4.5 to 6.0 dBA for each doubling of distance. Construction noise levels were quantified at predetermined distances from the site using the L_{eq} metric.

Calculated noise levels associated with the proposed Project's construction at noise-sensitive receptor locations were then compared to estimated existing noise levels and the construction noise significance thresholds.

Table 4.10-5: Estimate of Hourly Construction Activity Levels presents the construction activity shifts that would occur during the 24-hour period. Construction activity would primarily occur over a 16 hour daily schedule with two shifts, either a Morning/Evening shift from approximately 7:00 AM to 3:00 PM and an evening shift from approximately 3:00 PM to 11:00 PM, or a Morning/Night shift from approximately 7:00 AM to 3:00 PM during the day and a night shift from approximately 11:00 PM to 7:00 AM.[11] There will be

10 SoundPLAN model is in compliance with ISO 9613-2 standards for assessing attenuation of sound propagating outdoors and general calculation method.

11 **Appendix 3.0.4: Construction Scenarios** for this Draft EIR, June 2020.

periods when construction activities are scheduled to occur from approximately 11:00 PM to 7:00 AM to accommodate work activities that cannot be accomplished during the daytime shifts (i.e., during large-scale pours of concrete when it would be necessary to maintain a continuous stream of concrete deliveries through multiple shifts). Construction work is assumed to occur seven days a week.

Table 4.10-5
Estimate of Hourly Construction Activity Levels

		Equipment Use Activity Factor	
	Hour	**Morning/Evening Shift (7:00 AM – 3:00 PM, 3:00 PM – 11:00 PM)**	**Morning/Night Shift (7:00 AM – 3:00 PM, 11:00 PM – 7:00 AM)**
Nighttime	12:00 AM – 1:00 AM	25%	50%
	1:00 AM – 2:00 AM	25%	50%
	2:00 AM – 3:00 AM	25%	50%
	3:00 AM – 4:00 AM	25%	50%
	4:00 AM – 5:00 AM	25%	50%
	5:00 AM – 6:00 AM	25%	50%
	6:00 AM – 6:59 AM	25%	50%
Daytime	7:00 AM – 8:00 AM	100%	100%
	8:00 AM – 9:00 AM	100%	100%
	9:00 AM – 10:00 AM	100%	100%
	10:00 AM – 11:00 AM	100%	100%
	11:00 AM – 12:00 PM	100%	100%
	12:00 PM – 1:00 PM	100%	100%
	1:00 PM – 2:00 PM	100%	100%
	2:00 PM – 3:00 PM	100%	100%
	3:00 PM – 4:00 PM	100%	50%
	4:00 PM – 5:00 PM	100%	50%
	5:00 PM – 6:00 PM	100%	50%
	6:00 PM – 6:59 PM	100%	50%
Evening	7:00 PM – 8:00 PM	75%	38%
	8:00 PM – 9:00 PM	75%	38%
	9:00 PM – 9:59 PM	75%	38%
Nighttime	10:00 PM – 11:00 PM	50%	25%
	11:00 PM – 12:00 AM	25%	50%

Source: ***Appendix 3.0.4: Construction Scenarios for the EIR****, June 2020.*

For purposes of this analysis, a hybrid construction shift was derived from **Table 4.10-5** to calculate maximum construction noise levels. Conservatively, the construction noise analysis assumed the equipment use activity factor for morning/night shift during the nighttime period (10:00 PM – 6:59 AM), morning/evening shift during the daytime period (7:00 AM – 6:59 PM), and the morning/evening shift during the evening period (7:00 PM – 9:59 PM). 24-hour CNEL, daytime (7:00 AM to 8:00 PM) and nighttime (8:00 PM to 7:00 AM) construction noise levels are provided in **Appendix 4.10.4-2** through **4.10.4-5** for each construction phase. Maximum hourly construction noise levels are provided in the tables below.

Due to site constraints, primarily along Prairie Avenue and Manchester Boulevard, just-in-time deliveries of construction materials would be required during off-peak hours and/or night hours. Additionally, construction of the guideway, columns and station components that could impact Prairie Avenue and Manchester Boulevard would be primarily constructed during the off-peak hours and night hours in order to minimize impacts to daily commuter traffic and potential event traffic. Delivery of construction materials would occur during the night shift, as would most lane closures. Construction activities during the day shift would primarily consist of work that could proceed without requiring lane closures or significant disruption to daily commuter traffic and potential event traffic along Prairie Avenue and Manchester Boulevard. Additionally, it can be anticipated that some minor activity would occur during periods in between construction shifts for logistics, moving equipment, etc. An adjusted workload intensity is assumed for these periods of minor activity.

Construction equipment noise was evaluated by determining the noise levels generated by typical outdoor construction activity and calculating the potential for exposure to noise-sensitive uses. Construction equipment noise impacts were assessed by identifying the closest noise-sensitive receptors to each construction area.

Construction Traffic Noise

The analysis of construction traffic noise impacts focuses on off-site Project construction activity by:

- Identifying major roadways that may be used for construction worker commute routes or truck haul routes;
- Identifying the nature and location of noise-sensitive receptors along those routes; and
- Evaluating the traffic characteristics along those routes, specifically as related to existing traffic volumes.

The primary haul and delivery routes include Florence Avenue, Manchester Boulevard, Prairie Avenue and Century Boulevard which have been designated by the City as Truck Routes.[12] To minimize traffic impacts to streets in and around the proposed Project area, excavated dirt materials/spoils will be hauled during off-peak and night hours.

Construction traffic volume data was provided for multiple segments along each roadway. According to FHWA, traffic noise levels increase by 3 dBA where traffic volumes double (100 percent increase). Therefore, where Project construction traffic along a haul route results in the doubling of ADT, a significant impact would occur.

12 City Municipal Code, Section 3-85. Truck Routes Established.

Construction Equipment Vibration

For quantitative construction vibration assessments related to building damage and human annoyance, vibration source levels for construction equipment were taken from the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual.*[13] Building damage would be assessed for each piece of equipment individually and assessed in terms of peak particle velocity. Ground-borne vibration related to human annoyance is assessed in terms of rms velocity levels.

Ground-borne vibration measurements (refer to **Appendix 4.10-3**) were collected in accordance with FTA guidance[14] at each of the five noise monitoring locations that were measured over a 24-hour period. Outdoor field measurements were taken using remote monitoring systems and an accelerometer on November 16, 2018. Accelerometers were placed on smooth surfaces on the ground to ensure that vertical vibration was accurately captured. The vibration intervals were set to 1 second at each location.

Existing vibration monitoring was conducted to provide data on ambient ground-borne vibration generated by traffic and operation of activities. The locations of the vibration monitoring selected were either adjacent to sensitive land uses (residences and hotels) or buildings that were close to where the components of the proposed Project would be constructed. Vibration data was acquired with a flat frequency response range from 6 Hertz (Hz) to 400 Hz.

4.10.3.3 Operational Noise and Vibration

This section addresses the methodology to assess potential noise impacts associated with changes in roadway traffic attributable to the operation of the proposed Project. Additionally, this section addresses noise and vibration impacts associated with operation of trains and stationary uses (MSF and TPSSs).

Traffic Noise

The analysis evaluates the extent to which ambient exterior noise levels at noise-sensitive uses located along major roadways within the Project vicinity may change due to traffic associated with the operation of the proposed Project, and noise generated from the APM trains and stationary sources such as the MSF.

The noise evaluation addressed the following scenarios:

- Adjusted Baseline Conditions during typical non-event Weekday without the ITC Project
- Adjusted Baseline Conditions during typical non-event Weekday with the ITC Project
- Opening Year (2026) Conditions with NFL event Weekday without the ITC Project

13 FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018, accessed August 2020, 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

14 USDOT, FTA, Transit Noise and Vibration Impact Assessment.

- Opening Year (2026) Conditions with NFL event Weekday with the ITC Project
- Future Horizon Year (2045) Conditions with NFL event Weekday without the ITC Project
- Future Horizon Year (2045) Conditions with NFL event Weekday with the ITC Project

Traffic Data Conversions

The traffic study (see **Appendix 4.12.1**) evaluated an extensive network of roadway intersections to be assessed for increases in traffic volumes within the area surrounding the proposed Project. Existing ADTs were estimated using the validated Inglewood Travel Demand Forecasting Model (ITDF). The ITDF Model was utilized along with existing transportation networks for each of the four time periods (AM, Mid-Day, PM, Nighttime) and the associated socio-economic database consistent with the SCAG RTP/SCS Regional Model. The results for all four time periods were aggregated to reflect the average daily conditions. The resulting ADT volumes reflect typical weekday operations under the existing (2020) conditions.

This area is generally bound by Florence Avenue to the north, Century Boulevard and 104th Street to the south, Crenshaw Boulevard to the east and La Brea Avenue to the west. A total of 26 intersections were studied that may be subjected to an increase or decrease in ambient roadway traffic noise as a result of the proposed Project (see **Appendix 4.12.1**). These intersections are identified on **Table 4.10-6: Proposed Project Study Intersections** and shown on **Figure 4.10-2: Traffic Study Areas and Intersections**. At each intersection, turning movements were recorded during the morning and afternoon peak traffic hours. The collected turning movement data was converted into estimated road traffic noise levels using the FHWA TNM methodology.[15]

Traffic Volume Data

The process of assessing potential road traffic noise impacts that would be generated by implementation of the Project requires that estimates of current road traffic noise levels be prepared to establish existing conditions as a baseline for noise impact analyses. The traffic turning movement counts collected as part of the Traffic Study (see **Appendix 4.12.1**) were used to calculate estimates of daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) average daily traffic (ADT) volumes on the roadway segments between traffic study intersections (refer to **Appendix 4.10-2.1**). These ADT values were inputted into the FHWA traffic noise model.

Traffic Noise Modeling

Traffic volume and road parameter data were inputted via the SoundPLAN[16] noise model to the FHWA TNM 2.5 model,[17] which is the road traffic noise model preferred by the California Department of

15 Federal Highway Administration, Traffic Noise Model Version 2.5, https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/.
16 SoundPLAN https://www.soundplan.eu/en/
17 Federal Highway Administration, Traffic Noise Model Version 2.5, https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/.

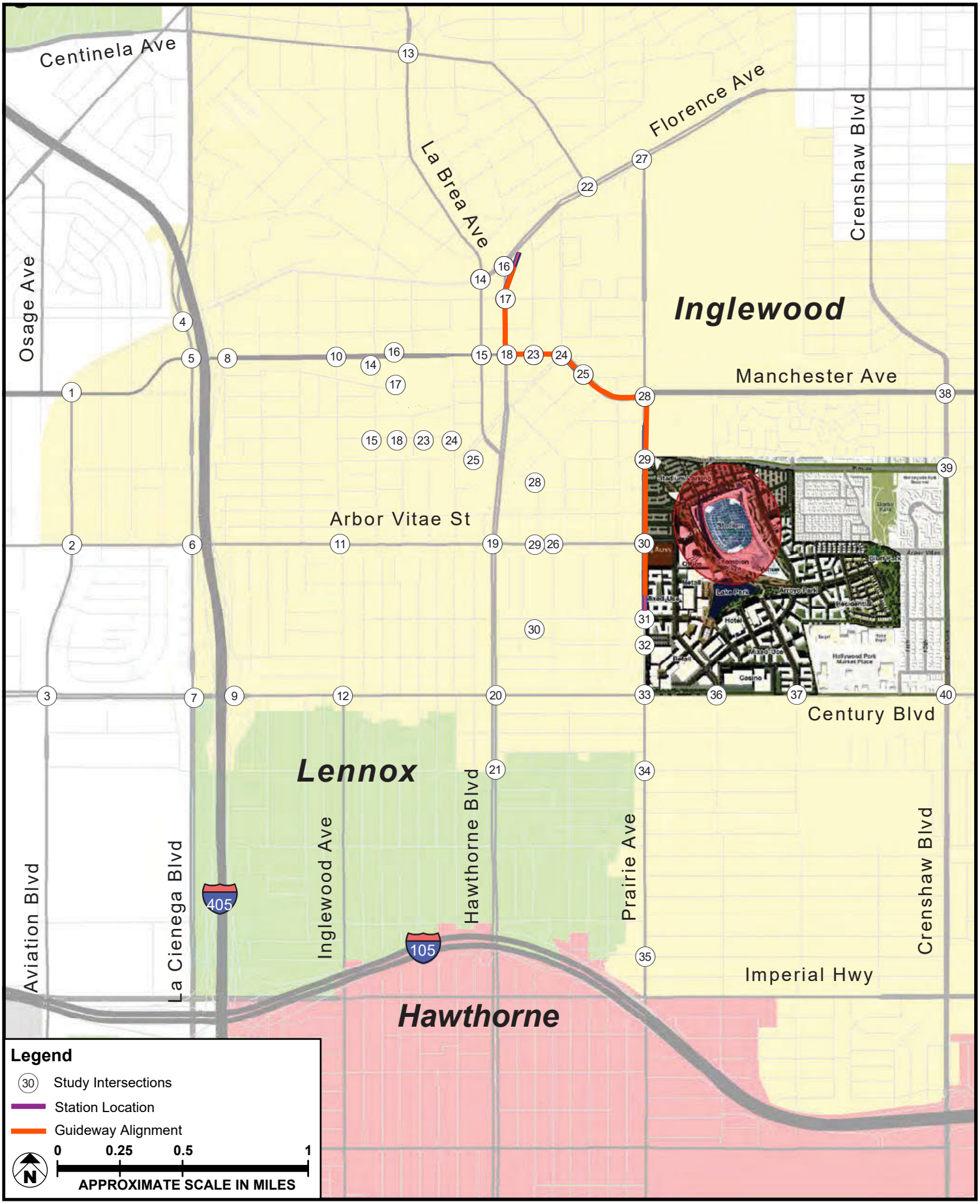
Transportation (Caltrans). The TNM model calculates the average noise levels at the specific locations based on nearby roadway traffic volumes, average vehicle speeds, roadway geometry, and physical site conditions. The modeled noise levels for each of the scenarios described above is the average CNEL[18] calculated for the daytime and nighttime periods by the model for sensitive receptors assumed to be located adjacent to the street. These values represent the maximum potential noise levels to which sensitive receptors could be exposed to from road traffic noise.

Table 4.10-6
Proposed Project Study Intersections

Map ID	Intersection
1	La Brea Avenue & Florence Avenue
2	La Brea Avenue & Manchester Boulevard
3	Market Street & Florence Avenue
4	Market Street & Regent Street
5	Market Street & Manchester Avenue
6	La Brea Avenue & Arbor Vitae Street
7	La Brea Avenue & Century Boulevard
8	Hawthorne Boulevard & 104th Street
9	Centinela Avenue & Florence Avenue
10	Locust Street & Manchester Avenue
11	Hillcrest Boulevard & Manchester Boulevard
12	Spruce Avenue & Manchester Boulevard
13	Myrtle Avenue & Arbor Vitae Street
14	Prairie Avenue & Florence Avenue
15	Prairie Avenue & Manchester Boulevard
16	Prairie Avenue & Kelso Street/Pincay Drive
17	Prairie Avenue & Arbor Vitae Street
18	Prairie Avenue & Hardy Street
19	Prairie Avenue & 97th Street
20	Prairie Avenue & Century Boulevard
21	Prairie Avenue & 104th Street
22	Doty Avenue & Century Boulevard
23	Yukon Avenue & Century Boulevard
24	Crenshaw Boulevard & Manchester Boulevard
25	Crenshaw Boulevard & Pincay Drive/90th Street
26	Crenshaw Boulevard & Century Boulevard

Source: Raju Associates, Traffic Study 2020, ***Appendix 4.12.1.***

18 Community Noise Equivalent Level (CNEL) is a weighted average of noise level over time. It is used to compare the noisiness of neighborhoods. CNEL is frequently used in regulations of airport noise impact on the surrounding community. A CNEL exceeding 65db is generally considered unacceptable for a residential neighborhood.



SOURCE: Google Earth - 2020; Meridian Consultants LLC - 2020

FIGURE **4.10-2**

Traffic Study Areas and Intersections

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FTA Vibration Guidelines

The FTA has published a technical manual, *Transit Noise and Vibration Impacts Assessment*, that provides ground-borne vibration impact criteria with respect to building damage during construction activities.[19] Building vibration damage is measured in PPV. According to the FTA guidelines, a vibration criterion of 0.20 PPV should be considered as the significant impact level for nonengineered timber and masonry buildings. Structures or buildings constructed of reinforced concrete, steel, or timber have a vibration damage criterion of 0.50 PPV based on the FTA guidelines.

The human reaction to various levels of vibration is highly subjective and varies from person to person. **Table 4.10-7: Ground-borne Vibration Criteria—Human Annoyance** shows the FTA's vibration criteria to evaluate vibration-related annoyance due to resonances of the structural components of a building. These criteria are based on extensive research that suggests humans are sensitive to vibration velocities in the range of 8 to 80 Hz.[20]

Structures amplify ground-borne vibration, and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than are heavier buildings. The level at which ground-borne vibration is strong enough to cause architectural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards, shown in **Table 4.10-8: Ground-borne Vibration Criteria—Architectural Damage**.[21]

Table 4.10-7
Ground-borne Vibration Criteria—Human Annoyance

Land Use Category	Max Lv (VdB)	Description
Workshop	90	Distinctly felt vibration; appropriate to workshops and nonsensitive areas
Office	84	Felt vibration; appropriate to offices and nonsensitive areas
Residential: Daytime	78	Barely felt vibration; adequate for computer equipment
Residential: Nighttime	72	Vibration not felt, but ground-borne noise may be audible inside quiet rooms

Source: United States Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment *(May 2006).*
Note: For Max Lv (VdB), Lv is the velocity level in decibels as measured in 1/3 octave bands of frequency over the frequency ranges of 8 to 80 Hz

19 US Department of Transportation, Federal Transit Administration (USDOT, FTA), Transit Noise and Vibration Impact Assessment, FTA report no. 0123 (September 2018), accessed December 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.
20 USDOT, FTA, Transit Noise and Vibration Impact Assessment.
21 USDOT, FTA, Transit Noise and Vibration Impact Assessment.

Table 4.10-8
Ground-borne Vibration Criteria—Architectural Damage

Building Category	PPV (ips)	Lv (VdB)
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Nonengineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment *(May 2006).*
Note: For Max Lv (VdB), Lv = the velocity level in decibels as measured in 1/3 octave bands of frequency over the frequency ranges of 8 to 80 Hz; VdB = vibration decibels; Hz = hertz; ips = inches per second.

Transit Noise and Vibration

The proposed Project will be a "pinched loop" system, whereby trains operate back and forth from the Market Street/Florence Avenue Station to the Prairie Avenue/Hardy Street Station, stopping at each station along the way and reversing at "turnbacks" at each end of the system.[22] Trains will crossover to the adjacent guideway prior to entering the Market Street/Florence Avenue Station and reverse direction when leaving the station. At the Prairie Avenue/Hardy Street Station end of the line, trains will also crossover prior to entering the station and reverse direction when leaving the station.

The proposed Project is planned to operate from 6:00 AM to 12:00 AM for normal weekday/weekend service, with the possibility to add trains and extend hours, as needed, to serve special events. Generally, additional service will be provided before the start of an event to bring passengers to the venue, and again at the end of the event to bring passengers back to the Metro Crenshaw/LAX Line.

As part of the proposed Project, the Operating Systems Report[23] technical requirements identified large, automated monorail, and rubber-tire APM trains as the technology to be maintained for consideration. The review confirmed that rubber-tire APM train and large automated monorail technologies are applicable and appropriate for the proposed Project. The requirements for rubber-tire APM train and large monorail technologies were used in the design and in this analysis.[24]

The APM trains would be either a rubber-tire, steel-wheel system, or a monorail system. The technical requirements for large, automated monorail, rubber-tire APM train, and automated steel-wheel/steel-rail, also known as automated light rail transit (ALRT) were reviewed against the public rights of-way and

22 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020. Section 5, System Operations.
23 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020. Section 3, Technology Assessment.
24 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020. Section 3, Technology Assessment.

property availability to determine the technologies best applicable for the proposed Project. While rubber tired APM trains, including monorail systems, can meet the defined physical requirements for the Project, steel wheel/steel rail technologies may also be viable provided this technology can comply with the defined requirements for the Project, including the ability to fit within the defined physical space available for the Project and maximum limits on noise. A steel wheel/steel rail may be applied to the project provided it can be demonstrated that the noise that would be generated by this system would be within the maximum limits defined for rubber tired APM Systems in the ASCE APM Standards Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.[25] Accordingly if steel wheel/steel rail technologies are applied the Project the noise levels generated would not be greater than the noise levels from a rubber tire system and no additional analysis for noise that would be generated by a steel wheel/steel rail system is required.

The estimated fleet size considers the operating fleet, which is the number of vehicles required to provide the necessary line capacity to meet the projected demand, as well as the spare fleet, comprised of the hot standby and maintenance trains to ensure that the number of trains required for operations is always available.[26] Rubber-tire APM train are typically used at airports around the world as well as urban areas. Typical characteristics of such APM trains include speeds of up to 50 miles per hour and vehicle dimensions of approximately 40 to 42 feet long and approximately 9 feet wide.[27] Monorail technologies are typically used in urban environments. Typical characteristics of both APM trains and monorails include train speeds of up to 50 miles per hour and vehicle dimensions of approximately 55 to 65 feet long by approximately 9.5 feet to 10.3 feet wide.[28]

Exterior APM Train Noise

Noise from APM trains is generated primarily from electric control systems and traction (electric) motors, gear systems, wind shear, and contact between wheels and the rails. While train horns and crossing notification systems can also be typical noise sources for APM trains, the guideway would be completely grade-separated, with no vehicle or passenger walkway along the routes.

The Automated People Mover Standards Committee of the Standards Council of the Transportation and Development Institute of ASCE[29] has developed the Automated People Mover Standards,

25 American Society of Civil Engineers, Automated People Mover Standards – Part 2 Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.

26 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020. Section 5.4, Fleet Size and Line Capacity Analysis.

27 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020.

28 Lea+Elliott, Inc. Inglewood Transit Connector EIR Operating Systems Conceptual Planning EIR Project Definition DRAFT - December 2020.

29 Automated People Mover Standards Committee of the Standards Council of the Transportation and Development Institute of ASCE, https://www.asce.org/templates/membership-communities-committee-detail.aspx?committeeid=000000885461.

ANSI/ASCE/T&DI 21-13,30 which establishes the minimum requirements necessary to achieve an acceptable level of safety and performance for an APM train. An APM train is defined as a guided light-rail transit train mode that is fully automated, featuring vehicles that operate on guideways with exclusive right-of-way. The ASCE Standard covers design, construction, operation, and maintenance of APM trains. Top APM train speed of 50 mph is achievable, but the actual operational speed will be limited to a maximum of 45 mph for passenger comfort and will be further governed by the speed restrictions imposed by the City as a condition of operation. Conservatively, this analysis assumes a maximum top speed of 50 miles per hour and travel speeds of 45 miles per hour for the rubber tire APM trains and monorails.

The exterior noise level generated by the APM train, with all contributing noise sources in operation, would not exceed the levels specified in Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.[31] The design of any barrier-type noise reducing devices along the guideway would be subject to the limits noted in **Table 4.10-9: Exterior APM Train Noise Limits**.

Table 4.10-9
Exterior APM Train Noise Limits

Condition	Maximum dBA Level	Measurement Location
Maximum length train entering and leaving station	76 (slow response)	In the station, 5 feet from the platform edge and 5 feet above the station floor.
Maximum length train stopped in station	74 (slow response)	In the station, 5 feet from the platform edge and 5 feet above the station floor, with vehicle doors and platform doors fully open.
Maximum length train traveling along the entire guideway under any normal velocity, acceleration, and deceleration operating condition	76 (fast response)	At any point* on a cylindrical envelope co-axial with, and 50 feet from, the centerline of each guideway lane (track), whichever is closer.
Maximum length train traveling at 10 mph	74 (fast response)	At any point* on a cylindrical envelope co-axial with, and 50 feet from, the centerline of each guideway lane (track).

Source: American Society of Civil Engineers, Automated People Mover Standards - Part 2 Section 2.2.1, Exterior Airborne Noise, ASCE 21-05

Potential operational transit noise levels for operation of APM trains are calculated with the computer noise model SoundPLAN, which generates computer simulations of noise propagation from sources such as rail noise. SoundPLAN creates noise contour maps and forecast noise levels at specific receptors using

30 Automated People Mover Standards Committee of the Standards Council of the Transportation and Development Institute of ASCE, Automated People Mover Standards, ANSI/ASCE/T&DI 21-13. https://ascelibrary.org/doi/book/10.1061/asce21#:~:text=Automated%20People%20Mover%20Standards%2C%20Part%201%20(ASCE%2021%2D96)&text=Automated%20People%20Mover%20Standards%20establishes%20the%20minimum%20set%20of%20requirements,people%20mover%20(APM)%20system.

31 American Society of Civil Engineers, Automated People Mover Standards - Part 2 Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.

sound power data and three-dimensional topographical data. Rail noise is modeled according to the industry standard rail noise prediction methodologies adopted by the Federal Railroad Administration (FRA).[32] The FRA noise prediction model calculates an A-weighted noise level at a receiver location through direct propagation or by taking into account shielding provided by barriers.

Operational Vibration

Ground-borne vibration measurements were collected in accordance with guidance provide in the FTA *Transit Noise and Vibration* Impact *Assessment Manual*.[33] Under the FTA *Transit Noise and Vibration Impact Assessment Manual*, land use types in determining noise impact criteria are designated into three land use categories:

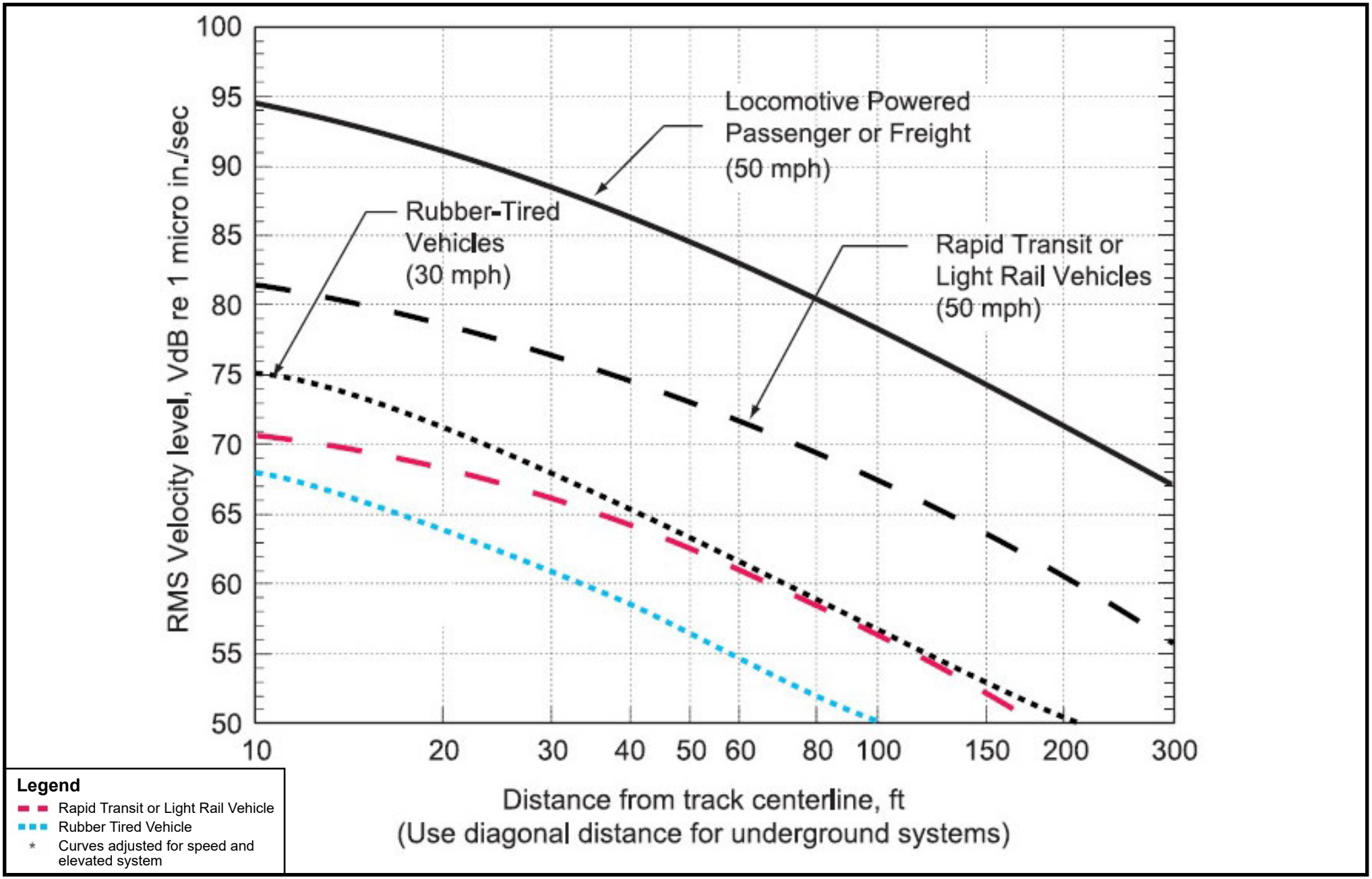
- **Category 1 (high vibration sensitivity)** includes uses where quiet is an essential element in their intended purpose, such as indoor concert halls or outdoor concert pavilions, or National Historic Landmarks where outdoor interpretation routinely takes place.
- **Category 2 (residential)** includes residences and buildings where people sleep, and
- **Category 3 (institutional)** includes institutional land uses with primarily daytime and evening uses, such as school, places of worship, and libraries.

These categories are developed to determine the level of vibration (VdB) that would disturb people during various activities and at various locations. The basic approach for a General Vibration Assessment is to define a curve, or set of curves, that predicts the overall ground-surface vibration as a function of distance from the source, apply adjustment to those vibration curves to account for site- or system-specific factors such as speed and system design, and estimate the vibration levels for uses located along the transit corridor.

Figure 4.10-3: Generalized Ground-Surface Vibration Curves presents the generalized ground-surface vibration curves at representative North American transit systems. These curves assume typical ground-borne vibration levels, equipment in good condition, and speeds of 50 miles per hour (mph) for the rail systems and 30 mph for buses. The top curve applies to trains that are powered by diesel or electric locomotives, which includes intercity passenger trains and commuter rail trains. The curve for rapid transit rail cars covers both heavy- and light-rail vehicles on at-grade and subway tracks. The curve for rubber-tired vehicles is for vehicles that rarely create ground-borne vibration problems unless there is a discontinuity or bump in the road that causes the vibration. Adjustment factors related to speed and distance determine the base curve for assessment of the guideway.

32 Federal Railroad Administration, High-Speed Ground Transportation Noise and Vibration Impact Assessment, September 2012.

33 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.



SOURCE: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual - September 2018

FIGURE **4.10-3**

Generalized Ground-Surface Vibration

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As shown in **Figure 4.10-3**, based on adjustment factors presented in the FTA *Transit Noise and Vibration Impact Assessment* manual[34] each base curve was reduced by 10 dB to account for the design of the proposed Project to operate on an elevated structure. Speed adjustments were also made, with 0.9 dB being subtracted to the vibration curve (red dotted line) for rapid transit or light rail vehicles to reduce the default speed of 50 mph to 45 mph, and 3.5 dB was added to rubber-tired APM trains vibration curve (blue dotted line) to increase the default speed of 30 mph to 45 mph.

4.10.4 REGULATORY FRAMEWORK

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.

4.10.4.1 Federal Regulations and Directives

There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the proposed Project.

Noise Control Act

In 1972, the Noise Control Act[35] was passed by congress to promote limited noise environments in support of public health and welfare. It also established the USEPA Office of Noise Abatement and Control to coordinate federal noise control activities.

USEPA established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects.

In a 1974 study,[36] USEPA 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 USEPA found that the DNL should not exceed 55 dBA outdoors or 45 dBA indoors. In 1982, noise control was largely passed to State and local governments.

34 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018.
35 Noise Control Act (42 United States Code section 4901 et seq.)
36 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. p. 34.

Office of Safety and Health Administration

With regard to noise exposure and workers, the Office of Safety and Health Administration (OSHA) regulations safeguard the hearing of workers exposed to occupational noise. OSHA is responsible for the protection against the effects of noise exposure when sound levels exceed those, listed in **Table 4.10-10: Permissible Noise Exposures for Workers**, when measured on the A scale of a standard sound level meter at slow response.[37]

Table 4.10-10
Permissible Noise Exposures for Workers

Work Duration per Day (hours)	Sound level (dBA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

Source: Occupational Safety and Health Administration, "Occupational Noise Exposure,"https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10625.

Federal Vehicle Noise Regulations

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.[38] 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 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.

37 OSHA, "Occupational Noise Exposure," https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10625.

38 Code of Federal Regulations (CFR), Title 40. Protection of Environment, Environmental Protection Agency, Subchapter G. Noise Abatement Programs, Part 205. Transportation Equipment Noise Emission Controls.

4.10.4.2 State Regulations and Directives

State Noise Standards

The State of California has adopted noise compatibility guidelines for general land use planning as shown in **Figure 4.10-4: State Criteria for Noise Compatible Land Use**. The types of land uses addressed by the State and the acceptable noise categories for each land use are included in the *State of California General Plan Guidelines* guidance document, which is published and updated by the Governor's Office of Planning Research.[39] The level of acceptability of the noise environment is dependent on the activity associated with the particular land use. In addition, Section 65302(f) of the California Government Code requires each county and city in the State to prepare and adopt a comprehensive long-range general plan for its physical development, with Section 65302(g) requiring a noise element to be included in the general plan. The noise element must (1) identify and appraise noise problems in the community, (2) recognize Office of Noise Control guidelines, and (3) analyze and quantify current and projected noise levels.

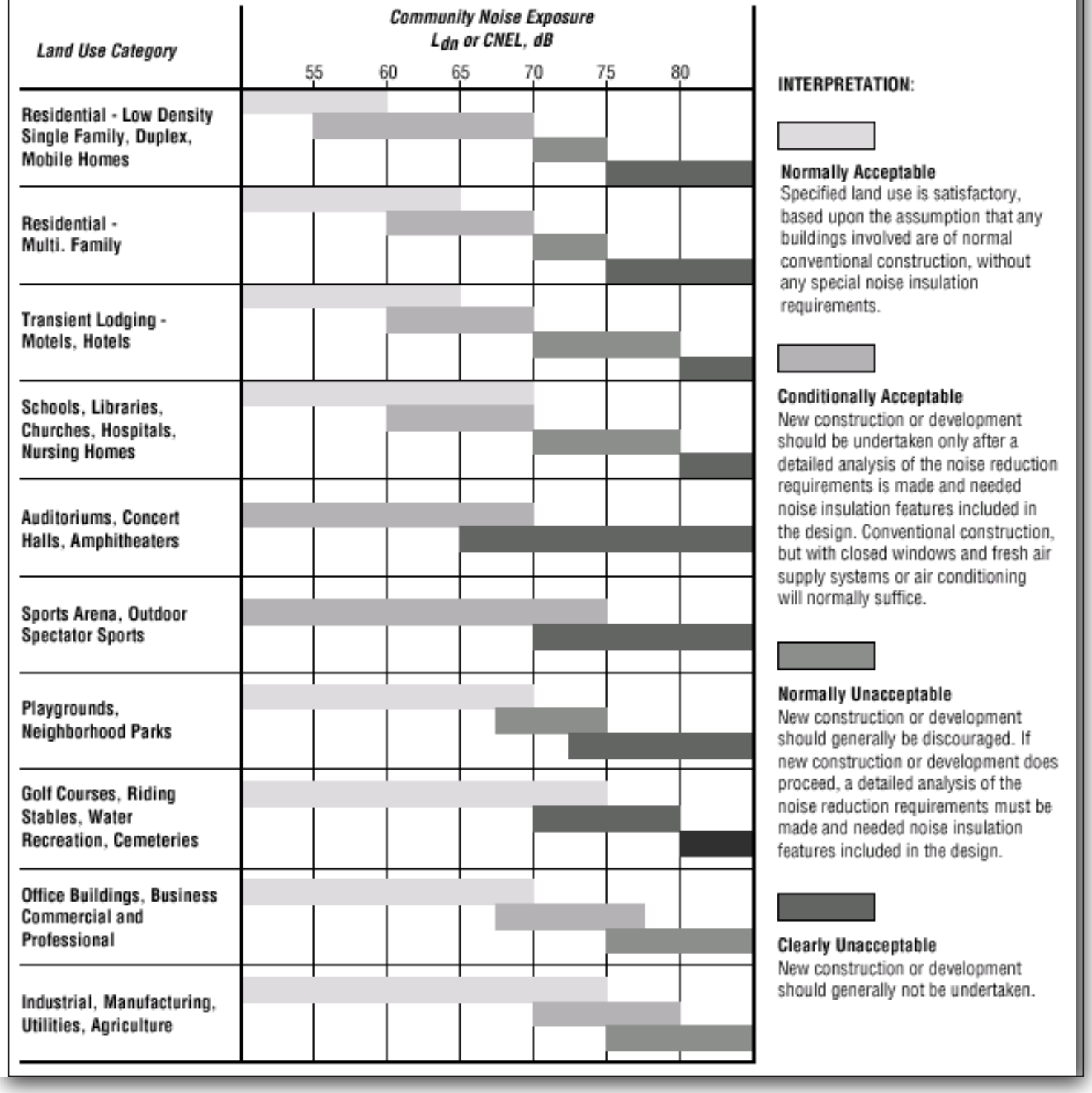
DHS's Office of Noise Control has established guidelines to provide communities with noise environments that it deems to be generally acceptable based on land-use categories. These guidelines serve as a primary tool for a city to use to assess the compatibility between land uses and outdoor noise. Noise exposure for single-family uses is normally acceptable when the noise level at exterior residential locations is equal to or below 60 dBA (CNEL or Ldn), conditionally acceptable when noise levels are between 55 to 70 dBA (CNEL or Ldn), and normally unacceptable when noise levels exceed 70 dBA (CNEL or Ldn). Some overlap exists between there categories as shown in **Figure 4.10-4: State Criteria for Noise Compatible Land Use**. These guidelines apply to noise sources such as vehicular traffic, aircraft, and rail movements.

The Department of Housing and Community Development has required that new residential units should not be exposed to outdoor ambient noise levels in excess of 65 dBA (CNEL or Ldn), and, if necessary, sufficient noise insulation must be provided to reduce interior ambient levels to 45 dBA. Within a 65 dBA exterior noise environment, interior noise levels are typically reduced to acceptable levels (to at least 45 dBA CNEL) through conventional construction, but with closed windows and fresh air apply systems or air conditioning.

Because typical noise attenuation within residential structures with closed windows is at least 20 dB, an exterior noise exposure of 65 dB CNEL is generally the noise land-use compatibility guideline for new residential dwellings in California. Because commercial and industrial uses are not occupied on a 24-hour basis, the exterior noise exposure standard for less-sensitive land uses generally is somewhat less stringent.

39 Governor's Office of Planning and Research, State of California General Plan Guidelines (2017), http://www.opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf.

FIGURE 2



SOURCE: TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT MANUAL, FEDERAL TRANSIT ADMINISTRATION

FIGURE **4.10-4**

State Criteria for Noise Compatible Land Use

Vehicle Noise Standards

The State of California establishes noise limits for vehicles licensed to operate on public roads.[40] 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.

4.10.4.3 Regional Regulations and Directives

Los Angeles County Airport Land Use Plan

Pursuant to the California Public Utilities Code,[41] 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 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 Airport Land Use Plan (ALUP).[42]

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. The Los Angeles County ALUP employs a land use compatibility table to identify the level of compatibility for particular land uses within the planning area boundaries/ AIAs for the County's airports based on community noise exposure level

Per the CFR Part 150 Land Use Compatibility Guidelines,[43] residential uses are identified as noncompatible land uses for parcels exposed to 65 dBA CNEL or higher. Commercial land uses are identified as compatible

40 2009 California Vehicle Code - Section 27200-27207: Article 2.5. Noise Limits

41 California Public Utilities Code, Division 9, Part 1, Chapter 4, Article 3.5, Sections 21670– 21679.5.

42 Los Angeles County Airport Land Use Commission, Los Angeles County Airport Land Use Plan, adopted December 1991, http://planning.lacounty.gov/view/alup/

43 Federal Aviation Administration, Land Use Compatibility and Airports. p.V-10.

with 65 and 70 dBA CNEL noise levels. The CFR Part 150 Land Use Compatibility Guidelines categorizes hotel uses as a transient lodging form of residential.

4.10.4.4 Local Regulations and Directives

Inglewood General Plan Noise Element

The General Plan includes a Noise Element[44] which identifies a program for noise control in the planning process and a tool for achieving and maintaining environmental noise levels compatible for land use. The Element includes goals and policies to help control noise through land use planning decisions and by developing measures to control nontransportation noise impacts.

The City's noise standards correlate with land-use zoning classifications to maintain identified ambient noise levels and to limit, mitigate, or eliminate intrusive noise that exceed the ambient noise levels within a specified zone. The City has adopted local guidelines based in part on the community noise compatibility guidelines established by the California Department of Health Services for use in assessing the compatibility of various land-use types with a range of noise levels.[45] These guidelines are set forth in the City's Noise Element in terms of the CNEL. These include:

- Residential uses normally incompatible in areas where the ambient noise levels exceed 70 dB CNEL; and residential uses are clearly and normally compatible in areas where the ambient noise levels range between 55–70 dB CNEL.
- Commercial/professional office buildings and land uses are normally incompatible in areas where the ambient noise levels exceed 75 dB CNEL and are normally compatible within areas where the ambient noise levels range from 65 dB CNEL to 75 dB CNEL (for commercial/professional offices only).
- Industrial uses are normally incompatible in areas where the ambient noise levels exceed 75 dB CNEL; and are normally compatible in areas where the ambient noise level ranges between 65-75 dB CNEL.
- Institutional land uses are normally incompatible in areas where the ambient noise levels exceed 65 dB CNEL and are normally compatible within areas where the ambient noise levels range from 60 to 65 dB CNEL.
- Schools, libraries, hospitals, and nursing homes are treated as noise-sensitive land uses, requiring acoustical studies within areas exceeding 60 dB CNEL.

The following goals from the City 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

44 City, General Plan, "Noise Element" (September 1, 1987).

45 California Department of Health Care Services, Systems of Care Division, Child Health and Disability Prevention Program, Health Assessment Guidelines (July 2016).

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 compatibilities 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.

Inglewood Municipal Code (IMC)

City Municipal Code Chapter 5 (Offenses, Miscellaneous), Article 2 (Noise Regulations) establishes "criteria and standards for the regulation of noise levels within the community." Rather than being adopted to assist the City in guiding land use decisions, like the Noise Element of the General Plan, the City's Noise Regulations are intended to protect "the comfort, repose, health, or peace of residents in the area," and define noise levels that are considered public nuisances and are subject to abatement through the City's exercise of its enforcement authority. 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.

- **Section 5-27: Base Ambient Noise Level:** 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.
- **Sections 5-29: Excessive Noise. Unlawful** and **5-30: Maximum Residential Noise Levels:** establish the City's authority to regulate noise that "disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person residing in the area," and identifies maximum lawful noise levels and maximum duration periods that may be generated on residential and nonresidential properties.
- **Section 5-31: Maximum Nonresidential Noise Levels:** Measured on the exterior of nonresidential properties, no noise level is permitted to exceed the respective base ambient noise levels for commercial and industrial land uses for a maximum cumulative duration of 30 minutes in any hour.
- **Section 5-39: Machinery, Equipment, Fans and Air-Conditioning, Noise Regulated:** states that it is unlawful for any person to operate, cause to operate or permit the operation of any machinery, equipment, device, pump, fan, compressor, air-conditioning apparatus, or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient noise base level by 5 dBA.

- **Section 5-41: Construction of Building and Projects, Noise Regulated:** states that is unlawful for any person within a residential zone, or within a radius of 500 hundred feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, pneumatic hammer, derrick, excavation or earth moving equipment, or other construction equipment between the hours of 8:00 PM and 7:00 AM of the next day in such a manner that a reasonable person residing in the area is caused discomfort or annoyance unless a permit has been obtained from the Permits and Licenses Committee of the City.
- **Section 5-43: Motor Driven Vehicles. Noise Regulated:** 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 5-45: Excessive Train Horn Noise Prohibited:** states that it is unlawful for any person to operate or sound, or cause to be operated or sounded, between the hours of 10:00 PM and 7:00 AM of the next day, a train horn or train whistle which creates a noise in excess of 90 dBA at any place or point 300 hundred feet or more distant from the source of such sound.

4.10.5 EXISTING CONDITIONS

4.10.5.1 Adjusted Baseline

The noise analysis assumes the Adjusted Baseline Environmental Setting as described in **Section 4.0: Environmental Analysis**; refer to **Table 4.0-1** for the details of the Adjusted Baseline. Related to noise, the changes associated with the Hollywood Park Specific Plan (HPSP) Adjusted Baseline projects, currently under development and anticipated to be operational prior to construction of the proposed Project, include vehicle trips associated with new uses in the HPSP area.

Vehicle trips associated with activities at the HPSP would take place during 2020 and would have an impact on the existing environment. Accordingly, the roadway noise associated with this development within the HPSP area are considered as part of the Adjusted Baseline. No other changes to the existing environmental setting related to noise would occur under the Adjusted Baseline.

4.10.5.2 Summary of Surrounding Land Uses

The proposed Project is located in the central portion of the City, within the Downtown TOD Plan,[46] and extends south along Market Street to Manchester, and then south along Prairie Avenue to Hardy Street.

46 City, New Downtown and Fairview Heights Transit Oriented Development Plan and Design Guidelines, (adopted November 1, 2016), accessed March 2019, http://inglewood.arroyogroup.com/wp-content/uploads/2017/01/The-New-Downtown-Fairview-Heights-TOD-Plan-Design-Guidelines-lo-res.pdf.

The southern portion of the proposed Project is adjacent to the Hollywood Park Specific Plan (HPSP)[47] development site.

The Downtown TOD Plan areas contain a variety of building types and designs and architectural styles. Open spaces within the Downtown TOD Plan area consist of man-made parks, plazas, the Inglewood Cemetery, and landscaped areas that also have an urban and developed character.

Land uses are well balanced in downtown Inglewood with the concentration of commercial retail uses in the historic core. Land uses within Downtown TOD consists of residential uses; retail commercial, and office; and the remainder consists of public services/facilities, industrial, and vacant parcels. The residential neighborhoods in Downtown Inglewood contain a mix of single-family homes, duplexes, or triplexes, along with apartments or townhomes.

The Downtown District is a pedestrian-scaled area with historic commercial buildings that provide retail and office uses. This district contains many buildings of architectural, historic, and cultural significance that help define its visual character. These buildings include, but are not limited to: Fox West Coast Theater, Bank of Inglewood, Lepper Building, S.H. Kress Store, and the Inglewood Veterans Memorial Building. The area centered on Hillcrest Boulevard between Regent Street and Grace Avenue, which consists entirely of single-family dwellings. Industrial uses are generally located west of La Brea Boulevard, with additional industrial uses north of Florence Avenue east of La Brea.

Located immediately to the south of The Forum, the former Hollywood Park Racetrack on Prairie Avenue between Arbor Vitae Street and Century Boulevard is being redeveloped as part of the HPSP with major new development. The HPSP, which was adopted in 2009, which is a large mixed-use development, including high density residential, retail space, office development, a relocated casino, hotel, four acres of civic uses, and 25 acres of new public parks, including a large lake.

As the result of the current construction of SoFi stadium, development plans for the Hollywood Park site were expanded to add the area between Pincay Drive and Arbor Vitae Street, and to reorganize the northern part of the site, enabling room for the stadium and its parking lots, along with increasing retail and office capacity to 890,000 SF and 780,000 SF, respectively.

The HPSP is located in a developed area which is supported by existing urban infrastructure. The surrounding area is comprised of a mix of low- to medium-density residential, commercial, and office uses.

47 City of Inglewood, Hollywood Park Specific Plan, adopted July 8, 2009, amended September 23, 2014, and further amended February 24, 2015.

The properties immediately to the west of the HPSP (across Prairie Avenue) are several single-story retail/commercial and multifamily residential uses.

4.10.5.3 Sensitive Receptors

Some land uses are considered more sensitive to intrusive noise than others based on the types of activities typically involved at the receptor location. Land uses considered to be noise sensitive, as identified in the City's General Plan Noise Element[48], includes residences, schools, hospitals, libraries, and parks. Residential land uses are considered especially noise sensitive because (1) considerable time is spent by individuals at home, (2) significant activities occur outdoors, and (3) sleep disturbance is most likely to occur in a residential area. The Federal Highway Administration (FHWA) considers uses where people normally sleep, such as residences, hotels, and motels, noise-sensitive land uses.[49] Commercial and industrial uses are not considered noise-sensitive by either the City or FHWA. However, for purposes of this analysis, adjacent commercial and industrial uses that are considered vibration-sensitive are listed below.

Land uses adjacent to and within a quarter mile radius of the proposed Project, including the guideway and stations and the MSF, include noise sensitive receptors, including single and multifamily residences (identified as Category 2 uses), schools, places of worship, medical offices (identified as Category 3 uses), and hotels (see **Section 4.0**, *4.0.7*). For the purpose of presenting the results of the potential noise impact analyses in this EIR, the noise sensitive receptors nearest to the proposed Project have been organized into groups by geographic proximity as shown **Figure 4.10-5: Noise Sensitive Receptor Groups**. These receptor groups are used in this EIR to provide a representation of the potential noise impacts on noise-sensitive receptors around the proposed Project and represent the areas where baseline noise monitoring was conducted. Although the receptor groups shown do not include all the receiver points evaluated in the noise modeling analyses, these identified groups include all noise-sensitive receptors nearest to the proposed Project and represent the greatest potential for noise impacts. Adjacent commercial and industrial uses that are not noise-sensitive (specifically, receptor groups Site A – Commercial uses along E. Queen Street, Site D – Commercial uses along Prairie Avenue; lodging uses along W. Century Boulevard, Site E – Commercial and lodging uses along the southern portion of W. Century Boulevard, Site J – Commercial uses along E. Manchester Boulevard, and Site K – Commercial uses along E. Regent Street) but considered vibration-sensitive (as discussed in more detail below), are also listed in the prior locations for informational purposes. As such, the areas where noise and vibration monitoring was conducted along

48 City of Inglewood, Inglewood General Plan: Noise Element, September 1987, https://www.cityofinglewood.org/DocumentCenter/View/130/Noise-Element-1987-PDF. Accessed December 2018.

49 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 23, September 2018, accessed October 2020, 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

the proposed alignment and stations are comprised of the following uses:

Market Street Segment

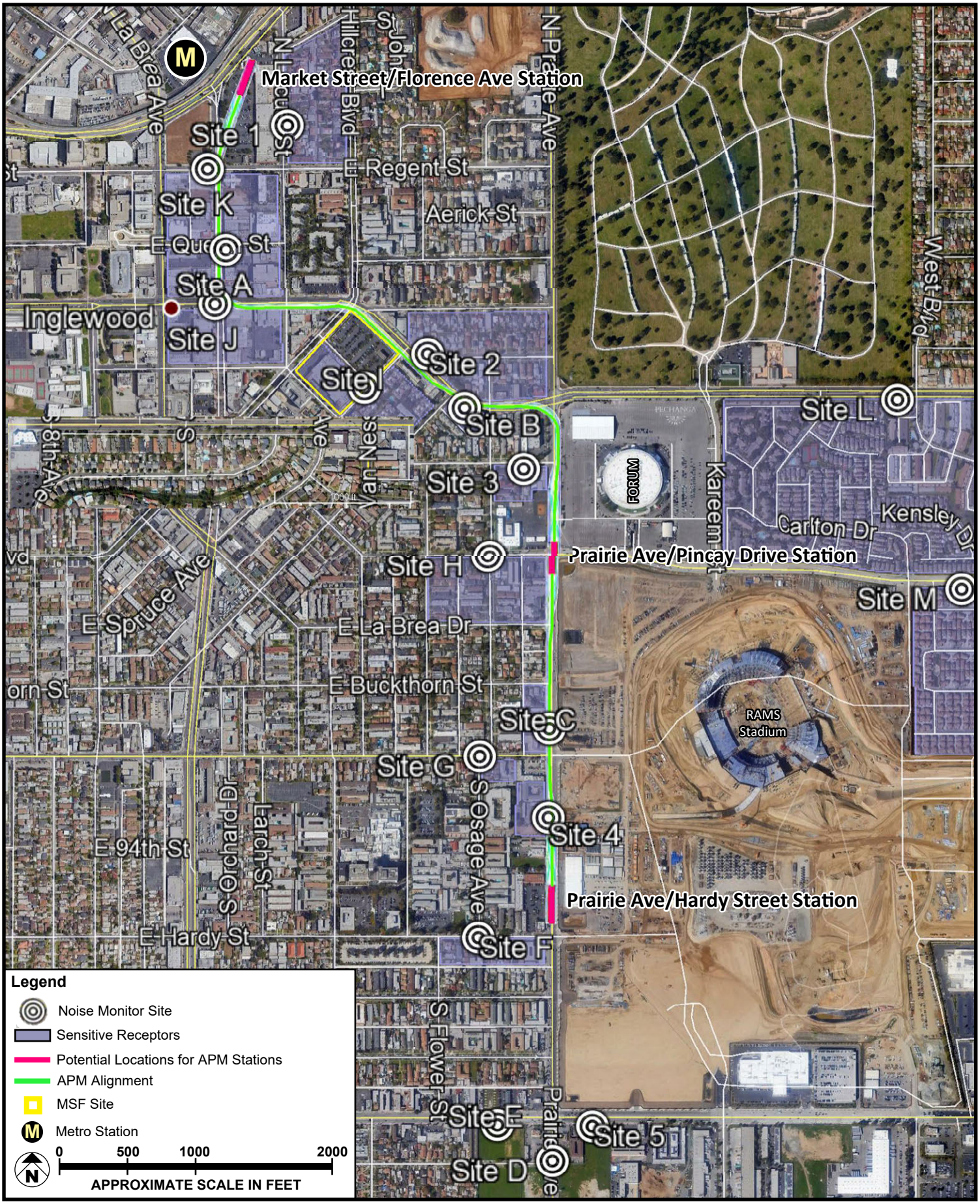
- **Site 1:** Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street;
- **Site A:** Commercial uses along E. Queen Street; and
- **Site K**: Commercial uses along E. Regent Street.

Manchester Boulevard Segment

- **Site 2:** Residential uses along E. Manchester Boulevard, Manchester Drive and S. Osage Avenue;
- **Site B:** Residential uses on the northern portion of E. Manchester Boulevard, commercial uses on the southern portion of E. Manchester Boulevard;
- **Site I:** Residential uses on the eastern portion of E. Spruce Avenue, commercial uses on the western portion of E. Spruce Avenue;
- **Site J:** Commercial uses along E. Manchester Boulevard; and
- **Site L:** Residential uses along W. Manchester Boulevard.

Prairie Avenue Segment

- **Site 3:** Residential uses along E. Nutwood Street, educational facilities along Prairie Avenue;
- **Site 4:** Mixed-use residential along west side of Prairie Avenue;
- **Site H:** Residential uses on the northern and southern portion of E. Kelso Street; educational uses on the corner of Prairie Avenue and Kelso Street;
- **Site G:** Residential uses along E. Arbor Vitae Street;
- **Site M:** Residential uses along Pincay Drive;
- **Site F:** Multifamily residential uses along E. Hardy Street;
- **Site C:** SoFi Stadium to the west of Prairie Avenue, commercial and lodging uses to the east of Prairie Avenue;
- **Site 5:** Lodging uses on the southern portion of W. Century Boulevard;
- **Site D:** Commercial uses along Prairie Avenue; lodging uses along W. Century Boulevard; and
- **Site E:** Commercial and lodging uses along the southern portion of W. Century Boulevard.



SOURCE: Google Earth - 2020; Meridian Consultants LLC - 2020

FIGURE **4.10-5**

Noise Sensitive Receptor Groups

251-003-20

4.10.5.4 Noise

Ambient Noise

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

To establish baseline noise conditions, long-term 24-hour noise levels (refer to **Appendix 4.10-1.1**) were monitored at five representative receptor locations (identified as Sites 1 to 5) in the vicinity of the proposed guideway and stations, and at the proposed MSF site. Thirteen (13) additional locations (Site A through M) were monitored on two nonsuccessive days, measured as one-hour measurements (refer to **Appendix 4.10-2.2**). The daytime (AM peak) ambient noise levels were measured between 7:00 AM and 10:00 AM, and the evening (PM peak) ambient noise levels were measured between 4:00 PM and 7:00 PM.

Table 4.10-11: Long-term (24-hour) Ambient Noise Measurements provides a summary of the ambient noise measurements conducted at the five selected noise receptor locations for a 24-hour period. Based on field observations, the ambient noise at the measurement locations is dominated by local vehicular traffic and, to a lesser extent, airplane flyovers and other typical urban noises. As shown, the existing 24-hour ambient noise levels (CNEL) at the off-site noise receptor locations ranged from a low of 63.7 dBA CNEL at residential use at Site 1 (Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street) to a high of 80.6 dBA CNEL at the residential uses at Site 4 (Mixed-use residential along west side of Prairie Avenue). In terms of the City's land use noise compatibility categories, locations range from clearly compatible to clearly incompatible. Specifically, the noise exposure compatibility categories are summarized as follows:

- Clearly Compatible: Locations where residential uses are dominant along Locust Avenue (Site 1) and Manchester Boulevard (Site 2) with nighttime averages falling within this category.
- Normally Compatible: Locations where residential uses are dominant along Locust Avenue (Site 1) and Manchester Boulevard (Site 2) with daytime averages and 24-hour CNEL falling within this category. Additionally, nighttime averages of the residential uses along Nutwood Street (Site 3) and lodging uses along Century Boulevard (Site 5) fall within this category.
- Normally Incompatible: Locations where residential uses are dominant along Nutwood Street (Site 3) and lodging uses along Century Boulevard (Site 5) with daytime averages and 24-hour CNEL falling within this category. Additionally, locations where commercial uses are dominant along Prairie Avenue (Site 4) with daytime and nighttime averages falling with this category.
- Clearly Incompatible: Locations where commercial uses are dominant along Prairie Avenue (Site 4) with 24-hour CNEL averages falling within this category.

Table 4.10-12: Short-term (1-hour) Ambient Noise Measurements (Daytime) provides the one-hour measurements during the AM and PM peak hours at the 13 selected noise receptor locations (refer to **Appendix 4.10-1.2**). As shown, the existing 1-hour ambient noise levels (dBA Leq) at the off-site noise receptor locations ranged from a low of 62.7 dBA Leq at the residential uses at Site F (Multifamily residential uses along E. Hardy Street) during the AM period to a high of 76.6 dBA Leq at the residential uses at Site M (Residential uses along Pincay Drive) during the PM period. In terms of the City's land use noise compatibility categories, locations range from clearly compatible to clearly incompatible. Specifically, the noise exposure compatibility categories are summarized as follows:

- Clearly Compatible: Locations where public uses are dominant along Market Street (Site K).
- Normally Compatible: Locations where residential uses are dominant along Queen Street (Site K), Manchester Boulevard (Site I), Arbor Vitae Street (Site G), Kelso Street (Site H) and Hardy Street (Site F).
- Normally Incompatible: Land uses where commercial uses are dominant along Market Street (Site J), where residential uses are dominant along Manchester Boulevard (Site L), where lodging uses are dominant along Prairie Avenue (Site D) and Century Boulevard (Site E), and where education uses are dominant along Manchester Boulevard (Site B) and Kelso Street (Site H).
- Clearly Incompatible: Land uses where places of worship are dominant on Prairie Avenue (Site C).

Table 4.10-13: Short-term (15-minute) Ambient Noise Measurements (Nighttime) provides the 15-minute measurements during the nighttime period after 8:00 PM at the 13 selected noise receptor locations (refer to **Appendix 4.10-1.3**). As shown, the existing short-term 15-minute noise levels during the nighttime ranged from a low of 56.6 dBA Leq at Site H (Residential uses on the northern and southern portion of E. Kelso Street; educational uses on the corner of Prairie Avenue and Kelso Street) to a high of 72.8 dBA Leq at Site L (Residential uses along W. Manchester Boulevard). In terms of the City's land use noise compatibility categories, locations range from clearly compatible to clearly incompatible. Specifically, the noise exposure compatibility categories are summarized as follows:

- Clearly Compatible: Land uses where residential uses are dominant along Queen Street (Site A), Manchester Boulevard (Site I), Kelso Street (Site H), and Hardy Street (Site F). Additionally, where commercial uses are dominant along Market Street (Site J and K).
- Normally Compatible: Land uses where residential uses are dominant along Arbor Vitae Street (Site G), Chapman Lane (Site M). Additionally, where lodging uses are dominant along Prairie Avenue (Site D) and Century Boulevard (Site E).
- Normally Incompatible: Land uses where residential uses are dominant along Manchester Boulevard (Site L). Additionally, where educational uses are dominant along Manchester Boulevard (Site B) and where place of worship uses are dominant along Prairie Avenue (Site C).
- Clearly Incompatible: None.

Table 4.10-11
Long-term (24-hour) Ambient Noise Measurements

Site	Address	Existing Land Use	Monitored Date	CNEL (dBA)	Daytime Average (dBA Leq)[1]	Nighttime Average (dBA Leq)[2]	Noise Exposure Compatibility Category
Market Street Segment							
1	220 Locust Avenue	Residential	November 14, 2018	63.7	61.9	54.6	Clearly/Normally Compatible
			November 15, 2018	65.7	65.6	55.1	Clearly/Normally Compatible
Manchester Boulevard Segment							
2	607 Manchester Boulevard	Residential	November 14, 2018	67.7	65.0	59.4	Clearly/Normally Compatible
			November 15, 2018	67.5	64.1	59.6	Clearly/Normally Compatible
Prairie Avenue Segment							
3	818 Nutwood Street	Residential	November 14, 2018	74.1	71.2	66.0	Normally Compatible/Normally Incompatible
			November 15, 2018	75.2	71.5	67.5	
4	923 Prairie Avenue	Commercial	November 14, 2018	80.1	78.0	71.6	Normally Incompatible/Clearly Incompatible
			November 15, 2018	80.6	77.2	72.8	
5	3940 Century Boulevard	Lodging	November 14, 2018	77.6	73.3	70.2	Normally Compatible/Normally Incompatible
			November 15, 2018	77.6	73.7	70.0	

*Source: Refer to **Appendix 4.10-1: Long-Term (24-hour) Ambient Noise Measurement Sheets** for monitoring data sheets.*
Note:
[1] Daytime period (Lday) includes 7:00 AM to 10:00 PM.
[2] Nighttime period (Lnight) includes 10:00 PM to 7:00 AM.

Table 4.10-12
Short-term (1-hour) Ambient Noise Measurements (Daytime)

Site	Approximate Address	Existing Land Use	Monitored Date	1-hour Leq (dBA)		Average	Noise Exposure Compatibility Category
				AM Peak Hour	PM Peak Hour		
Market Street Segment							
J	201 Market Street	Commercial/Mixed Use	December 17, 2018 December 19, 2018	73.3 73.8	73.2 73.9	73.6	Normally Incompatible
K	205 Market Street	Public	November 26, 2018 November 28, 2019	67.1 69.1	68.0 64.6	67.5	Clearly/Normally Compatible
A	300 Queen Street	Residential	November 26, 2018 November 28, 2018	64.2 63.5	64.1 64.6	64.1	Normally Compatible
Manchester Boulevard Segment							
L	3500 Manchester Boulevard	Residential	December 17, 2018 December 19, 2018	73.9 74.5	74.2 73.4	74.0	Normally Incompatible
I	500 Manchester Boulevard	Residential	December 11, 2018 December 13, 2018	69.5 67.6	66.6 67.8	68.0	Normally Compatible
B	712 Manchester Boulevard	Educational	December 11, 2018 December 13, 2018	72.1 76.1	71.2 72.9	73.5	Normally Incompatible
Prairie Avenue Segment							
G	629 Arbor Vitae Street	Residential	December 11, 2018 December 13, 2018	64.3 68.0	67.0 68.8	67.3	Normally Compatible
H	728 Kelso Street	Educational/Residential	December 17, 2018 December 19, 2018	68.1 65.4	69.1	67.6	Normally Compatible/Normally Incompatible
M	3681 Chapman Lane	Residential	December 17, 2018 December 19, 2018	72.8 73.2	75.9 76.6	74.9	Normally Incompatible
F	636 Hardy Street	Residential	January 21, 2019 January 23,2019	62.7 71.5	63.8 70.9	68.8	Normally Compatible

Site	Approximate Address	Existing Land Use	Monitored Date	1-hour Leq (dBA)		Average	Noise Exposure Compatibility Category
				AM Peak Hour	PM Peak Hour		
C	823 Prairie Avenue	Place of Worship/Lodging	December 11, 2018	77.3	76.1	76.7	Normally/Clearly Incompatible
			December 13, 2018	77.1	76.2		
D	10023 Prairie Avenue	Lodging	November 27, 2018	75.1	78.5	76.2	Normally Incompatible
			December 4, 2018	74.4	75.4		
E	4020 Century Boulevard	Lodging	November 27, 2018	72.8	71.7	72.6	Normally Incompatible
			December 4, 2018	73.1	72.7		

*Source: Refer to **Appendix 4.10-2: Short-term (1-hour) Ambient Noise Measurement (Daytime)** for monitoring data sheets.*

Note: Two sets of measurements were taken on nonsuccessive days for each site. AM Peak hour measurements taking place between 7:00 AM to 10:00 AM. PM peak hour measurements took place between 4:00 PM to 7:00 PM.

Table 4.10-13
Short-term (15 minute) Ambient Noise Measurements (Nighttime)

Site	Approximate Address	Existing Land Use	Monitored Date	15-minute dBA	Noise Exposure Compatibility Category
Market Street Segment					
J	201 Market Street	Commercial/Mixed Use	August 3, 2020	69.1	Cleary Compatible
K	205 Market Street	Public	August 3, 2020	63.4	Cleary Compatible
A	300 Queen Street	Residential	August 3, 2020	57.8	Cleary Compatible
Manchester Boulevard Segment					
L	3500 Manchester Boulevard	Residential	August 4, 2020	72.8	Normally Incompatible
I	500 Manchester Boulevard	Residential	August 3, 2020	58.5	Cleary Compatible
B	712 Manchester Boulevard	Educational	August 4, 2020	70.5	Normally Incompatible
Prairie Avenue Segment					
G	629 Arbor Vitae Street	Residential	August 5, 2020	61.5	Normally Compatible
H	728 Kelso Street	Educational/Residential	August 4, 2020	56.6	Cleary Compatible
M	3681 Chapman Lane	Residential	August 4, 2020	67.9	Normally Compatible
F	636 Hardy Street	Residential	August 5, 2020	59.9	Cleary Compatible
C	823 Prairie Avenue	Place of Worship/Lodging	August 5, 2020	70.6	Normally Incompatible
D	10023 Prairie Avenue	Lodging	August 5, 2020	67.0	Normally Compatible
E	4020 Century Boulevard	Lodging	August 5, 2020	66.2	Normally Compatible

*Source: Refer to **Appendix 4.10-3: Short-term (15-minute) Ambient Noise Measurements (Nighttime)** for monitoring data sheets.*
Note: Nighttime measurements took place between 8:00 PM to 9:45 PM.

Roadway Noise

Adjusted baseline conditions include socio-economic and demographic components, and transportation network components that are currently under construction or have building permits issued by the City in the immediate vicinity of the ITC Project alignment. Accordingly, as explained in Traffic Study (refer to **Appendix 4.12.1**) the travel demand forecasting model used in the process was updated as required to reflect these assumptions.

The adjusted baseline traffic noise on local roadways in the surrounding areas was calculated to quantify the daytime and nighttime noise levels using information provided by the Traffic Study (see **Appendix 4.12.1**). As previously noted, a total of 26 intersections and corresponding roadway segments were selected for the existing off-site traffic noise analysis, based on proximity to noise sensitive uses along the roadway segments and potential increases in traffic volume from the proposed Project.

Trip generation associated with the buildout and operation of the Adjusted Baseline (see **Section 4.0**, *4.0.5: Adjusted Baseline*) has been estimated and traffic volumes in the area surrounding the proposed Project have been projected to establish the Adjusted Baseline traffic environment along the roadway segments selected for analysis. Additionally, trip generation associated with events at the SoFi Stadium, The Forum, and concurrent 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.

Appendix 4.10.2-6 provides the roadway noise levels for the adjusted baseline traffic levels in details. As shown, adjusted baseline roadway noise levels during the daytime ranged from a low of 55.8 dBA along Market Street from Florence Avenue to Regent Street to a high of 72.5 dBA along Century Boulevard between Grevillea Avenue and La Brea Avenue/Hawthorne Boulevard. Additionally, nighttime roadway noise levels ranged from a low of 48.2 along Market Street from Florence Avenue to Regent Street to a high of 64.3 dBA along Century Boulevard from Club Drive to Crenshaw Boulevard.

Aircraft Noise

The nearest public use airports to the proposed Project include LAX and Jack Northrop Field/Hawthorne Municipal Airport (HHR). There are no private airstrips located in the vicinity of the proposed Project.

The Planning Boundary for LAX represents the combined areas around the airport subject to potential noise impacts and safety hazards associated with airport operations. The ALUP[50] provides noise and safety policies governing development of compatible future land uses in areas around LAX. Portions of the alignment between south Market Street, along Manchester Boulevard and south Prairie Avenue are

50 Los Angeles County Airport Land Use Plan, 1991, Contour Map, http://planning.lacounty.gov/view/alup/

located within the Planning Boundary/Airport Influence Area established for LAX in the Los Angeles County ALUP[51] Map for LAX as shown in **Figure 4.10-6: ALUP Noise Contours**. Portions of the proposed Project between south Market Street, along Manchester Boulevard and south prairie Street are located within the CNEL 65 dBA contour established for LAX in the ALUP (see **Figure 4.10-4**).[52]

Groundborne Noise

Groundborne noise levels in residential areas similar to the Project area would generally be 20 to 50 decibels lower than the velocity level depending on the frequency level of the source.[53] With a background groundborne vibration level is residential areas of 50 VdB or lower, groundborne 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. Typical vibration from construction equipment would fall under the low frequency range with vibratory equipment such as pile drivers falling in the mid frequency range.[54] With a vibration velocity of 108 VdB at five feet from the source, a large bulldozer would generate groundborne noise level of approximately 58 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).[55]

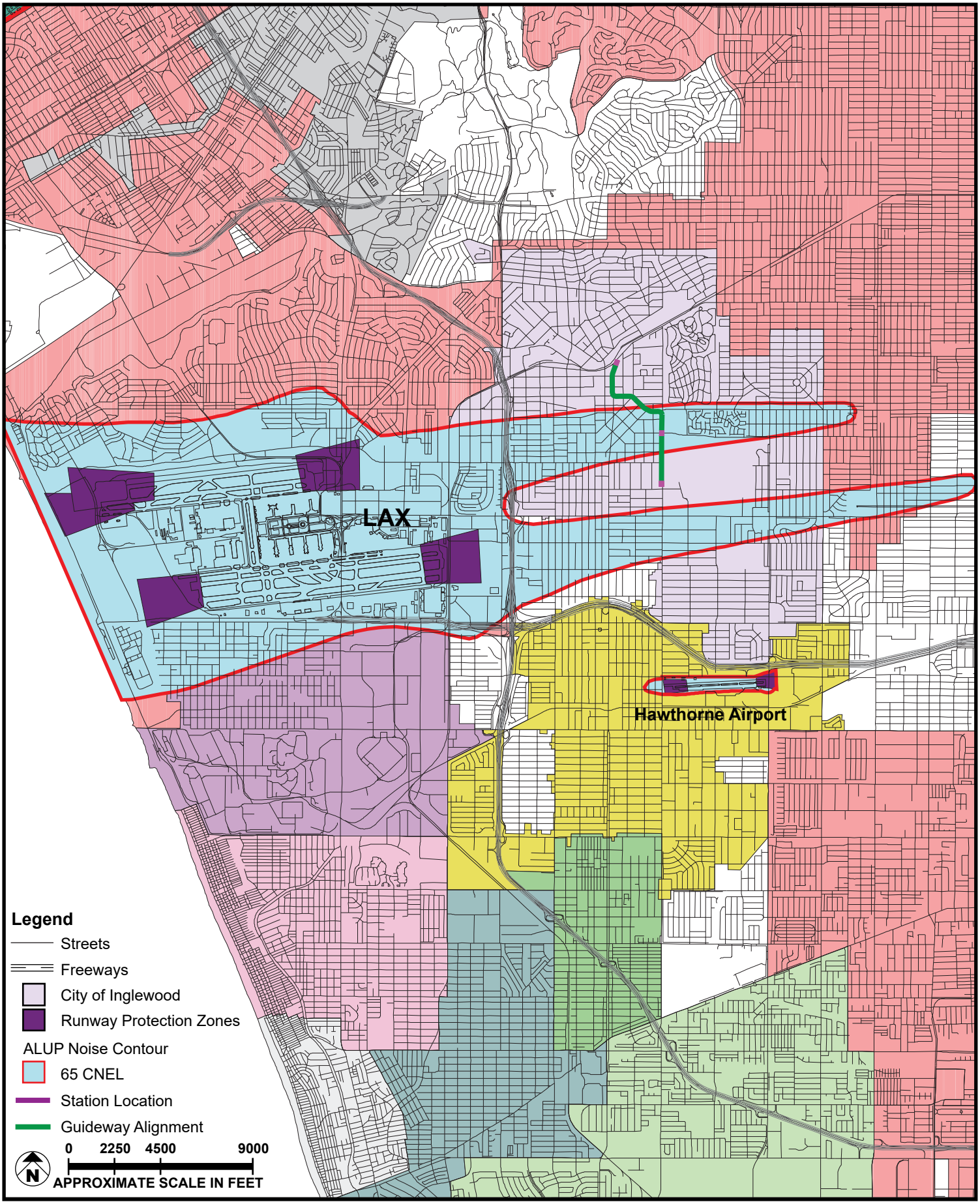
51 Los Angeles County Airport Land Use Plan, 1991, Los Angeles Internal Airport Contour Map, http://planning.lacounty.gov/view/alup/

52 Los Angeles County Airport Land Use Plan, 1991, Los Angeles Internal Airport Contour Map, http://planning.lacounty.gov/view/alup/

53 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 146, September 2018, accessed October 2020, 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

54 Roberts, Cedric, Construction Noise and Vibration Impact on Sensitive Premises, p. 6, November 23 – 25, 2009, accessed October 2020, https://www.acoustics.asn.au/conference_proceedings/AAS2009/papers/p11.pdf

55 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 120, September 2018, accessed October 2020, 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



SOURCE: Google Earth - 2020; Meridian Consultants LLC - 2020

FIGURE **4.10-6**

ALUP Noise Contours

251-003-20

4.10.5.2 Vibration

Groundborne Vibration

The groundborne vibration level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans, which is around 65 VdB.[56] 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 groundborne 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 groundborne 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 groundborne vibration in the area surrounding the Project area 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 groundborne vibration velocity of 63 VdB (approximately 0.006 in/sec PPV).[57] Aircraft flyovers could generate vibration levels that would cause human annoyance; however, they would not generate building vibration levels that would cause building damage.[58]

Ambient Vibration

An ambient vibration monitoring survey was undertaken to establish existing ground-borne vibration levels at various locations near the proposed Project. Existing vibration monitoring was conducted to provide data on ambient ground-borne vibration generated by traffic and operation of activities. The locations of the vibration monitoring selected were either adjacent to sensitive land uses (residences and hotels) or buildings that were close to where the components of the proposed Project would be constructed. Five ground vibration monitoring locations were established, as shown on **Figure 4.10-5**.

Table 4.10-14: 24-hour Vibration Measurements in Project Vicinity shows vibration velocities attributed to road traffic and normal operations of establishments in the area. The vibration velocity is expressed in vibration decibels (VdB) and is the maximum RMS value measured on the frequency range between 8 and 80 Hz. As shown, the average vibration velocities ranged from a low of 52 VdB at Site 1 at 220 Locust Avenue to a high of 67 VdB at Site 5 at 3940 Century Boulevard. It is important to note, Site 5 is located outside of the guideway of the proposed Project. Maximum vibration velocities within the proposed

56 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 113, September 2018, accessed October 2020, 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

57 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 113, September 2018, accessed October 2020, 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

58 National Aeronautics and Space Administration, Building Vibrations Induced by Noise from Rotorcraft and Propeller Aircraft Flyovers, p. 10, June 1992.

Project is 62 VdB at Site 4 at 923 Prairie Avenue. These vibration velocities are considered to be below the approximate threshold of perception for many humans of 72 VdB as established by the FTA. [59]

Table 4.10-14
24-hour Vibration Measurements in Project Vicinity

Site	Address	Existing Land Use	24-HR VdB
Market Street Segment			
1	220 Locust Avenue	Residential Development	52
Manchester Boulevard Segment			
2	607 Manchester Boulevard	Residential Development	60
Prairie Avenue Segment			
3	818 Nutwood Street	Educational/Residential Development	60
4	923 Prairie Avenue	Residential Development	62
5	3940 Century Boulevard	Lodging	67

*Source: Refer to **Appendix 4.10-5** for Vibration monitoring data sheets.*
Note: Vibration measurements were conducted on November 16, 2018.

4.10.6 THRESHOLDS OF SIGNIFICANCE

The project would have a significant impact in relation to noise and vibration if it were to result in:

Threshold NOI-1 **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?**

Threshold NOI-2 **Generation of excessive groundborne vibration or groundborne noise levels?**

4.10.6.1 Construction Noise

The City has not adopted thresholds of significance for analysis of impacts from noise. Section 5-41 of the City's Municipal Code[60] regulates construction noise and specifies restrictions for work occurring within a residential zone or within a radius of 500 feet between the hours of 8:00 PM and 7:00 AM. Pursuant to Section 5-41, it is unlawful for any person within a residential zone, or within a radius of 500 hundred feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, pneumatic hammer, derrick, excavation or earth

59 US Department of Transportation, Federal Transit Administration (USDOT, FTA), Transit Noise and Vibration Impact Assessment, FTA report no. 0123 (September 2018), accessed December 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.

60 City of Inglewood, Municipal Code, Article 2, Noise Regulations. Section 5-41, Construction of Building and Projects, Noise Regulated 41http://www.qcode.us/codes/inglewood/?view=desktop&topic=5-2

moving equipment, or other construction equipment between the hours of 8:00 PM and 7:00 AM of the next day in such a manner that a reasonable person residing in the area is caused discomfort or annoyance unless a permit has been obtained from the Permits and Licenses Committee of the City. The prohibition of nighttime construction in or near residential zones, without first obtaining a permit authorizing such nighttime construction (8:00 PM to 7:00 AM), reflects that the City does not regulate construction noise during daytime hours (7:00 AM to 8:00 PM).

Because the proposed Project would include construction between the hours of 8:00 PM and 7:00 AM throughout the project construction period (all phases), for this EIR the City has elected to identify a threshold of significance to apply to the proposed nighttime construction work for identified time period mentioned in Section 5-41. Further, because of the unique size, scale, planned construction schedule, and proximity of the proposed Project to noise sensitive uses, for this EIR the City has elected to apply a threshold of significance for daytime construction noise, which could occur on a fluctuating and intermittent basis throughout the construction period. For the reasons described above, the City has decided that in this EIR it will define "a substantial temporary or permanent increase in ambient noise levels" during construction as an exceedance in existing ambient exterior noise levels by 5 dBA Leq 1-hour or more at a noise sensitive use during the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) period.

As stated previously, the use of these thresholds in this Draft EIR responds to the unique circumstances of the proposed Project and its alignment along the fixed guideway corridor. By utilizing these quantitative thresholds in this Draft EIR, the City is not making a decision whether to use these thresholds in CEQA documents on other proposed projects in the future. The City would, however, retain its authority as CEQA lead agency to utilize these or other thresholds, including relying exclusively on the provisions of Municipal Code section 5-41,[61] for the consideration of construction noise, as appropriate to the circumstances of other projects in the future.

4.10.6.2 Operational Noise

For operational impacts, the City recognizes that such impacts occur on the long-term, and, as a result, the City has determined that in this case the significance threshold should be more conservative, specifically in areas where sensitive receptors are already exposed to above acceptable levels. As such, an increase in noise level of 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories is considered significant. For residential – low density single-family, duplex, mobile home and multifamily uses and schools, libraries, churches, hospitals, and nursing homes

61 City, Municipal Code, Article 2, Noise Regulations. Section 5-41, Construction of Building and Projects, Noise Regulated 41http://www.qcode.us/codes/inglewood/?view=desktop&topic=5-2

– the upper limit for Conditionally Acceptable noise exposures is 70 dBA DNL or CNEL. For office buildings, business commercial and profession uses the upper limit for Conditionally Acceptable noise exposures is 77.5 dBA DNL or CNEL.

As described above, the City has adopted Noise Regulations[62] that prohibit noise in excess of specified levels, depending on base ambient noise levels, the nature of the use where noise levels are measured, and the duration period of such noise. The Noise Regulations may prohibit any increase in ambient noise levels under specified circumstances. The City has not previously relied on the Noise Regulations to serve as significance thresholds for operational noise. The City has determined that the Noise Regulations should not serve as operational noise thresholds for the proposed Project. The reason for this determination is that an increase in ambient noise would be imperceptible, or at most barely perceptible, where that increase is less than 3 dBA. Such an increase in ambient noise levels would not have a significant effect on the physical environment. The City has instead determined that the threshold should be set at a level that is actually perceivable. Additionally, the more a new source of 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 levels, a 10 dBA change is subjectively heard as approximately doubling in loudness, and can cause adverse response.[63] As such, in the event the resulting noise levels remain within acceptable noise limits, an increase of 10 dBA or more is considered significant.

In the cumulative context, the proposed Project's noise and vibration impacts are considered in conjunction with other reasonably foreseeable development, using the same thresholds set forth above.

4.10.6.3 Groundborne Noise

According to the FTA, airborne noise levels would be higher than groundborne noise levels.[64] 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 proposed guideway vicinity. Therefore, the effects of airborne noise would continue to be higher than groundborne noise levels. In addition, groundborne noise generated by a large bulldozer within five feet of a receptor building would reach an approximate level of 58 dBA, which is not greater

62 City, Municipal Code, Article 2, Noise Regulations. http://www.qcode.us/codes/inglewood/?view=desktop&topic=5-2.

63 California Department of Transportation, *Technical Nosie Supplement,* September 2013, accessed December 2020, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf

64 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, p. 112, September 2018, accessed October 2020, 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

than the airborne noise levels generated by construction equipment discussed below. As such, impacts related to groundborne noise are not discussed further.

4.10.6.4 Groundborne Vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings founded on the soil near the construction site respond to these vibrations with varying results, ranging from no perceptible effects at the lowest levels, low rumbling sounds and perceptible vibrations at moderate levels, and slight damage at the highest levels.

There are no adopted City standards or thresholds of significance for vibration. The evaluation of potential building damage impacts related to construction vibration levels is based on the published data in the FTA guidelines.[65] While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration. As such, the vibration damage criteria adopted by the FTA and applied in this analysis are listed below:

- Reinforced-concrete, steel, or timber (no plaster) would exceed 0.5 peak particle velocity (PPV) (inches per second);66
- Engineered concrete and masonry (no plaster) would exceed 0.3 PPV;
- Nonengineered timber and masonry buildings would exceed 0.2 PPV;
- Buildings extremely susceptible to vibration damage would exceed 0.12 PPV.

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 FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for the following three-land use categories: (1) Category 1, High Sensitivity; (2) Category 2, Residential; and (3) Category 3, Institutional.

- **Category 1** refers to 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

65 US Department of Transportation, Federal Transit Administration (USDOT, FTA), Transit Noise and Vibration Impact Assessment, FTA report no. 0123 (September 2018), accessed December 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.

66 When assessing vibration source levels from construction equipment, vibration is generally assessed in terms of peak particle value (PPV). PPV is defined as the peak signal value of an oscillating vibration velocity waveform, expressed in inches per second.

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.

For purposes of this analysis, the human annoyance threshold is 72 VdB for residences and buildings where people normally sleep and 75 VdB for commercial uses, industrial uses, and churches with primarily daytime use.

It is important to note, it is extremely rare for vibration from train operations to cause substantial or even minor cosmetic building damage. However, damage to fragile historic buildings located near the right of way may be of concern. Even in these cases, damage is unlikely except when the track is located very close to the structure.

4.10.7 IMPACT ANALYSIS

Impact NOI-1: **Would the project result in 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?**

Construction

Proposed Project Construction Activities

As previously discussed, construction activity would primarily occur over a 16-hour per day schedule with two shifts, either a Morning/Evening shift from approximately 7:00 AM to 3:00 PM and an evening shift from approx. 3:00 PM to 11:00 PM, or a Morning/Night shift from approximately 7:00 AM to 3:00 PM and a night shift from approximately 11:00 PM to 7:00 AM.[67] There will also be periods when construction activities are scheduled to occur from approximately 11:00 PM to 7:00 AM to accommodate work activities that cannot be accomplished during the daytime shifts (i.e., during large-scale pours of concrete when it would be necessary to maintain a continuous stream of concrete deliveries through multiple shifts). Construction work is assumed to occur seven days a week.

67 **Appendix 3.0.4: ITC Construction Scenarios** in this Draft EIR, June 2020.

Construction noise impacts due to construction activities were determined by comparing the calculated construction-related noise levels of the proposed Project to the measured existing ambient noise levels (i.e., noise levels without construction noise from the proposed Project). Construction noise levels were calculated for each phase of construction (Phases 1 through 4) at the adjacent sensitive receptors.

Phase 1

As described above, Phase 1 includes demolition of commercial property for Market Street/Florence Avenue Station, for retail commercial property on Manchester Boulevard, and the commercial building on the southeast corner of Manchester Boulevard and Market Street. Phase 1 will also include the start of construction for the MSF Structure.

Table 4.10-15: Phase 1 Proposed Project Construction Noise Levels presents the forecasted demolition and construction noise levels generated by construction equipment during Phase 1 of the nearby adjacent sensitive receptors.

As shown, construction noise level increases over the significance threshold during the daytime period would range from a low of 1.2 dBA Leq1-hour at the residential uses at Site 2 located approximately 225 feet from the proposed MSF (Residential uses along E. Manchester Boulevard, Manchester Drive and S. Osage Avenue) to a high of 14.5 dBA Leq1-hour at the residential use at Site 1 located approximately 100 feet from the demolition of the commercial property for the Market Street/Florence Avenue Station (Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street). Additionally, construction noise level increases over the significance threshold during the nighttime period would range from a low of 0.3 dBA Leq1-hour at the residential uses at Site A to a high of 18.8 dBA Leq1-hour at the residential uses at Site 1.

As demonstrated by the evaluation of impacts to noise-sensitive receptors, daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) construction noise levels from peak construction activity would exceed the 5 dBA threshold of significance over ambient noise levels (Leq) to noise-sensitive receptors.

The proposed Project's construction noise impacts during Phase 1 would be potentially significant.

Table 4.10-15
Phase 1 Proposed Project Construction Noise Levels

Receptor	Existing Land Use	Time Period	Ambient Noise Levels	Construction Noise (Max Leq, 1hr)	Ambient plus Construction Noise[1]	Significance Threshold	Increase Over Significance Threshold	Significant Impact?
			dBA					
Market Street Segment								
Site 1	Residential	Daytime	61.9	81.4	81.4	66.9	+14.5	**Yes**
		Nighttime	54.6	78.4	78.4	59.6	+18.8	**Yes**
Site 2	Residential	Daytime	67.5	72.5	73.7	72.5	+1.2	**Yes**
		Nighttime	64.1	69.5	70.6	69.1	+1.5	**Yes**
Site A	Commercial	Daytime	64.1	64.6	67.4	69.1	--	No
		Nighttime	57.8	61.6	63.1	62.8	+0.3	**Yes**
Manchester Boulevard Segment								
Site 2	Residential	Daytime	67.5	72.5	73.7	72.5	+1.2	**Yes**
		Nighttime	64.1	69.5	70.6	69.1	+1.5	**Yes**
Site B	Residential	Daytime	73.5	64.5	74.0	78.5	--	No
		Nighttime	70.5	61.5	71.0	75.5	--	No
Site I	Residential	Daytime	68.0	81.4	81.6	73.0	+8.6	**Yes**
		Nighttime	58.5	78.4	78.4	63.5	+14.9	**Yes**
Site J	Commercial/Mixed Use	Daytime	73.6	71.5	75.7	78.6	--	No
		Nighttime	69.1	68.5	71.8	74.1	--	No
Prairie Avenue Segment								
Site K	Public	Daytime	67.5	76.9	77.4	72.5	+4.9	**Yes**
		Nighttime	63.4	73.9	74.3	68.4	+5.9	**Yes**

*Source: SoundPLAN (version 8.2). Refer to **Appendix 4.10-4.2** for construction noise (Phase 1) worksheets.*
Note: [1] Logarithmic increase = Ambient Noise + Modeled Construction Level.

Phase 2

As mentioned previously, Phase 2 would continue enabling the construction sequence of the proposed Project along Prairie Avenue from the Hardy Street intersection to Manchester Boulevard. **Table 4.10-16: Phase 2 Proposed Project Construction Noise Levels** presents the forecasted construction noise levels generated by construction equipment during Phase 2 at the nearby adjacent sensitive receptors. As shown, construction noise level increases over the significance threshold during the daytime period would range from a low of 0.5 dBA Leq1-hour at the education/residential uses at Site 3 approximately 145 feet from the construction sequence of the guideway along Prairie Avenue (Residential uses along E. Nutwood Street, educational facilities along Prairie Avenue) to a high of 8.1 dBA Leq1-hour at the residential uses at Site I approximately 95 feet from construction of the MSF (Residential uses on the eastern portion of E. Spruce Avenue, commercial uses on the western portion of E. Spruce Avenue). Additionally, construction noise level increases over the significance threshold during the nighttime would range from a low of 1.5 dBA Leq1-hour at the residential uses at Site 2 located approximately 225 feet from the proposed MSF (Residential uses along E. Manchester Boulevard, Manchester Drive and S. Osage Avenue) to a high of 14.4 dBA Leq1-hour at the residential uses at Site I.

As demonstrated by the evaluation of impacts to noise-sensitive receptors, daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) construction noise levels from worst-case construction activity would exceed the 5 dBA threshold of significance over ambient noise levels (Leq) to noise-sensitive receptors.

The proposed Project's construction noise impacts during Phase 2 would be potentially significant.

Table 4.10-16
Phase 2 Proposed Project Construction Noise Levels

Receptor	Existing Land Use	Time Period	Ambient Noise Levels	Construction Noise (Max Leq, 1hr)	Ambient plus Construction Noise[1]	Significance Threshold, dBA	Increase Over Significance Threshold	Significant Impacts?
			dBA					
Manchester Boulevard Segment								
Site 2	Residential	Daytime	67.5	72.5	73.7	72.5	+1.2	**Yes**
		Nighttime	64.1	69.5	70.6	69.1	+1.5	**Yes**
Site B	Educational	Daytime	73.5	66.1	74.2	78.5	--	No
		Nighttime	70.5	63.1	71.2	75.5	--	No
Site I	Residential	Daytime	68.0	80.9	81.1	73.0	+8.1	**Yes**
		Nighttime	58.5	77.9	77.9	63.5	+14.4	**Yes**
Site L	Residential	Daytime	74.0	58.3	74.1	79.0	--	No
		Nighttime	72.8	55.3	72.9	77.8	--	No
Prairie Avenue Segment								
Site 3	Education/Residential	Daytime	71.2	75.2	76.7	76.2	+0.5	**Yes**
		Nighttime	66.0	72.2	73.1	71.0	+2.1	**Yes**
Site 4	Residential	Daytime	77.2	71.0	78.1	81.2	--	No
		Nighttime	71.6	68.0	73.1	76.6	--	No
Site C	Place of worship/Lodging	Daytime	76.7	86.5	86.9	81.7	+5.2	**Yes**
		Nighttime	70.6	83.5	83.7	75.6	+8.1	**Yes**
Site G	Residential	Daytime	67.3	66.9	70.1	72.3	--	No
		Nighttime	61.5	63.9	65.6	66.5	--	No
Site H	Education/Residential	Daytime	67.6	70.4	72.2	72.6	--	No
		Nighttime	56.6	67.3	67.7	61.6	+6.1	**Yes**
Site M	Residential	Daytime	74.9	58.8	75.0	79.9	--	No
		Nighttime	67.9	55.8	68.1	72.9	--	No

*Source: SoundPLAN (version 8.2). Refer to **Appendix 4.10-6.2** for construction noise (Phase 2) worksheets.*
Note: [1] Logarithmic increase = Ambient Noise + Modeled Construction Level.

Phase 3

Phase 3 would continue enabling the construction sequence of the proposed Project along Manchester Boulevard from Prairie Avenue to Market Street, and Market Street from Manchester Boulevard to Florence Avenue. **Table 4.10-17: Phase 3 Proposed Project Construction Noise Levels** presents the forecasted construction noise levels generated by construction equipment during Phase 3 of the nearby adjacent sensitive receptors. As shown, construction noise level increases over the significance threshold during the daytime would range from a low of 1.5 dBA Leq1-hour at the commercial/mixed-use developments at Site J located approximately 60 feet from the construction sequence of the guideway (Commercial uses along E. Manchester Boulevard and Market Street) to a high of 20.5 dBA Leq1-hour at the residential uses at Site A located approximately 25 feet from the construction sequence of the guideway (Commercial uses along E. Queen Street and Market Street). Additionally, construction noise level increases over the significance threshold during the nighttime would range from a low of 2.7 dBA Leq-1hour at the commercial/mixed-use developments at Site J to a high of 23.8 dBA Leq-1hour at the residential uses at Site A.

As demonstrated by the evaluation of impacts to noise-sensitive receptors, daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) construction noise levels from worst-case construction activity would exceed the 5 dBA threshold of significance over ambient noise levels (Leq) to noise-sensitive receptors.

The proposed Project's construction noise impacts during Phase 3 would be potentially significant.

Table 4.10-17
Phase 3 Proposed Project Construction Noise Levels

Receptor	Existing Land Use	Time Period	Ambient Noise Levels	Construction Noise (Max Leq, 1hr)	Ambient plus Construction Noise[1]	Significance Threshold	Increase Over Significance Threshold	Significant Impacts?
			dBA					
Market Avenue Segment								
Site 1	Residential	Daytime	61.9	72.6	73.0	66.9	+6.1	**Yes**
		Nighttime	54.6	69.6	69.7	59.6	+10.1	**Yes**
Site A	Commercial	Daytime	64.1	89.6	89.6	69.1	+20.5	**Yes**
		Nighttime	57.8	86.6	86.6	62.8	+23.8	**Yes**
Site K	Public	Daytime	74.9	77.0	77.3	79.9	--	**No**
		Nighttime	63.4	74.0	74.4	68.4	+6.0	**Yes**
Manchester Boulevard Segment								
Site 2	Residential	Daytime	67.5	79.4	79.7	72.5	+7.2	**Yes**
		Nighttime	64.1	76.3	76.6	69.1	+7.5	**Yes**
Prairie Avenue Segment								
Site 3	Education/Residential	Daytime	71.2	70.9	74.0	76.2	--	No
		Nighttime	66.0	67.9	69.8	71.0	--	No
Site B	Educational	Daytime	73.5	83.5	83.9	78.5	+5.4	**Yes**
		Nighttime	70.5	80.5	80.9	75.5	+5.4	**Yes**
Site I	Residential	Daytime	68.0	81.2	81.4	73.0	+8.4	**Yes**
		Nighttime	58.5	78.2	78.2	63.5	+14.7	**Yes**
Site J	Commercial/Mixed-Use	Daytime	73.6	79.0	80.1	78.6	+1.5	**Yes**
		Nighttime	69.1	76.0	76.8	74.1	+2.7	**Yes**

*Source: SoundPLAN (version 8.2). Refer to **Appendix 4.10-6.3** for construction noise (Phase 3) worksheets.*
Note: [1] Logarithmic increase = Ambient Noise + Modeled Construction Noise Level.

Phase 4

Phase 4 would continue enabling the completion of the aerial construction elements of the proposed Project. **Table 4.10-18: Phase 4 Proposed Project Construction Noise Levels**, presents the forecasted construction noise levels generated by construction equipment during Phase 4 of the nearby adjacent sensitive receptors. As shown, construction noise level increases over the significance threshold during the daytime would range from a low of 1.0 dBA Leq-1hour at the residential uses at Site 2 located approximately 225 feet from the proposed MSF (Residential uses along E. Manchester Boulevard, Manchester Drive and S. Osage Avenue) to a high of 8.3 dBA Leq-1hour at the residential uses at Site A located approximately 25 feet from the construction sequence of the guideway and stations (Commercial uses along E. Queen Street and Market Street). Additionally, construction noise level increases over the significance threshold during the nighttime would range from a low of 0.4 dBA Leq-1hour at the place of worship/lodging uses at Site C located approximately 25 feet from the construction sequence of the guideway and stations (Places of worship and commercial uses along Prairie Avenue) to a high of 11.1 dBA Leq-1hour at the residential uses at Site A.

As demonstrated by the evaluation of impacts to noise-sensitive receptors, daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) construction noise levels from worst-case construction activity would exceed the 5 dBA threshold of significance over ambient noise levels (Leq) to noise-sensitive receptors.

Construction noise impacts during Phase 4 of the proposed Project would be potentially significant.

Table 4.10-18
Phase 4 Proposed Project Construction Noise Levels

Receptor	Existing Land Use	Time Period	Ambient Noise Levels	Construction Noise Level, (Max Leq, 1hr)	Ambient plus Construction Noise[1]	Significance Threshold	Increase Over Significance Threshold	Significant Impacts?
			dBA					
Market Street Segment								
Site 1	Residential	Daytime	61.9	67.7	68.7	66.9	+1.8	**Yes**
		Nighttime	54.6	64.6	65.0	59.6	+5.4	**Yes**
Site A	Commercial	Daytime	64.1	77.2	77.4	69.1	+8.3	**Yes**
		Nighttime	57.8	74.2	74.3	62.8	+11.5	**Yes**
Site K	Public	Daytime	67.5	73.5	74.5	72.5	+2.0	**Yes**
		Nighttime	63.4	70.5	71.3	68.4	+2.9	**Yes**
Manchester Boulevard Segment								
Site 2	Residential	Daytime	67.5	72.2	73.5	72.5	+1.0	**Yes**
		Nighttime	64.1	69.2	70.4	69.1	+1.3	**Yes**
Site B	Educational	Daytime	73.5	73.1	76.3	78.3	--	No
		Nighttime	70.5	70.1	73.1	75.5	--	No
Site I	Residential	Daytime	68.0	65.9	70.0	73.0	--	No
		Nighttime	58.5	62.9	64.2	63.5	+0.7	**Yes**
Site J	Commercial/Mixed Use	Daytime	73.6	69.9	75.1	78.6	--	No
		Nighttime	69.1	66.9	71.0	74.1	--	No
Site L	Residential	Daytime	74.0	56.9	74.1	79.0	--	No
		Nighttime	72.8	53.9	72.9	77.8	--	No
Prairie Avenue Segment								
Site 3	Education/Residential	Daytime	71.2	71.2	74.2	76.2	--	No
		Nighttime	66.0	68.2	70.0	71.0	--	No

Receptor	Existing Land Use	Time Period	Ambient Noise Levels	Construction Noise Level, (Max Leq, 1hr)	Ambient plus Construction Noise[1]	Significance Threshold	Increase Over Significance Threshold	Significant Impacts?
			dBA					
Site 4	Residential	Daytime	77.2	83.2	84.0	81.2	+3.8	**Yes**
		Nighttime	71.6	80.2	80.4	76.6	+3.8	**Yes**
Site C	Place of worship/Lodging	Daytime	76.7	83.4	84.2	81.7	+2.5	**Yes**
		Nighttime	70.6	80.4	80.5	75.6	+4.9	**Yes**
Site E	Lodging	Daytime	72.6	56.3	72.7	77.8	--	No
		Nighttime	66.2	53.3	66.4	71.2	--	No
Site F	Residential	Daytime	68.8	62.7	69.7	67.7	--	No
		Nighttime	59.9	59.7	62.6	64.9	--	No
Site G	Residential	Daytime	67.3	67.4	70.4	69.2	--	No
		Nighttime	61.5	64.4	65.9	66.5	--	No
Site H	Education/Residential	Daytime	67.6	68.4	71.0	72.6	--	No
		Nighttime	56.6	65.3	65.5	61.6	+3.9	**Yes**
Site M	Residential	Daytime	74.9	57.0	75.0	79.9	--	No
		Nighttime	67.9	54.0	68.1	72.9	--	No
Site 5	Lodging	Daytime	73.3	56.6	73.4	78.3	--	No
		Nighttime	70.0	53.6	70.1	75.0	--	No
Site D	Lodging	Daytime	76.2	56.6	76.2	81.2	--	No
		Nighttime	67.0	53.6	67.2	72.0	--	No

*Source: SoundPLAN (version 8.2). Refer to **Appendix 4.10-6.4** for construction noise (Phase 4) worksheets.*
Note: [1] Logarithmic increase = Ambient Noise + Modeled Construction Noise Level.

Potential Health Effects of Proposed Project Construction Noise

As detailed in **Table 4.10-15** through **4.10-18**, construction noise levels would exceed ambient exterior levels by 5 dBA Leq 1-hour or more during the daytime and nighttime period. More specifically, ambient plus construction noise levels during the daytime would range from a low of 67.4 dBA Leq-1hour during Phase 1 at Site A located approximately 25 feet from the construction sequence of the guideway and stations (Commercial uses along E. Queen Street and Market Street) (Phase 1) to a high of 89.6 dBA Leq1-hour during Phase 3 at Site A. Additionally, ambient plus construction noise levels during the nighttime would range from 62.6 dBA Leq 1-hour during Phase 4 at Site F (Residential uses along E. Hardy Street) to a high of 86.2 dBA Leq-1hour at Site A during Phase 3. However, although noise levels would exceed applicable thresholds, construction levels would not reach the point at which pain or hearing damage would occur. As shown in **Table 4.10-1** above, when measured on the A scale of a standard sound level meter, short-term noise levels constituting the threshold of pain and hearing damage are between 130 dBA and 140 dBA.

With respect to potential nighttime awakenings due to construction noise, the area surrounding the proposed Project where there is the potential for sleep disturbance during nighttime construction has been identified. Construction activities will occur adjacent to residential uses, especially adjacent to the MSF site and other areas along the proposed Project.

According to the Acoustical Society of America, receivers that would experience an indoor SEL of 50 dBA or lower would have an awakening probability of zero.[68] Based on the assumption that standard building construction in a warm climate area such as southern California offers an exterior-to-interior attenuation rate of 12 dB, it is assumed that indoor SEL would be 12 dB lower than exterior construction noise levels.[69] The area surrounding the proposed Project that would experience an indoor SEL of greater than 50 dBA (exterior construction noise level of greater than 62 dBA Leq) during a worst-case or loudest maximum nighttime construction noise level event was identified. This does not take into account the existing indoor SEL currently experienced due to aircraft flyovers from LAX and/or other existing noise sources in the area such as traffic and industrial operations. Based on the preceding impact analyses provided in **Table 4.10-15** through **Table 4.10-18**, exterior noise increases above ambient would range from a low of 0.3 dBA to a high of 23.8 dBA throughout various stages during the four phases of construction. Exterior noise levels at all analyzed locations would be above 62 dBA Leq prior to the addition of construction noise.

Due to the high variability of each individual's sensitivity to nighttime noise, uncertain factors related to nighttime construction activity such as number of peak noise level occurrences, and lack of an established or adopted threshold designating acceptable occurrences of awakenings, the estimated area for

68 Acoustical Society of America, 2018. Rationale for Withdrawing ANSI/ASA S12.9-2008/Part 6. Annex 3. July 22, 2018.
69 United States Environmental Protection Agency, Protective Noise Levels, 1978, p.11

awakenings presented in this analysis represents the City's best effort to disclose the potential sleep disturbance effects of nighttime construction, but do not represent predictions of sleep awakenings for any specific location or population.

There are no established thresholds with regard to an acceptable level of short-term sleep disturbance. While exposure to high levels of noise during sleep can result in physiological responses, it is not possible to predict such effects in any particular population. As such, due to the lack of established thresholds and noise levels do not exceed the threshold of pain and hearing damage, construction activities from the proposed Project would not result in adverse health effects related to pain and hearing loss.

Off-Site Construction Traffic

Construction traffic would generate noise along access routes to and from the proposed Project's construction areas. Construction activities would require the movement of heavy equipment throughout the Project area during respective construction phases and for each specialized construction activity (e.g., demolition, grading). Construction staging, parking and equipment storage areas will be on-site within the proposed fenced in yards or within each phasing area.

Delivery of construction materials would occur during the night shift, as would most lane closures. Construction activities during the day shift would primarily consist of work that could proceed without requiring lane closures or significant disruption to daily commuter traffic and potential event traffic along Prairie Avenue and Manchester Boulevard. Additionally, it can be anticipated that some minor activity would occur during periods in between construction shifts for logistics, moving equipment, etc.

Construction employee parking would be provided within the construction areas and may also serve as temporary parking for construction personnel. Parking could occur at staging locations along Manchester Boulevard, Market Street, and designated areas as noted in the Construction Scenario (**Appendix 3.0.4** to this Draft EIR).

Designated delivery and haul routes would be established for the proposed Project consistent with the City's General Plan roadway designations and the haul routes currently used for local projects. As shown in **Figure 3.0-37: Construction Haul Routes**, the primary delivery and haul routes proposed during construction of the proposed Project would utilize Florence Avenue, Manchester Boulevard, Prairie Avenue, and Century Boulevard, which have been designated by the City as appropriate for heavy truck use.[70] These routes would convey materials to and from regional routes, including the I-405 (Glen Anderson Freeway) and I-405 (San Diego Freeway).

70 City of Inglewood, Municipal Code, Section 3-95, Truck Routes Established. https://www.qcode.us/codes/inglewood/view.php?topic=3-3-3_85&frames=on

The construction contractor would be required to utilize the haul route closest to the respective areas of the proposed Project. Excavated dirt materials will be hauled at night, where possible, due to the congested freeways and surface streets around or near the excavation site during daytime hours. The construction contractor would develop an excavation plan that defines haul routes, dust control, sweeping, and the location(s) for final disposal.

As shown in the Construction Scenario, a variety of heavy trucks will travel to and from the proposed Project during various phases of construction. The total trucks per phase is shown in **Table 4.10-4** above. The proposed Project is expected to generate a maximum of approximately 145 trips per day and 19 trips per hour which includes both on-road on- and off-site equipment.

Although it is unlikely that all Project construction related heavy-duty construction trucks would travel along the same haul route, due to the uncertainty of the route trucks would take it has been conservatively assumed that the maximum anticipated number of heavy-duty construction trucks could potentially travel along the same route.

Traffic volume data was provided for multiple segments along each roadway, resulting in multiple different daily volumes. The lowest adjusted baseline average daily trip (ADTs) volumes along West Century Boulevard, Manchester Boulevard, and South Prairie Avenue are 33,218 trips, 20,326 trips, and 22,141 trips, respectively, (refer to **Appendix 4.10-2.2**) and the highest adjusted baselines volumes along West Century Boulevard, Manchester Boulevard, and South Prairie Avenue are 50,753 trips, 36,827 trips, and 39,187 trips, respectively.[71]

The sound power from one heavy-duty truck is greater than the sound power from one passenger vehicle (i.e., car). According to Caltrans, the noise levels from one heavy-duty truck at a speed of 35 miles per hour is equivalent to 19 passenger vehicles traveling at a speed of 35 miles per hour. Applying this multiplier to a maximum of approximately 145 trips per day, construction would generate a potential maximum sound power equivalency of up to 2,755 passenger vehicle trips per day. Additionally, the maximum workforce estimate range between 210 – 238 persons during Phase 3, as such resulting in 2,993 passenger trips per day.

According to FHWA, assuming all other factors remain the same, it takes a doubling of traffic volumes (100 percent increase) in order to increase traffic noise levels by 3 dBA.[72] As compared to adjusted baseline average daily traffic volumes along the roadways mentioned above, the sound power generated by the maximum anticipated number of construction trucks would not be equivalent or greater to a doubling of

71 Traffic data provided in the Traffic report available in **Appendix 4.12.1**.

72 Federal Highway Administration, FHWA Highway Traffic Noise Prediction Model, December 1978, https://ia801807.us.archive.org/3/items/fhwahighwaytraff00barr/fhwahighwaytraff00barr.pdf.

both the minimum and maximum ADT along West Century Boulevard, Manchester Boulevard or South Prairie Avenue and therefore would not result in a 5 dBA Leq (1-hour) increase along those roadways.

Therefore, noise impacts from off-site construction traffic from trucks would be less than significant.

Mitigation Measures

The following mitigation measures have been identified to reduce potentially significant noise impacts related to construction:

MM 4.10-1: **Construction Noise Control Plan**. Prior to the issuance of any demolition or construction permit for each phase of project development, the Construction Manager shall develop a Construction Noise Control Plan demonstrating how to ensure increases in ambient noise levels are less than 5 dBA Leq (1-hour) over existing conditions. The Construction Noise Control Plan shall be developed in coordination with a certified acoustical/vibration consultant and the Construction Manager, and shall be approved by the City's Director of Public Works prior to construction. The Plan shall include the following elements:

- Measurements of existing one-hour Leq noise levels at sensitive receptors prior to construction activities.
- Construction noise measures necessary to ensure increase in noise are less than 5 dBA Leq over existing conditions. This plan could include, but would not be limited to, the following strategies:
  - Install temporary noise barriers that block line-of-sight to sensitive receptors including when work occurs on the elevated guideways and stations.
  - Reduce the simultaneous use of heavy-duty construction equipment.
  - Operate equipment at the lowest possible power levels.
  - Use solar, battery powered, or hybrid equipment whenever practical.
  - Locate staging areas as far away from sensitive receptors as feasible.
- Enclose stationary noise sources with acoustical barriers where possible.
  - Stationary noise sources (e.g., generators) shall be muffled and enclosed within sheds, incorporate insulation barriers, or other measures to ensure increases in ambient noise levels are less than 5 dBA Leq (1-hour). Pole power shall be utilized at the earliest feasible point in time, and to the maximum extent feasible in lieu of generators. If stationary equipment such as diesel- or gasoline-powered generators are not enclosed within a shed or barrier, such equipment must be located at least 100 feet from sensitive land uses (e.g., residences, schools, childcare centers, hospitals, parks, or similar uses), whenever possible.

- Impact tools (i.e., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust and external jackets shall be used to ensure increases in ambient noise levels are less than 5 dBA Leq (1-hour). Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible. Limiting the use impact pile drivers and impact hammers operating simultaneously can reduce Lmax noise levels by approximately 7 dBA. Additionally, use of "quiet" pile driving technology (such as auger displacement installation), where feasible in consideration of geotechnical and structural requirements and conditions shall be considered.

MM 4.10-2: **Designate Community Affairs Liaison. Designate a Community Affairs Liaison Officer**. The City shall designate a Community Affairs Liaison Officer. This person's contact information shall be posted around the Project area, in adjacent public spaces, and in construction notifications. The Community Affairs Liaison shall be responsible for responding within 24 hours to any local complaints about construction activities. This Community Affairs Liaison shall receive all public complaints about construction noise and vibration disturbances and be responsible for determining the cause of the complaint and implementation of feasible measures to be taken to alleviate the problem. Additionally, the Community Affairs Liaison Officer shall coordinate with the Kelso Elementary School administrators to avoid disruptive activities during school hours.

The Community Affairs Liaison shall have the authority to coordinate with a designated construction contractor representative for the purpose of investigating the noise disturbance and undertaking all feasible measures to protect public health and safety and shall ensure that steps be taken to reduce construction vibration levels as deemed appropriate and safe by the designated construction contractor representative. Such steps could include the application of noise and vibration absorbing barriers, substitution of lower noise and vibration generating equipment or activity, rescheduling of noise and vibration-generating construction activity, or other potential adjustments to the construction program to reduce noise and vibration impacts at the adjacent noise and vibration-sensitive receptors.

Level of Significance after Mitigation

As shown in **Table 4.10-15** through **Table 4.10-18**, the maximum construction noise level increase over the significance threshold before mitigation would be approximately 23.8 dBA during Phase 3 of construction.

Implementation of **Mitigation Measure MM 4.10-1** would require development of a Construction Noise Control Plan to demonstrate how to ensure increases in ambient noise levels are less than 5 dBA Leq (1-hour) over existing conditions. One-hour Leq noise measurements at sensitive receptors would occur prior to construction activities to establish baseline conditions. Also, implementation of **Mitigation Measure MM 4.10-2** would designate a Community Affairs Liaison to be responsible for responding within 24 hours to any local complaints about construction activities related to noise and vibration.

With implementation of **MM 4.10-1** that would require continuous noise measurements to occur during construction to ensure noise levels are less than 5 dBA Leq (1-hour) and designation of a Community Affairs Liaison as discussed in **MM 4.10-2**, noise impacts resulting from construction would be less than significant.

Operation

Road Traffic Noise

As the City transforms into a major regional activity center, the ITC Project is designed to meet the City's goals and objectives related to the reducing the City's traffic congestion and alleviate growing demand on the existing roadway network by encouraging and providing the use of intermodal transportation systems. Thus, the Project is intended to reduce vehicle trips and roadway noise levels due to the ITC Project, resulting in negligible increases in the roadway network as discussed below.

Adjusted Baseline Conditions During Typical Non-Event Weekdays With ITC Project

Appendix 4.10.2-6 illustrates the change in daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) noise levels for the Adjusted Baseline Conditions during typical Non-Event Weekday with ITC Project traffic noise levels in detail. The difference in traffic noise between Adjusted Baseline Without ITC Project and Adjusted Baseline With ITC Project represents the increase (or decrease) in noise attributable to Project-related traffic area. As shown, the maximum noise level increase along analyzed roadways during the daytime period (7:00 AM to 10:00 PM) would be 0.2 dBA Leq (Lday)along Hillcrest Boulevard from Nutwood Street/Locust Street to Manchester Boulevard. Additionally, roadway noise levels during the nighttime period (10:00 PM – 7:00 AM) would be 0.3 dBA Leq (Lnight) along Hillcrest Boulevard from Nutwood Street/Locust Street to Manchester Boulevard. Because the proposed Project would remove trips, there would be some intersections that would see a decrease in noise. Therefore, the roadway noise level during the daytime or nighttime periods would not exceed the threshold of significance of an increase

in noise level of 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA when noise levels remain within acceptable limits.

Impacts of the proposed Project related to traffic generated noise for the Adjusted Baseline Conditions during typical non-event weekdays with ITC Project would be less than significant.

Opening Year (2026) Conditions With NFL Event Without ITC Project

Appendix 4.10.2-6 illustrates the change in daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) provides the roadway noise levels for the Opening Year (2026) Conditions With NFL Event Without ITC Project traffic noise levels in detail. As shown, roadway noise levels during the daytime ranged from a low of 57.2 dBA Leq (Lday) along Market Street from Florence Avenue to Regent Street to a high of 73.8 dBA Leq (Lday) along Century Boulevard between Grevillea Avenue and La Brea Avenue/Hawthorne Boulevard. Additionally, nighttime roadway noise levels ranged from a low of 49.7 dBA Leq (Lnight) along Market Street from Florence Avenue to Regent Street to a high of 65.5 dBA Leq (Lnight) along Century Boulevard between Doty Avenue and HP Casino Way and between HP Casino Way to Yukon Avenue.

Opening Year (2026) Conditions With NFL Event With ITC Project

Appendix 4.10.2-6 compares the daytime and nighttime noise levels from Opening Year (2026) Conditions With NFL Event Without ITC Project to the Opening Year (2026) Conditions With NFL Event With ITC Project. As shown, roadway noise levels during both the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods would not exceed the threshold of significance of an increase in noise level of 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

Impacts of the proposed Project related to traffic generated noise for the Opening Year (2026) Conditions with NFL Event With ITC Project would be less than significant.

Future Horizon Year (2045) With NFL Event Without ITC Project

Appendix 4.10.2-6 illustrates the daytime and nighttime noise levels from traffic generated for the Future Horizon Year (2045) With NFL Event Without ITC Project. As shown, roadway noise levels during the daytime ranged from a low of 58.1 dBA Leq (Lday) along Market Street from Florence Avenue to Regent Street to a high of 74.6 dBA Leq (Lday) along Century Boulevard between Grevillea Avenue and La Brea Avenue/Hawthorne Boulevard. Additionally, nighttime roadway noise levels ranged from a low of 50.6 dBA Leq (Lnight) along Market Street from Florence Avenue to Regent Street to a high of 66.1 dBA Leq (Lnight) along Century Boulevard between Doty Avenue and HP Casino Way and between HP Casino Way to Yukon Avenue.

Future Horizon Year (2045) With NFL Event With ITC Project

Appendix 4.10.2-6 compares the daytime and nighttime noise levels from traffic generated by the Future Horizon Year (2045) With NFL Event Without ITC Project to the Future Horizon Year (2045) With NFL Event With Project conditions. As shown, roadway noise levels during both the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods would not exceed the threshold of significance of an increase in noise level of 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

Therefore, impacts of the proposed Project related to traffic generated noise for the Future Horizon Year (2045) With NFL Event without and with the ITC Project would be less than significant.

APM Train Transit Noise

As mentioned previously, for analysis purposes it is assumed that the proposed Project would either utilize large, automated monorail technologies or rubber-tire vehicles operating along a fixed guideway. **Table 4.10-19: APM Trains Exterior Noise Levels** below provides the predicted noise levels of both the rubber-tired APM train and monorail.

Rubber-tired APM Train Noise

As shown in **Table 4.10-19**, when compared to ambient conditions, daytime noise level increases from the rubber-tired APM trains would range from 0.1 dBA Leq (Lday) at various sites to a high of 0.2 dBA Leq (Lday) at Site 1 (Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street). Additionally, nighttime noise levels increase would range from a low of 0.1 dBA Leq (Lnight) at Site A (Commercial uses along E. Queen Street) to a high of 0.8 dBA Leq (Lnight) at Site 1. It is important to note that the majority of the noise monitoring locations identified are not predicted to experience any increase resulting from operation of the rubber-tired APM trains. As such, operational noise levels would not result in increases of 3 dBA to or within the "normally unacceptable" or "clearly unacceptable" compatibility category for land uses or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

The results of the modeling process for operations of the proposed Project using rubber-tired APM trains is shown graphically in **Figure 4.10-7: Proposed Project with Rubber-Tired APM Train Noise Contour Map (Daytime)** and **Figure 4.10-8: Proposed Project with Rubber-Tired APM Train Noise Contour Map (Nighttime)**.

Monorail Noise

As shown in **Table 4.10-19**, when compared to ambient conditions, daytime noise level increases from the monorail technology would range from a low of 0.1 dBA Leq (Lday) at various sites to a high of 0.7 dBA Leq (Lday) at Site 2. Additionally, nighttime noise levels increase would range from a low of 0.1 dBA Leq (Lnight) at Sites 4, A, B and K to a high of 1.9 dBA Leq (Lnight) at Site 1. However, similar to the rubber-tired APM trains, the majority of locations monitored are not predicted to experience any increases resulting from operation of the monorail technology trains. As such, operational noise levels from the monorail technology would not result in increases of 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" compatibility category for land uses or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

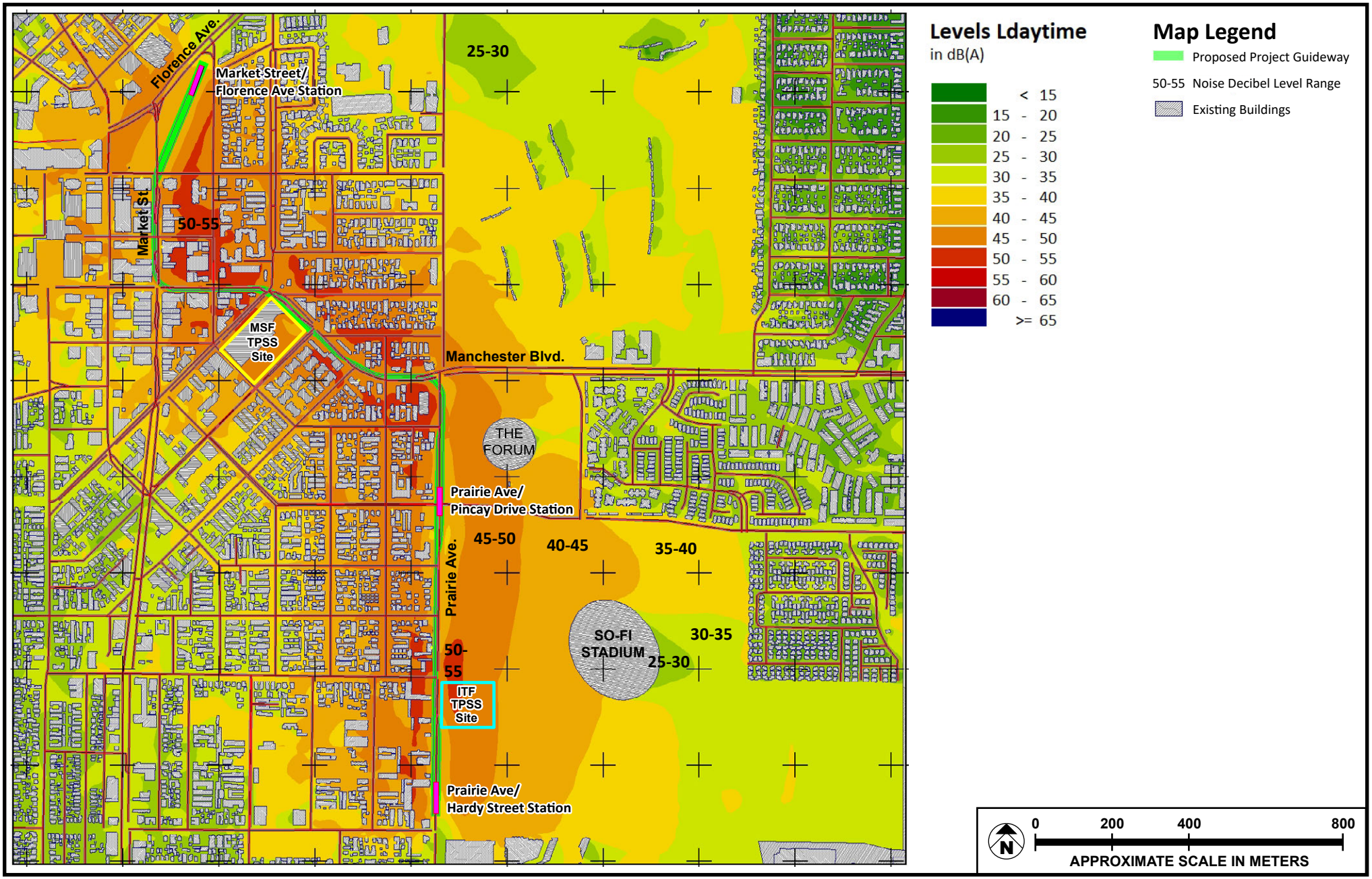
The results of the modeling process for operations of the monorail technology is shown graphically in **Figure 4.10-9: Monorail Noise Contour Map (Daytime)** and **Figure 4.10-10: Monorail Noise Contour Map (Nighttime)**.

Table 4.10-19
APM Trains Exterior Noise Levels

Site ID	Land Use	Existing Ambient		Train Type	Modeled Guideway Noise Levels		Future Ambient Plus Proposed APM Trains		Increase in Noise		Significant Impact?
		Daytime	Nighttime		Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	
		dBA			dBA						
Market Street Segment											
Site 1	Residential	61.9	54.6	Rubber Tired	48.4	47.6	62.1	55.4	+0.2	+0.8	**No**
				Monorail	52.8	52.0	62.4	56.5	+0.5	+1.9	**No**
Site A	Residential	64.1	57.8	Rubber Tired	41.9	41.0	64.1	57.9	0.0	+0.1	**No**
				Monorail	51.7	50.8	64.3	58.6	+0.2	+0.8	**No**
Site K	Public	67.5	63.4	Rubber Tired	39.2	38.4	67.5	63.4	0.0	0.0	**No**
				Monorail	49.0	48.2	67.6	63.5	+0.1	+0.1	**No**
Manchester Boulevard Segment											
Site 2	Residential	64.1	59.4	Rubber Tired	49.5	48.6	64.2	59.7	+0.1	+0.3	**No**
				Monorail	56.7	55.9	64.8	61.0	+0.7	+1.6	**No**
Site B	Educational	73.5	70.5	Rubber Tired	47.5	46.6	73.5	70.5	0.0	0.0	**No**
				Monorail	55.0	54.1	73.6	70.6	+0.1	+0.1	**No**
Site I	Residential	68.0	58.5	Rubber Tired	46.3	45.5	68.0	58.7	0.0	+0.2	**No**
				Monorail	51.1	50.2	68.1	59.1	+0.1	+0.6	**No**
Site J	Commercial/Mixed Use	73.6	69.1	Rubber Tired	41.2	40.3	73.6	69.1	0.0	0.0	**No**
				Monorail	50.2	49.4	73.6	69.1	0.0	0.0	**No**
Site L	Residential	74.0	72.8	Rubber Tired	30.4	29.5	74.0	72.8	0.0	0.0	**No**
				Monorail	37.9	37.0	74.0	72.8	0.0	0.0	**No**

Prairie Avenue Segment											
Site 3	Educational/Residential	71.2	66.0	Rubber Tired	50.3	49.4	71.2	66.0	0.0	0.0	**No**
				Monorail	55.6	54.7	71.3	66.3	+0.1	+0.3	**No**
Site 4	Residential	77.2	71.6	Rubber Tired	41.3	40.4	77.2	71.6	0.0	0.0	**No**
				Monorail	53.4	52.5	77.2	71.7	0.0	+0.1	**No**
Site C	Place of Worship/Lodging	76.7	70.6	Rubber Tired	41.9	41.1	76.7	70.6	0.0	0.0	**No**
				Monorail	53.2	52.4	76.7	70.7	0.0	+0.1	**No**
Site E	Lodging	72.6	66.2	Rubber Tired	25.3	24.4	72.6	66.2	0.0	0.0	**No**
				Monorail	38.3	37.4	72.6	66.2	0.0	0.0	**No**
Site F	Residential	68.8	59.9	Rubber Tired	40.7	39.8	68.8	59.9	0.0	0.0	**No**
				Monorail	46.8	46.0	68.8	60.0	0.0	+0.1	**No**
Site G	Residential	67.3	61.5	Rubber Tired	46.2	45.3	67.3	61.6	0.0	+0.1	**No**
				Monorail	53.1	52.2	67.5	62.0	+0.2	+0.5	**No**
Site H	Educational/Residential	67.6	56.6	Rubber Tired	46.2	45.4	67.6	56.9	0.0	+0.3	**No**
				Monorail	52.4	51.6	67.7	57.8	0.0	+1.2	**No**
Site M	Residential	74.9	67.9	Rubber Tired	27.7	26.8	74.9	67.9	0.0	0.0	**No**
				Monorail	34.8	33.9	74.9	67.9	0.0	0.0	**No**
Site 5	Lodging	73.3	70.0	Rubber Tired	27.3	26.4	73.3	70.0	0.0	0.0	**No**
				Monorail	39.9	39.0	73.3	70.0	0.0	0.0	**No**
Site D	Lodging	76.2	67.0	Rubber Tired	24.6	23.7	76.2	67.0	0.0	0.0	**No**
				Monorail	37.2	36.3	76.2	67.0	0.0	0.0	**No**

*Source: Refer to **Appendix 4.10-7** for Operational Noise for Modeled Guideway System Worksheets.*



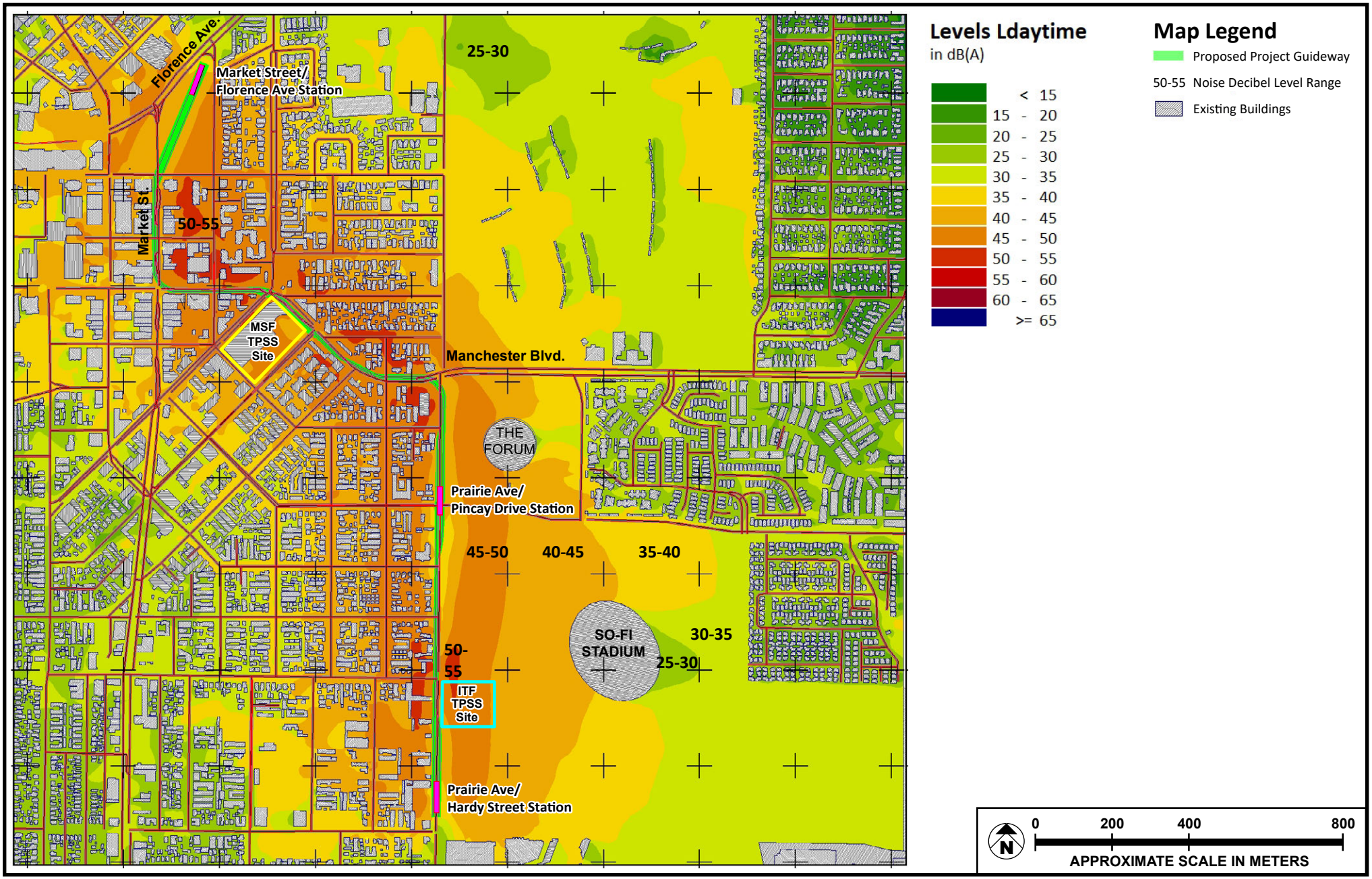
SOURCE: Google Earth - 2020

FIGURE **4.10-7**

Meridian Consultants

Proposed Project with Rubber-tire APM Train - Noise Contour Map (Daytime)

251-003-20



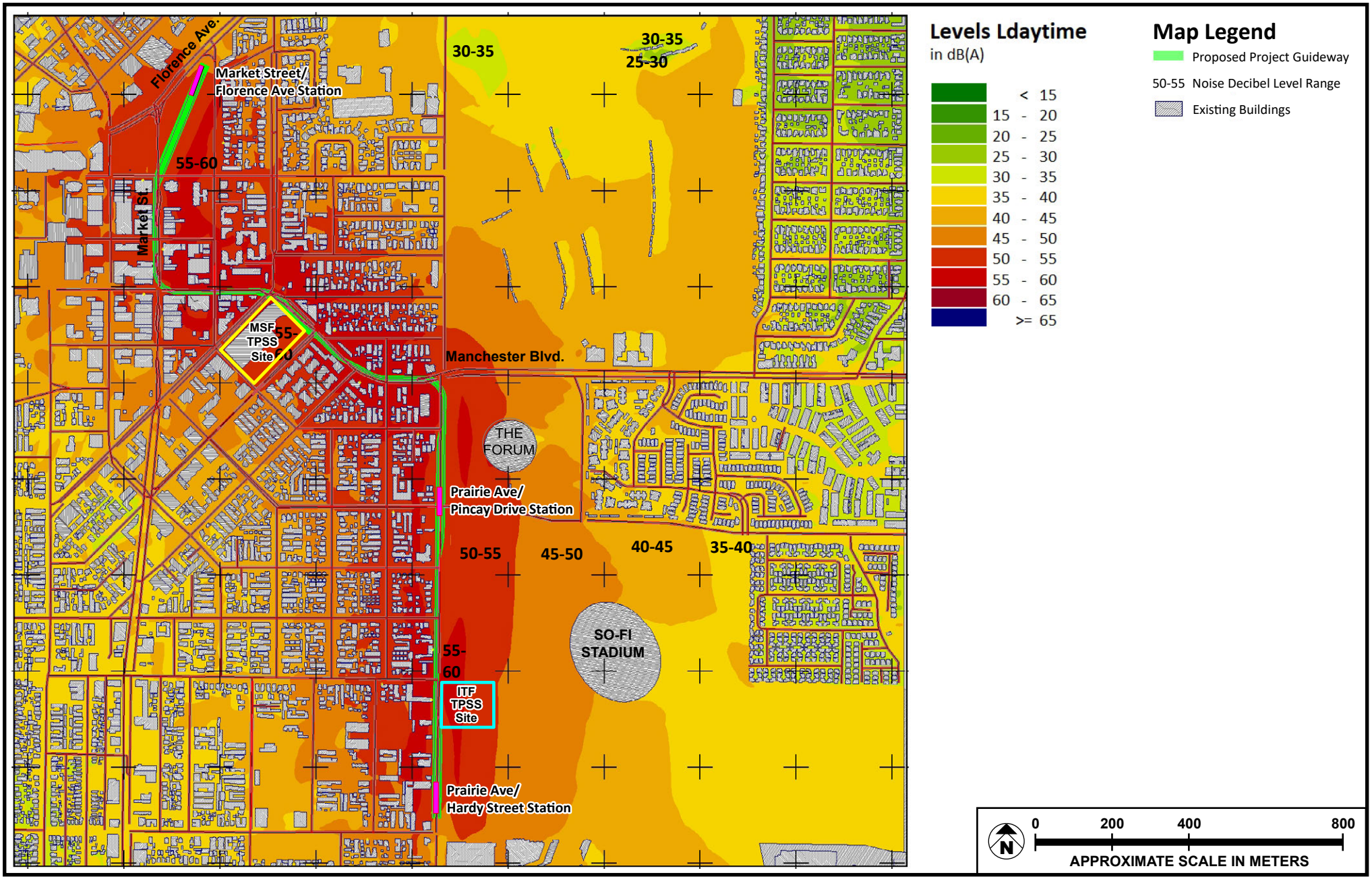
SOURCE: Google Earth - 2020

FIGURE **4.10-8**

Meridian Consultants

Proposed Project with Rubber-tire APM Train - Noise Contour Map (Nighttime)

251-003-20



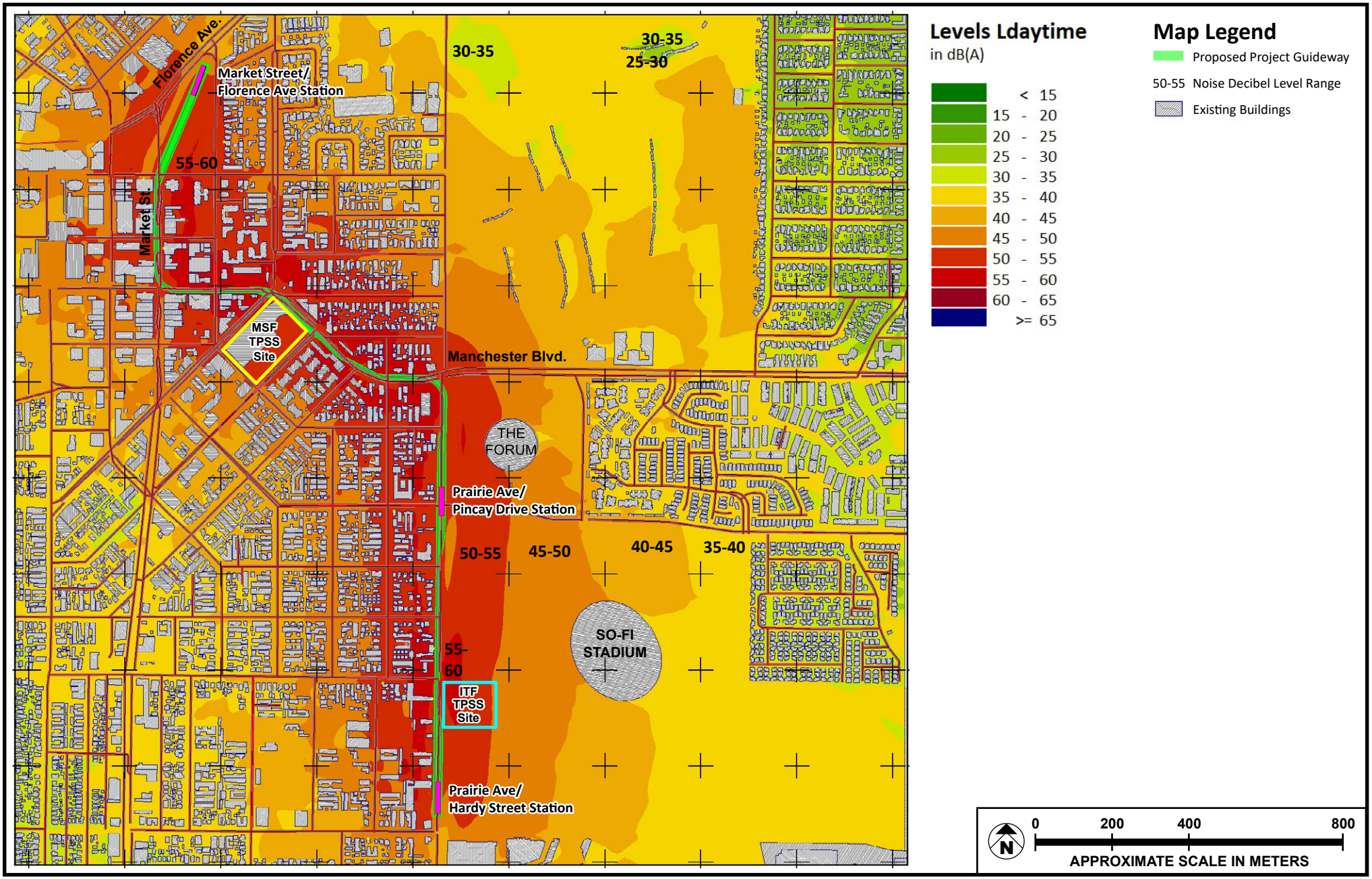
SOURCE: Google Earth - 2020

FIGURE **4.10-9**

Meridian Consultants

Monorail APM System Noise Contour Map (Daytime)

251-003-20



SOURCE: Google Earth - 2020

FIGURE **4.10-10**

Meridian Consultants

Monorail APM System Noise Contour Map (Nighttime)

251-003-20

Stationary Source Noise

MSF Site Operations

The proposed Project would include a Maintenance and Storage Facility (MSF) that would be used to maintain and store trains. A description of the MSF is provided in **Section 3.0: Project Description**, *3.5.2: Maintenance Storage Facility (MSF).*

The MSF is a large facility (approximately 97,400 SF), spread out over considerable area with various noise levels. The MSF would cover approximately 1.8 acres and would be sized to accommodate the APM train rolling stock and operating equipment. The MSF building would be elevated and consist of three levels. General dimensions of the MSF building would amount to approximately 195 feet in width (northwest–southeast) and 400 feet in length (northeast–southwest). The minimum clearance for the structure would be 16 feet 6 inches above grade, with a maximum height from the ground of approximately 75 feet.

The MSF would be an elevated multistory structure with a largely unenclosed ground floor. The maintenance level for APM train vehicles would be located on the second floor to match the height of the elevated guideway. Three entrance/exit tracks would be individually supported by dual-column spans, while the tracks just prior to switching into six rail docks would be supported by rounded, dual-column spans. As shown in **Figure 3.0-7**, the MSF would include the following three levels:

- Ground Level: The ground floor of the MSF would consist of a generally unenclosed space for employee parking, loading dock and large truck circulation, access driveways, traction power substation (30 feet by 100 feet), facility support rooms (mechanical, electrical, and plumbing support services), and freight elevator and other vertical circulation cores to higher levels of the structure.
- Maintenance Level: The maintenance level of the MSF would be located on the second floor, approximately 37.5 feet above grade. The northwestern side of the MSF would house one dock to be used for APM trains exterior/interior washing, including a collection system for wastewater and fluids from the train washing system. Towards the center area, the MSF would consist of two docks for light maintenance of the trains. Finally, near the southeastern side, the MSF would include two more docks to be used for heavy vehicle maintenance. The heavy maintenance docks would be located on top of a solid platform structure to capture and contain any mechanical fluids or components during maintenance activities.
- Rail access would be provided to the MSF maintenance level via a tertiary track adjacent to the Manchester Boulevard portion of the guideway that would match the height of the guideway.
- Mezzanine Level: The mezzanine level of the MSF would be located above the inventory and storage area, along the southeastern side of the facility. This area would house the operations control center where automated train operations are monitored and controlled.

Vehicle and passenger access to the MSF would be provided via controlled gates, as well as paved interior circulation for employees, service vehicles, and delivery vehicles.

The MSF site is bordered on three sides by residential and commercial uses across E. Hillcrest Boulevard, E. Spruce Avenue and E. Nutwood Street. In addition, there are commercial and residential uses to the east/northeast across Manchester Boulevard.

Using the general assessment of FTA's *Noise and Vibration Impacts Assessment,* the salient features of each fixed facility are considered in the noise analysis. **Table 4.10-20: Source Reference Levels at 50 feet from the Border of the MSF Site, Stationary Sources**, shows the source reference levels at 50 feet based on measurements for the peak hour of operation of a typical stationary source of the type and size noted.

Table 4.10-20
Source Reference Levels at 50 feet from Border of the MSF Site, Stationary Sources

Source	Reference SEL dBA	Reference Conditions
Yards and shops	118	20 train movements in peak activity hour
Crossovers	100	One Train
Signals	109	3600 second duration

Source: US Department of Transportation, Federal Transit Administration (USDOT, FTA), Transit Noise and Vibration Impact Assessment, FTA report no. 0123 (September 2018).

The items shown in **Table 4.10-20** are the highest of the activities in a typical maintenance and operations facility. The MSF is a large facility, spread out over considerable area with various noise levels depending on the layout of the facility. Specifying the reference SEL at a distance of 50 feet from the property line would be misleading in this case. Consequently, the reference distance is described as the "the equivalent distance of 50 feet," which is determined by estimating the noise levels at a greater distance and projecting back to 50 feet, assuming the noise sources are concentrated at the MSF on the northern side of the site.

The SoundPLAN noise propagation model was used to calculate area noise sources with the MSF. The model accounts for multiple receiver points, resulting in varying impacts due to distance of each point and the location of any intervening existing structures that serve as shields or noise barriers. As shown in **Table 4.10-21: Modeled Operational Noise Levels**, operational noise level increases during the daytime would range from no change at the majority of the identified receptors listed below to a high of 2.4 dBA Leq (Lday) at Site I (residential uses along Spruce Ave across from the MSF). Taking into account the ambient environment exterior noise levels during the daytime period at Site I would be 70.2 dBA. Increases in daytime noise levels would not exceed the 3 dBA Leq to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits. Additionally, nighttime noise level increases would range from no

change at the majority of the identified receptors listed below to a high of 4.4 dBA Leq (Lnight) at Site I. Taking into account the ambient environment, exterior noise levels during the nighttime period at Site I would be 62.9 dBA. Although nighttime noise levels would increase by more than 3 dBA Leq, nighttime noise levels would not result in an exterior environment that exceeds the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits. Additionally, equipment noise generating mechanical equipment in the MSF would include sound enclosures that would further reduce noise levels.

Impacts related to stationary noise sources from the MSF would be less than significant.

TPSS Site Operations

The proposed Project will include two TPSS sites. The identified TPSS locations are the proposed MSF site (AIN 4021-024-015) and the City's Civic Center site on Prairie Avenue (AINs 4025-011-901 and 4025-011-902). Each TPSS includes equipment to transform the medium- to high-voltage power feed provided from the power companies to the required 750-volt direct current (VDC) needed to power the vehicles and other ancillary equipment. A description of the TPSSs is provided in **Section 3.0**, *3.5.3: Traction Power Substations*.

Noise from transformers and similar equipment at substations is usually a low-frequency (60 Hz) humming sound. Noise from fans and ventilation equipment at substation sites can also contribute to this source. Transformer noise will "transmit" and attenuate at different rates depending on the transformer size, voltage rating, and design.[73] The substation line would be the source of noise from what is termed corona discharge. Noise from corona discharge and similar electrical phenomena associated with high voltage transmission lines is heard as a cracking or hissing sound, which commonly varies with the humidity. While distinctive at a short distance, this noise is typically only about 40 to 50 dBA or less and would not be loud enough to exceed any noise compatibility standards.[74] As mentioned previously, residential uses are normally compatible in areas where the ambient noise levels range between 55 – 70 dBA. When taking into account the noise from the transmission line ranging from 40 to 50 dBA, this results in a maximum increase of 0.1 dBA Leq, which is technically considered not perceivable. With the concurrent operation of noise generated from the MSF, the noise levels generated by the transformers would be negligible. Additionally, equipment noise generating mechanical equipment in the off-site TPSS would include sound enclosures that would further reduce noise levels.

Thus, the off-site TPSS would result in a less-than-significant noise impact.

73 Southern California Edison, Tehachapi Renewable Transmission Project, accessed August 2020, https://www1.sce.com/nrc/trtp/PEA/4.12_Noise.htm

74 Southern California Edison, Tehachapi Renewable Transmission Project, accessed August 2020, https://www1.sce.com/nrc/trtp/PEA/4.12_Noise.htm

Table 4.10-21
Modeled Operational Noise Levels

Receptor	Land Use	Time Period	Ambient Noise	MSF Operational Noise, Leq	MSF Operational Noise plus Ambient, leq	Increase Over Ambient, Leq	Significant Impact?
			dBA				
Market Street Segment							
Site 1	Residential	Daytime	61.9	37.5	61.9	0.0	**No**
		Nighttime	54.6	31.8	54.6	0.0	**No**
Site A	Residential	Daytime	64.1	38.1	64.1	0.0	**No**
		Nighttime	57.8	32.4	57.8	0.0	**No**
Site K	Public	Daytime	67.5	36.1	67.5	0.0	**No**
		Nighttime	63.4	30.4	63.4	0.0	**No**
Manchester Boulevard Segment							
Site 2	Residential	Daytime	67.5	57.5	67.9	+0.4	**No**
		Nighttime	64.1	51.9	64.4	+0.3	**No**
Site B	Educational	Daytime	73.5	45.9	73.5	0.0	**No**
		Nighttime	70.5	40.2	70.5	0.0	**No**
Site I	Residential	Daytime	68.0	66.6	70.4	+2.4	**No**
		Nighttime	58.5	61.0	62.9	+4.4	**No**
Site J	Commercial/Mixed Use	Daytime	73.6	37.6	73.6	0.0	**No**
		Nighttime	69.1	32.0	69.1	0.0	**No**
Site L	Residential	Daytime	74.0	41.1	74.0	0.0	**No**
		Nighttime	72.8	35.5	72.8	0.0	**No**
Prairie Avenue Segment							
Site 3	Educational/Residential	Daytime	71.2	48.3	71.2	0.0	**No**
		Nighttime	66.0	42.6	66.0	0.0	**No**
Site 4	Residential	Daytime	77.2	34.0	77.2	0.0	**No**

Receptor	Land Use	Time Period	Ambient Noise	MSF Operational Noise, Leq	MSF Operational Noise plus Ambient, leq	Increase Over Ambient, Leq	Significant Impact?
			dBA				
		Nighttime	71.6	28.3	71.6	0.0	**No**
Site C	Place of Worship/Lodging	Daytime	76.7	36.0	76.7	0.0	**No**
		Nighttime	70.6	30.3	70.6	0.0	**No**
Site E	Lodging	Daytime	72.6	29.3	72.6	0.0	**No**
		Nighttime	66.2	23.7	66.2	0.0	**No**
Site F	Residential	Daytime	68.8	39.1	68.8	0.0	**No**
		Nighttime	59.9	33.4	59.9	0.0	**No**
Site G	Residential	Daytime	67.3	42.3	67.3	0.0	**No**
		Nighttime	61.5	36.7	61.5	0.0	**No**
Site H	Educational/Residential	Daytime	67.6	46.9	67.6	0.0	**No**
		Nighttime	56.6	41.3	56.7	+0.1	**No**
Site M	Residential	Daytime	74.9	37.4	74.9	0.0	**No**
		Nighttime	67.9	31.7	67.9	0.0	**No**
Site D	Lodging	Daytime	76.2	38.1	76.2	0.0	**No**
		Nighttime	67.0	32.5	67.0	0.0	**No**
Site 5	Lodging	Daytime	73.3	38.4	73.3	0.0	**No**
		Nighttime	70.0	32.8	70.0	0.0	**No**

*Source: Refer to **Appendix 4.10-5.1** for MSF Stationary Source Worksheets.*

Backup Generators

To assure the ability to allow APM trains to reach the nearest stations to offload riders in the event of loss of electrical supply, each TPSS will be equipped with backup power generators. The proposed Project would include up to two stationary standby generators, one at each of the two TPSS sites, with an estimated total capacity rated at approximately 4,000 kilowatts (kW) to provide emergency power primarily for APM train operation, lighting, and other emergency systems.

Community response to noise and vibration correlates with the frequency of events and, intuitively, more frequent events of low noise and vibration levels may evoke the same responses as fewer high vibration level events. This effect is accounted for in the ground-borne noise and vibration impact criteria by characterizing projects by frequency of events. According to the FTA Transit Noise and Vibration Impact Assessment Manual, frequent events are defined as more than 70 events per day and infrequent events are defined as fewer than 30 events per day. Each standby generator would operate for 2 hours per day during 24 days per year (twice a month) for a total of not more than 50 hours per year. Each standby generator would be tested during different days; if needed for emergency operation, both generators would operate for up to 2 hours each and operation could occur simultaneously.

Reference noise levels for emergency generators from the SoundPLAN source library range from 60 dB to 75 dB at 10 meters (32.8 feet) from the source. Assuming the maximum emergency generator noise level of 75 dB, sensitive receptors within this distance without the use of barriers would exceed the upper limit for the Normally Acceptable noise exposure to residential residences of 70 dBA. As mentioned previously, based on conventional standard point source noise-distance attenuation factors, noise levels would be reduced by a factor of 4.5 to 6.0 dBA for each doubling distance. Assuming the lowest end of the attenuation factor of 4.5 dBA per doubling distance, emergency generator noise levels within 100 feet would be reduced to 67.6 dBA, below the normally acceptable noise exposure for residential residences. Additionally, stationary noise sources would be muffled and enclosed and would incorporate insulation barriers or other measures to the extent feasible to further reduce noise levels from the emergency generator. As such, due to the infrequent use of the generator and the use of barriers for stationary noise sources, a less-than-significant noise impact is anticipated for the use of emergency generators.

Station Operation Noise

The proposed Project includes three station at Market Street/Florence Avenue, Prairie Avenue/Pincay Street and Prairie Avenue/Hardy Street. Both the Prairie Avenue/Pincay Street and Prairie Avenue/Hardy Street station will be located within the public rights-of-way while the Market Street/Florence Avenue will be located outside the right-of way on the current CVS commercial plaza site at the northeast corner of Market Street and Regent Street. All platforms would be elevated at least 16 feet above ground level and

would include three levels (street level, mezzanine level, and platform level); a typical station design is shown in **Figure 3.0-8**. Additional details of the stations are discussed in **Section 3.0**, *3.5.1: Proposed Project Description.* The Market Street/Florence Avenue Station will also include a passenger walkway across Florence Avenue to connect with the Metro Crenshaw/LAX Line station.

The station and aerial passenger walkway designs would reduce LRT vehicle noise at nearby sensitive land uses by moving the noise source further from these land uses. Additional noise may be generated as reflection from the elevated structure. Moderate noise impacts from APM train or monorail passbys have been analyzed along each of the guideway segments (Market Street, Manchester Boulevard and Prairie Avenue) including noise from the trains/monorails entering and exiting stations.

The exterior noise level generated by the APM trains, with all contributing noise sources in operation, would conform to the levels specified in Section 2.2.1, Exterior Airborne Noise, ASCE 21-05 and not exceed the exterior noise standards set forth therein.[75] The guideway would be designed to have noise limiting barriers to limit train noise as noted in **Table 4.10-5** above. As shown, the FTA noise limits for trains entering or leaving stations is 76 dBA.[76]

Furthermore, as shown in **Table 4.10-19** above, operation of the proposed Project would result in noise level increases from a low of 0.1 dBA Leq to a high of 1.9 dBA Leq for the monorail technology, which results in a higher increase when compared to the rubber-tired APM trains. Additionally, exterior noise levels from the APM trains at the Market Street Station would range from 39.2 dBA Leq (Lday) at Site K (commercial uses along E. Regent Street and N. Market Street) to a high of 52.8 dBA Leq (Lday) at Site 1 (Residential uses along N. Locust Street). Additionally, nighttime noise levels from the APM trains at the Market Street Station would range from a low of 38.4 dBA Leq (Lnight) at Site K to a high of 52.0 dBA Leq (Lnight) at Site 1.

As shown in **Table 4.10-19** above, exterior noise levels from the APM trains at the Prairie Avenue/Pincay Street Station during the daytime would range from a low of 46.2 dBA Leq (Lday) at Site H (Residential uses along E. Kelso Street and Osage Avenue) to a high of 55.6 dBA Leq (Lday) at Site 3 (Residential and commercial uses along E. Nutwood Street and Prairie Avenue). Additionally, APM train noise levels during the nighttime period would range from a low of 45.4 dBA Leq (Lnight) at Site H to a high of 54.7 dBA Leq (Lnight) at Site 3.

75 American Society of Civil Engineers, Automated People Mover Standards - Part 2 Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.

76 American Society of Civil Engineers, Automated People Mover Standards - Part 2 Section 2.2.1, Exterior Airborne Noise, ASCE 21-05.

As shown in **Table 4.10-23** above, exterior noise levels from the APM trains at the Prairie Avenue/Hardy Street station during the daytime would range from a low of 40.7 dBA Leq (Lday) at Site F (Residential uses along Hardy Street) to a high of 53.4 dBA Leq (Lday) at Site 4 (Residential uses along Prairie Avenue). Additionally, exterior noise levels from the APM trains during the nighttime would range from a low of 39.8 dBA Leq (Lnight) at Site F to a high of 52.5 dBA Leq (Lnight) at Site 4.

Noise from passengers that would use the passenger walkways from the Market Street/Florence Avenue Station to the Metro Crenshaw/LAX Line station would not be considered a substantial noise source in that the crossover would be elevated above Florence Avenue and removed from any adjacent buildings. In addition, the noise would be muffled by existing background noise from vehicle traffic on Florence Avenue and surrounding streets.

The anticipated noise increase from operation of the stations would not result in an increase in noise level of 3 dBA to or within the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

Composite Traffic and Proposed Project Noise

As discussed above, implementation of the proposed Project would result in changes to existing road traffic noise, generation of construction-related noise and transit noise.

Operation

As discussed, and shown in **Appendix 4.10.2-6**, operation of the proposed Project would not result in significant impacts related to noise from roadway traffic levels, resulting in maximum increases of 0.1 dBA; in some areas, noise would actually decrease. Additionally, as shown in **Table 4.10-19**, operation of the proposed Project would result in noise levels increases from a low of 0.1 dBA Leq to a high of 1.9 dBA Leq for the monorail technologies, which results in a higher increase when compared to the rubber-tired APM trains.

As shown in **Table 4.10-21**, anticipated noise levels from stationary sources from the proposed MSF would range from no increase to a high of 4.4 dBA Leq. Taking into account the ambient environment, exterior noise levels during the nighttime period at Site I would be 62.9 dBA Leq (Lnight). Although nighttime noise levels would increase by more than 3 dBA Leq, nighttime noise levels would not result in an exterior environment that exceeds the "normally unacceptable" or "clearly unacceptable" land use compatibility categories or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

Table 4.10-22: Composite Noise (Roadway, APM Trains, and Stationary Sources) presents the composite operational noise levels at each of the sensitive receptors. The impacts are indicative of the impacts that

would be experienced taking into account the change in roadway noise levels, operation of the APM trains and stationary noise from the proposed MSF. As a result, impacts within each receptor group may vary depending on the distance of each receiver point within the specific receptor group and the location of any shielding or barriers.

As shown in **Table 4.10-22**, maximum composite noise level increases during the daytime period range from a low of 0.1 dBA Leq (Lday) to a high of 4.8 dBA Leq (Lday). Additionally, maximum composite noise level increases during the nighttime period from a low of 0.3 dBA Leq (Lnight) to a high of 6.4 dBA Leq (Lnight). Although exterior noise levels would increase by more than 3 dBA Leq during both the daytime and nighttime period, increases would not cause noise levels to be within the "normally unacceptable" or "clearly unacceptable" land use compatibility ranges for residential uses or result in an increase of 10 dBA or greater when noise levels remain within acceptable limits.

Composite noise levels impacts would be less than significant.

Table 4.10-22
Composite Operational Noise (Roadway, APM Trains, and Stationary Sources)

Sensitive Receptor ID	Land Use	Time Period	Future Long-Term (2045) With Project Roadway Noise Levels[1]	Maximum Noise Levels at Guideway [2]	Maximum Stationary Noise Levels[3]	Future Roadway plus Maximum Noise at Guideway [3]	Increase in Composite Noise	Significant Impact?
			dBA					
Market Street Segment								
Site 1	Residential	Daytime	58.7	52.8	37.5	59.7	+1.0	**No**
		Nighttime	51.2	52.0	31.8	54.7	+3.5	**No**
Site A	Residential	Daytime	60.9	51.7	38.1	61.4	+0.5	**No**
		Nighttime	53.3	50.8	32.4	55.3	+2.0	**No**
Site K	Public	Daytime	67.3	49.0	36.1	67.4	+0.1	**No**
		Nighttime	59.8	48.2	30.4	60.1	+0.3	**No**
Manchester Boulevard Segment								
Site 2	Residential	Daytime	70.2	56.7	57.5	70.6	+0.4	**No**
		Nighttime	62.7	55.9	51.9	63.8	+1.1	**No**
Site B	Educational	Daytime	70.2	55.0	45.9	70.3	+0.1	**No**
		Nighttime	62.7	54.1	40.2	63.3	+0.6	**No**
Site I	Residential	Daytime	63.6	51.1	66.6	68.4	+4.8	**No**
		Nighttime	56.1	50.2	61.0	62.5	+6.4	**No**
Site J	Commercial/Mixed Use	Daytime	68.9	50.2	37.6	69.0	+0.1	**No**
		Nighttime	61.4	49.4	32.0	61.7	+0.3	**No**
Site L	Residential	Daytime	73.0	37.9	41.1	73.0	0.0	**No**
		Nighttime	65.5	37.0	35.5	65.5	0.0	**No**
Prairie Avenue Segment								
Site 3	Educational/Residential	Daytime	71.9	55.6	48.3	72.0	+0.1	**No**

Sensitive Receptor ID	Land Use	Time Period	Future Long-Term (2045) With Project Roadway Noise Levels[1]	Maximum Noise Levels at Guideway [2]	Maximum Stationary Noise Levels[3]	Future Roadway plus Maximum Noise at Guideway [3]	Increase in Composite Noise	Significant Impact?
			dBA					
		Nighttime	64.3	54.7	42.6	64.8	+0.5	**No**
Site 4	Residential	Daytime	71.8	53.4	34.0	71.9	+0.1	**No**
		Nighttime	64.3	52.5	28.3	64.6	+0.3	**No**
Site C	Place of Worship/Lodging	Daytime	72.1	53.2	36.0	72.2	+0.1	**No**
		Nighttime	64.6	52.4	30.3	64.9	+0.3	**No**
Site E	Lodging	Daytime	73.0	38.3	29.3	73.0	0.0	**No**
		Nighttime	65.5	37.4	23.7	65.5	0.0	**No**
Site F	Residential	Daytime	59.7	46.8	37.1	59.9	+0.2	**No**
		Nighttime	52.2	46.0	33.4	53.2	+1.0	**No**
Site G	Residential	Daytime	65.3	53.1	42.3	65.6	+0.3	**No**
		Nighttime	57.8	52.2	36.7	58.9	+1.1	**No**
Site H	Educational/Residential	Daytime	64.8	52.4	46.9	65.1	+0.3	**No**
		Nighttime	57.3	51.6	41.3	58.4	+1.1	**No**
Site M	Residential	Daytime	71.8	34.8	37.4	71.8	0.0	**No**
		Nighttime	64.3	33.9	31.7	64.3	0.0	**No**
Site D	Lodging	Daytime	73.6	37.2	38.1	73.6	0.0	**No**
		Nighttime	66.1	36.3	32.5	66.1	0.0	**No**
Site 5	Lodging	Daytime	73.6	39.9	38.4	73.6	0.0	**No**
		Nighttime	66.1	39.0	32.8	66.1	0.0	**No**

*Notes: [1] Refer to **Table 4.10-20** for Roadway Noise Levels*
*[2] Refer to **Table 4.10-23** for Monorail Guideway System operational noise levels.*
*[3] Refer to **Table 4.10-25** for MSF Operational Noise Levels*
[4] Logarithmic increase = Roadway Noise + Guideway Noise + Stationary MSF Noise

Mitigation Measures

Impacts associated with noise from operation of the proposed Project are less than significant do not require any mitigation.

Impact NOI-2: Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Construction

Construction activities can generate varying degrees of ground vibration, depending on the construction phase (e.g., site preparation, grading, etc.) and the type of construction equipment used. The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located near the construction site often varies depending on soil type, ground strata, and construction characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels to low rumbling sounds and perceptible vibration at moderate levels.

Ground-borne vibration impacts due to proposed Project construction activities were evaluated by identifying potential vibration sources (i.e., construction equipment), estimating the vibration levels at potentially affected receptors, and comparing the proposed Project's vibration levels to the applicable vibration significance thresholds.

Vibration levels were calculated based on the FTA published standard[77] vibration velocities for various construction equipment operations. Vibration levels with regard to potential building damage are evaluated at the nearest off-site buildings to the Project area, whereas the potential for human annoyance associated with construction-related vibration are evaluated at the identified receptor locations. In addition, vibration impacts, in accordance with FTA and Caltrans guidance, are evaluated based on the maximum peak vibration levels generated by each type of construction equipment. This differs from the analysis of noise impacts which is based on the average/equivalent (Leq) levels, which are dependent on the total number of construction equipment operating during the analysis period (i.e., 1 hour).

Construction Related Vibration Impacts from On Site Activities

77 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.

The proposed Project will involve the use of heavy equipment as discussed in the Construction Scenario (see **Appendix 3.0.4** of the EIR), the anticipated construction equipment for on and off site construction activities and is shown in **Table 4.10-4.**

Off-Road On-Site Equipment: Off-road construction equipment includes dozers, loaders, sweepers, and other heavy-duty construction equipment that is not licensed for travel on public highways.

On-Road On-Site Equipment: On-road on-site equipment includes shuttle vans transporting construction employees to and from the site(s), on-site pick-up trucks, crew vans, water trucks, dump trucks, haul trucks and other on road-road vehicles licensed to travel on public roadways.

Phases 1, 2 and 3 will involve extensive use of construction equipment that has the ability to create groundborne vibration. Phase 4 will include a significantly reduced amount of construction equipment that is not anticipated to include vibration intensive activities.

Table 4.10-23: Construction Related Vibration Impacts – Building Damage presents the construction vibration impacts associated with construction in terms of building damage. As indicated in **Table 4.10-23**, the forecasted vibration levels due to construction activities would exceed the building damage significance threshold of 0.2 PPV inches per second (ips) at:

Market Street and Market Street/Florence Avenue Station

- **Site 1** (Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street**)** with an estimated vibration velocity levels at the nearest off-site structures of 0.267 PPV ips;
- **Site A** (Commercial uses along E. Queen Street) with an estimated vibration velocity levels at the nearest off-site structures of 0.318 PPV ips; and
- **Site K** (Commercial uses along E. Regent Street) with an estimated vibration velocity levels at the nearest off-site structures of 0.228 PPV ips.

Manchester Boulevard and MSF Site

- **Site B** (Residential uses on the northern portion of E. Manchester Boulevard, commercial uses on the southern portion of E. Manchester Boulevard) with an estimated vibration velocity levels at the nearest off-site structures of 0.318 PPV ips; and
- **Site I** (Residential uses on the eastern portion of E. Spruce Avenue, commercial uses on the western portion of E. Spruce Avenue) with an estimated vibration velocity levels at the nearest off-site structures of 0.228 PPV ips; and

Prairie Avenue and Prairie Avenue/Pincay Drive and Prairie Avenue/Hardy Street Stations

- **Site 4** (Mixed-use residential along west side of Prairie Avenue) with an estimated vibration velocity levels at the nearest off-site structures of 0.490 PPV ips;
- **Site C** (SoFi Stadium to the west of Prairie Avenue, commercial and lodging uses to the east of Prairie Avenue) with an estimated vibration velocity levels at the nearest off-site structures of 0.318 PPV ips

These impacts are primarily caused by impact pile drivers located within 55 feet of the nearest receptor.

As such, construction vibration impacts would be potentially significant.

As shown in **Table 4.10-24: Proposed Project Construction Related Vibration Impacts—Human Annoyance**, the forecasted vibration levels from construction activities would exceed human annoyance significance threshold of 72 PPV ips for various types of equipment at:

Market Street and Market Street/Florence Avenue Station

- **Site 1** (Residential uses to the west of N. Locust Street including the Holy Faith Episcopal Church, commercial uses to the east of N. Locust Street**)** with an estimated maximum vibration velocity levels at the nearest off-site structures of 96 VdB.
- **Site A** (Commercial uses along E. Queen Street) with an estimated maximum vibration velocity levels at the nearest off-site structures of 98 VdB.
- **Site K** (Commercial uses along E. Regent Street) with an estimated maximum vibration velocity levels at the nearest off-site structures of 95 VdB.

Manchester Boulevard and MSF Site

- **Site 2** (Residential uses along E. Manchester Boulevard, Manchester Drive and S. Orange Avenue) with an estimated maximum vibration velocity levels at the nearest off-site structures of 91 VdB.
- **Site B** (Residential uses on the northern portion of E. Manchester Boulevard, commercial uses on the southern portion of E. Manchester Boulevard) with an estimated maximum vibration velocity levels at the nearest off-site structures of 98 VdB.
- **Site I** (Residential uses on the eastern portion of E. Spruce Avenue, commercial uses on the western portion of E. Spruce Avenue) with an estimated maximum vibration velocity levels at the nearest off-site structures of 95 VdB.
- **Site J** (Commercial uses along E. Manchester Boulevard) with an estimated maximum vibration velocity levels at the nearest off-site structures of 93 VdB.

Table 4.10-23

Proposed Project Construction Related Vibration Impacts – Building Damage

Nearest Off-Site Building Structures	Estimated Vibration Velocity Levels at the Nearest Off-Site Structures from Proposed Project Construction Equipment							Significance Threshold (PPV ips)	Significant Impacts?
	Pile Driver (impact)	Vibratory Roller	Large Bulldozer	Caisson Drilling	Loaded Trucks	Jack-hammer	Small bulldozer		
Market Street Segment									
Site 1	***0.267***	0.087	0.037	0.037	0.031	0.058	0.001	0.2	**Yes**
Site A	***0.318***	0.104	0.044	0.044	0.038	0.069	0.001	0.2	**Yes**
Site K	***0.228***	0.074	0.031	0.031	0.027	0.049	0.001	0.2	**Yes**
Manchester Boulevard Segment									
Site 2	0.137	0.045	0.019	0.019	0.016	0.030	0.001	0.2	No
Site B	***0.318***	0.104	0.044	0.044	0.038	0.069	0.001	0.2	**Yes**
Site I	***0.228***	0.074	0.031	0.031	0.027	0.049	0.001	0.2	**Yes**
Site J	0.173	0.056	0.024	0.024	0.020	0.038	0.001	0.2	No
Site L	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.2	No
Prairie Avenue Segment									
Site 3	0.051	0.017	0.007	0.007	0.006	0.011	0.000	0.2	No
Site 4	***0.490***	0.160	0.068	0.068	0.058	0.107	0.002	0.2	**Yes**
Site 5	0.124	0.040	0.017	0.017	0.015	0.027	0.001	0.2	No
Site C	***0.318***	0.104	0.044	0.044	0.038	0.069	0.001	0.2	**Yes**
Site D	0.012	0.004	0.002	0.002	0.001	0.003	0.000	0.2	No
Site E	0.011	0.004	0.002	0.002	0.001	0.002	0.000	0.2	No
Site F	0.051	0.017	0.007	0.007	0.006	0.011	0.000	0.2	No
Site G	0.028	0.009	0.004	0.004	0.003	0.006	0.000	0.2	No
Site H	0.008	0.003	0.001	0.001	0.001	0.002	0.000	0.2	No
Site M	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.2	No

Source: US Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment
*Refer to **Appendix 4.10-5** for Construction Vibration Worksheets*
*Note: **Boldface type** indicates noise level in exceedance of the significance threshold.*

Table 4.10-24

Proposed Project Construction Related Vibration Impacts – Human Annoyance

Nearest Off-Site Building Structures	Estimated Vibration Velocity Levels at the Nearest Off-Site Structures from Proposed Project Construction Equipment							Significance Threshold (VdB)	Significant Impacts?
	Pile Driver (impact)	Vibratory Roller	Large Bulldozer	Caisson Drilling	Loaded Trucks	Jack-hammer	Small bulldozer		
Market Street Segment									
Site 1	***96***	***87***	***79***	***79***	***78***	***83***	50	72	**Yes**
Site A	***98***	***88***	***81***	***81***	***79***	***85***	51	72	**Yes**
Site K	***95***	***85***	***78***	***78***	***77***	***82***	48	72	**Yes**
Manchester Boulevard Segment									
Site 2	***91***	***81***	74	74	72	***77***	44	72	**Yes**
Site B	***98***	***88***	***81***	***81***	***79***	***85***	51	72	**Yes**
Site I	***95***	***85***	***78***	***78***	***77***	***82***	48	72	**Yes**
Site J	***93***	***83***	***76***	***76***	74	***79***	46	72	**Yes**
Site L	53	44	36	36	35	40	7	72	No
Prairie Avenue Segment									
Site 3	***82***	72	65	65	64	69	36	72	**Yes**
Site 4	***102***	***92***	***85***	***85***	***83***	***89***	55	72	**Yes**
Site 5	***90***	***80***	***73***	***73***	71	***77***	43	72	**Yes**
Site C	***98***	***88***	***81***	***81***	***79***	***85***	51	72	**Yes**
Site D	*70*	60	52	52	51	56	23	72	No
Site E	*69*	59	51	51	50	55	22	72	No
Site F	***82***	72	65	65	64	69	36	72	**Yes**
Site G	***77***	67	60	60	58	64	30	72	**Yes**
Site H	66	56	49	49	47	53	19	72	No
Site M	44	34	26	26	25	30	-3	72	No

Source: US Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment
Refer to ***Appendix 4.10-5*** *for Construction Vibration Worksheets*
Note: ***Boldface type*** *indicates noise level in exceedance of the significance threshold.*

Prairie Avenue and Prairie Avenue/Pincay Drive and Prairie Avenue/Hardy Street Stations

- **Site 3** (Residential uses along E. Nutwood Street, education facilities along Prairie Avenue) with an estimated maximum vibration velocity levels at the nearest off-site structures of 82 VdB.
- **Site 4** (Mixed-use residential along west side of Prairie Avenue) with an estimated maximum vibration velocity levels at the nearest off-site structures of 102 VdB.
- **Site 5** (Lodging uses on the southern portion of W. Century Boulevard) with an estimated maximum vibration velocity levels at the nearest off-site structures of 90 VdB.
- **Site C** (SoFi Stadium to the west of Prairie Avenue, commercial and lodging uses to the east of Prairie Avenue) with an estimated maximum vibration velocity levels at the nearest off-site structures of 98 VdB.
- **Site F** (Multifamily residential uses along E. Hardy Street) with an estimated maximum vibration velocity levels at the nearest off-site structures of 82 VdB.
- **Site G** (Residential uses along E. Arbor Vitae Street) with an estimated maximum vibration velocity levels at the nearest off-site structures of 77 VdB.

The sites that exceed the human annoyance significance threshold of 72 PPV ips for forecasted vibration levels due to construction activities from heavy equipment would range from 73 PPV ips for large dozers and drilling equipment at Site 5 (Lodging uses on the southern portion of W. Century Boulevard) to 102 PPV ips for piles drivers at Site 4 (Mixed-use residential along west side of Prairie Avenue).

Thus, proposed Project construction would result in a significant vibration impact with regard to human annoyance.

Construction Haul Route Related Vibration Impacts

In addition to on-site construction activities, construction delivery/haul trucks would generate ground-borne vibration as they travel along the proposed Project's anticipated off-site truck travel routes. Based on FTA data,[78] the vibration generated by a typical heavy-duty truck would be approximately 63 VdB (0.00566 PPV) at a distance of 50 feet from the truck.

Existing buildings along the proposed Project's anticipated off-site truck travel routes (Florence Avenue, Manchester Boulevard, Prairie Avenue, and Century Boulevard) that are situated approximately 35 feet from the truck travel pathway would be exposed to ground-borne vibration levels of approximately 0.01 PPV. This forecasted vibration level would be below the most stringent building damage criteria of 0.12

78 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.

PPV. [79] Therefore, vibration impacts with respect to building damage from off-site construction truck travel on public roadways would be less than significant.

In addition, vibration sensitive uses (e.g., residential, hotel uses) are located along Florence Avenue, Manchester Boulevard, Prairie Avenue, and Century Boulevard. Ground-borne vibration levels generated by proposed Project off-site construction truck travel would be below the FTA 72 VdB significance threshold,[80] as these uses are located more than 25 feet from the truck travel pathway. Therefore, vibration impacts with respect to human annoyance from off-site construction truck travel would be less than significant for the vibration sensitive land uses located along these roadways.

Operation

The condition of the rails, type of guideway construction, other proposed Project components, and the mass and stiffness of the guideway structure would have an influence on the level of ground-borne vibration. Jointed rail, worn rail, and wheel impacts at special track work can all cause substantial increases in ground-borne vibration. It is rare for ground-borne vibration to be a problem with elevated railways except when guideway supports are located within 50 feet of buildings.[81] For rubber-tired APM trains, the smoothness of the roadway/guideway is the critical factor; if the surface is smooth, vibration problems are unlikely.

The vibration sensitive land uses nearest to the guideway include commercial and residential uses along Market Street, Manchester Boulevard and Prairie Avenue which would be approximately 30 feet from the guideway centerline. Based on the adjusted vibration level curve, the estimated ground-borne vibration levels would be approximately 67 VdB for monorail trains (rapid transit or light rail vehicles) and 64 VdB for rubber-tired APM trains. Consequently, the maximum vibration level of the uses along the guideway would be below the FTA recommended maximum acceptable level threshold of 72 VdB.[82]

As such, transit-related ground-borne vibration for rubber-tired APM train vehicles would be less than significant.

79 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.

80 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018.

81 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018, accessed July 2020, 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

82 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018

Mitigation Measures

The following mitigation measures have been identified to reduce potentially significant vibration impacts related to construction.

Construction

MM 4.10-3: **Construction Vibration Reduction Plan**. Prior to the issuance of any demolition or construction permit for each phase of project development, a Construction Vibration Reduction Plan shall be prepared to minimize construction vibration at nearby sensitive receptors from vibration created by construction activities. The Plan shall be developed in coordination with a certified acoustical/vibration consultant and the Construction Manager and shall be approved by the City's Director of Public Works. The Plan shall include but not be limited to the following elements to ensure impacts from groundborne vibration are less than significant:

A. A Pre-Demolition and Construction Plan that includes but not limited to:

   i. Photos of current conditions of buildings and structures that could be damaged from construction activities. This crack survey shall include photos of existing cracks and other material conditions present on or at the surveyed buildings. Images of interior conditions shall be included if possible. Photos in the report shall be labelled in detail and dated.

   ii. Identify representative cracks in the walls of existing buildings, if any, and install crack gauges on such walls of the buildings to measure changes in existing cracks during project activities.

   Crack gauges shall be installed on multiple representative cracks, particularly on sides of the building facing the project.

   iii. Determine the number and placement of vibration sensors at the affected buildings in consultation with a qualified architect. The number of units and their locations shall take into account proposed demolition and construction activities so that adequate measurements can be taken illustrating vibration levels during the course of the project, and if/when levels exceed the established threshold.

   iv. A line and grade pre-construction survey at the affected buildings shall be conducted.

B. A Vibration Plan During Demolition and Construction:

   i. The Construction Manager shall regularly inspect and photograph crack gauges, maintaining records of these inspections to be included in postconstruction reporting. Gauges shall be inspected every two weeks, or

more frequently during periods of active project actions in close proximity to crack monitors.

ii. The vibration monitoring system shall measure and continuously store the peak particle velocity (PPV) in inches/second. Vibration data shall be stored on a one-second interval. The system shall also be programmed for two preset velocity levels: a regulatory level that represents when PPV levels would exceed the FTA's threshold of significance for a building given its conditions, and a warning level that is 0.05 inch/second (PPV) less than the regulatory level. The system shall also provide real-time alert when the vibration levels exceed either of the two preset levels.

iii. In the event the warning level (PPV) is triggered, the contractor shall identify the source of vibration impacts and establish steps to reduce the vibration levels, including but not limited to halting or staggering concurrent activities and using lower vibratory techniques.

iv. In the event the regulatory level (PPV) is triggered, the Construction Manager shall halt the construction activities in the vicinity of the Project area and visually inspect the building for any damage. Results of the inspection must be logged. The Construction Manager shall identify the source of vibration generation and provide steps to reduce the vibration level. Vibration measurement shall be made with the new construction method to verify that the vibration level is below the warning level (PPV). Construction activities may then restart.

v. In the event damage occurs to historic finish materials due to construction vibration, such materials shall be repaired in consultation with a qualified preservation consultant.

vi. The Construction Manager shall collect vibration data from receptors and report vibration levels to the City Chief Building Official on a daily basis.

The reports shall include annotations regarding project activities as necessary to explain changes in vibration levels.

C. Post-Construction:

i. The Construction Manager shall provide a report to the City Chief Building Official regarding crack and vibration monitoring conducted during demolition and construction. In addition to a narrative summary of the monitoring activities and their findings, this report shall include photographs illustrating the post-

construction state of cracks and material conditions that were presented in the pre-construction assessment report, along with images of other relevant conditions showing the impact, or lack of impact, of project activities. The photographs shall sufficiently illustrate damage, if any, caused by the project and/or show how the project did not cause physical damage to the buildings. The report shall include analysis of vibration data related to project activities, as well as summarize efforts undertaken to avoid vibration impacts. Finally, a postconstruction line and grade survey shall also be included in this report.

ii. The Construction Manager shall be responsible for repairs and damage to buildings if damage is caused by vibration or movement during the demolition and/or construction activities. Repairs may be necessary to address, for example, cracks that expanded as a result of the project, physical damage visible in post-construction assessment, or holes or connection points that were needed for shoring or stabilization. Repairs shall be directly related to project impacts and will not apply to general rehabilitation or restoration activities of the buildings.

MM 4.10-4: **Construction Equipment Locations (Building Damage)**. To address potential structural and building damage, the following measures are proposed to reduce vibration impacts:

- Limit the location of pile driving and vibratory roller activity to not be within 55 feet and 30 feet of the nearest off-site sensitive receptor, respectively.
- Limit the number of jackhammers operating simultaneously to one (1) piece operating within 45 feet of off-site sensitive receptors.
- In the event impact pile driving is required, equipment shall only be used from the hours of 7:00 AM to 7:00 PM. If feasible, pile driving should use alternative technology such as vibration or hydraulic insertion.

MM 4.10-5: **Construction Equipment Locations (Human Annoyance)**. To reduce construction vibration impacts related to human annoyance, the following measures are proposed:

- Limit the location of pile driving to 310 feet of off-site vibration sensitive receptors.
- Limit the location of vibratory roller to 150 feet of off-site vibration sensitive receptors.
- Limit the location of large bulldozer to 85 feet of off-site vibration sensitive receptors.
- Limit the location of caisson drilling to 85 feet of off-site vibration sensitive receptors.
- Limit the location of loaded trucks to 75 feet of off-site vibration sensitive receptors.
- Limit the location of jackhammers to 45 feet of off-site vibration sensitive receptors.
- Limit the location of small bulldozer to 25 feet of off-site vibration sensitive receptors.

Operation

Impacts associated with groundborne vibration and noise from operation of the proposed Project are less than significant do not require any mitigation.

Level of Significance after Mitigation

Construction

As shown in **Table 4.10-23** and **4.10-24**, impacts related to construction vibration to both building damage and human annoyance would be significant.

As mentioned previously, implementation of **Mitigation Measure MM 4.10-2** would designate a Community Affairs Liaison to be responsible for responding within 24 hours to any local complaints about construction activities related to noise and vibration. **MM 4.10-2** would provide a community affairs liaison to investigate noise disturbance and undertake all feasible measures are implemented to reduce construction vibration levels as deemed appropriate. Additionally, implementation of **Mitigation Measure MM 4.10-3** would require a preparation of a Construction Vibration Reduction Plan to ensure minimization of construction vibration at nearby sensitive receptors from vibration created by construction activities. The Construction Vibration Reduction Plan would require continuous monitoring and collection of vibration data to verify vibration levels are below the warning level PPV. In the event regulatory levels of PPV is triggered, construction activities would halt to visually inspect sensitive buildings for damage. Additionally, **Mitigation Measure MM 4.10-4** and **MM 4.10-5** would require vibration-generating equipment to be located at specified distances from adjacent noise receptors.

Table 4.10-25: Mitigated Proposed Project Construction Related Vibration Impacts – Human Annoyance implements **Mitigation Measure MM 4.10-5** and provides the adjusted distances required to reduce vibration to below the perceptible levels of 72 VdB. As shown, impacts related to construction vibration impacts to human annoyance with adjusted distance of construction equipment would be less than significant with mitigation.

Table 4.10-25
Mitigated Proposed Project Construction Related Vibration Impacts – Human Annoyance

Equipment	Unmitigated		Mitigated		Exceed Significance Threshold of 72 VdB?
	Distance (feet)	Estimated Vibration Velocity Levels (PPV ips)	Distance (feet)	Estimated Vibration Velocity Levels (PPV ips)	
Pile Driver (impact)	25	104	310	71	**No**
Vibratory Roller	25	94	150	71	**No**
Large Bulldozer	25	87	85	71	**No**
Caisson Drilling	25	87	85	71	**No**
Loaded Trucks	25	86	75	71	**No**
Jackhammer	25	79	45	71	**No**
Small bulldozer	25	58	25	58	**No**

_____
Source: US Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment

Operation

Impacts associated with groundborne vibration from operation of the proposed Project are less than significant and do not require any mitigation.

4.10.8 CUMULATIVE IMPACTS

The analysis of changes to the community noise environment based on cumulative conditions considers development of the proposed Project in combination with ambient growth and other development projects located near the Project area. The potential for cumulative noise impacts is primarily related to the distance between each related project's stationary noise sources, as well as both the presence of existing structures in the Project area and the cumulative traffic that the cumulative development would add to the surrounding roadway network. As discussed in **Section 4.0**, *4.0.6: Cumulative Scenario*, there are 74 cumulative projects within the City.

4.10.8.1 Noise

Construction

Equipment Noise

Noise from the construction of development projects is typically localized and has the potential to affect noise-sensitive uses within 500 feet of the construction site. Thus, noise from construction activities for two projects within 1,000 feet of each other can contribute to a cumulative noise impact for receptors

located midway between the two construction sites. The cumulative project lists locating within 1,000 to the Project area are Project No. 7, 8, 20, 30, 35, 44, 37, 48, 60, and 73.

As shown in **Table 4.10-15** through **4.10-18**, construction noise impacts would be potentially significant without implementation of mitigation. The timing of the construction activities for cumulative projects cannot be defined, and any quantitative analysis of those projects to assume concurrent construction would be entirely speculative. Should construction activities (day or night) during any phase of construction occur concurrently with construction of the cumulative projects, adjacent receptors could be exposed to construction noise that results in temporary noise increases in excess of 5 dBA Leq 1-hour above ambient exterior noise level significance threshold. Given that the proposed Project's construction contributes to the noise levels generated by the cumulative projects within 1,000 feet, cumulative impacts would be significant during those periods of time when the proposed Project development and the cumulative projects construction are occurring concurrently. While it could reasonably be assumed that cumulative projects would implement mitigation measures to lessen to the extent feasible potential noise impacts from construction, potential cumulative impacts as a result of the cumulative projects and the proposed Project could occur.

Therefore, the cumulative construction equipment noise impact would be cumulatively considerable and significant.

Off-Site Construction Noise

In terms of off-site construction-related noise, the location of the cumulative projects suggests that off-site construction truck travel associated with the related projects would occur along portions of the same travel routes as those anticipated to be used by the proposed Project's off-site construction trucks.

As mentioned previously, the primary delivery and haul routes proposed during construction of the proposed Project would utilize Florence Avenue, Manchester Boulevard, Prairie Avenue, and Century Boulevard, which have been designated by the City as appropriate for heavy truck use. Should use of the same designated haul routes by any of the cumulative projects overlap with use of those haul routes during the same period, traffic volumes could potentially increase such that the resulting cumulative noise increase due to construction traffic along the haul routes would exceed 3 dBA over ambient noise levels at noise-sensitive receptors along those routes. However, similar to the proposed Project, related projects would likely designate construction routes to freeway and major arterials, avoiding minor arterials.

As mentioned previously, it takes a doubling of traffic volumes (100 percent increase) in order to increase traffic noise levels by 3 dBA. As compared to adjusted baseline average daily traffic volumes along the roadways mentioned above, the sound power generated by the maximum anticipated number of

construction trucks would not be equivalent or greater to a doubling of the maximum ADT along West Century Boulevard, Manchester Boulevard or South Prairie Avenue. In combination with the cumulative projects within 1,000 feet, construction-related traffic would not result in a double or tripling of existing daily traffic volumes on streets around the proposed Project. As such, the cumulative exceedances of related project construction truck traffic would not be considered cumulative considerable. Therefore, cumulative impacts associated with off-site construction noise would not be cumulatively considerable and would be less than significant.

Operation

Roadway Noise

Noise and vibration for the six operational scenarios was based on VMTs with and without the proposed Project. The Opening Year (2026) and Future Horizon Year (2045) scenarios include the development of the related projects identified in **Section 4.0**, *4.0.6*. In addition, the traffic study (see **Appendix 4.12.1**) the SCAG 2020 RTP/SCS[83] Socio-economic data (SED) for base year (2016) and Future baseline (2045) constrained conditions were utilized as the basis for developing the socio-economic data for use with the Inglewood Travel Demand Forecast (TDF) model. Updates to the socioeconomic data include those associated with known related projects from various cities and adjacent jurisdictions. Opening year (2026) SED database was used for the Inglewood TDF developed using interpolation of the 2016 and 2045 databases from SCAG 2020 RTP/SCS data updated for related projects. Therefore, the Opening Year (2026) and Future Horizon Year (2045) scenarios account for the growth associated with related project and future growth as provided by SCAG.

As detailed in **Appendix 4.10.2-6**, roadway noise levels from Opening Year (2026) Conditions With NFL Event Without ITC Project during the daytime ranged from a low of 57.2 dBA Leq (Lday) along Market Street from Florence Avenue to Regent Street to a high of 73.8 dBA Leq (Lday) along Century Boulevard between Grevillea Avenue and La Brea Avenue/Hawthorne Boulevard. Additionally, nighttime roadway noise levels ranged from a low of 49.7 dBA Leq (Lnight) along Market Street from Florence Avenue to Regent Street to a high of 65.5 dBA Leq (Lnight) along Century Boulevard between Doty Avenue and HP Casino Way and between HP Casino Way to Yukon Avenue.

As detailed in **Appendix 4.10.2-6,** roadway noise levels from Opening Year (2026) Conditions With NFL Event With ITC Project during both the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods would not exceed the 3 dBA Leq increase significance thresholds or result in an increase of 10 dBA when noise levels remain within acceptable limits during both daytime and nighttime periods.

83 Southern California Association of Governments (SCAG), Connect SoCal: 2020-2045 Regional Transportation Plan/Sustainable Communities Strategies Draft, "Chapter 1," https://www.connectsocal.org/Pages/Connect-SoCal-Draft-Plan.aspx, Accessed on July 10, 2020.

Impacts of the proposed Project related to traffic generated noise for the Future Opening Year (2026) with NFL Event With ITC Project would be less than significant.

As detailed in **Appendix 4.10.2-6,** roadway noise levels from Future Horizon Year (2045) With NFL Event Without ITC Project during the daytime ranged from a low of 58.1 dBA Leq (Lday) along Market Street from Florence Avenue to Regent Street to a high of 74.6 dBA Leq (Lday) along Century Boulevard between Grevillea Avenue and La Brea Avenue/Hawthorne Boulevard. Additionally, nighttime roadway noise levels ranged from a low of 50.6 dBA Leq (Lnight) along Market Street from Florence Avenue to Regent Street to a high of 66.1 dBA Leq (Lnight) along Century Boulevard between Doty Avenue and HP Casino Way and between HP Casino Way to Yukon Avenue.

As detailed in **Appendix 4.10.2-6**, roadway noise levels from Future Horizon Year (2045) With NFL Event With ITC Project during both the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods would not exceed the 3 dBA Leq increase significance thresholds or result in an increase of 10 dBA when noise levels remain within acceptable limits during both daytime and nighttime periods. Therefore, impacts of the proposed Project related to traffic generated noise for the Future Horizon Year (2045) With NFL Event With ITC Project would be less than significant.

Therefore, noise impacts resulting from the proposed Project related to traffic generated noise for both the Opening Year (2026) and Future Horizon Year (2045) with NFL Event With ITC Project are less than significant and would not be cumulatively considerable.

4.10.8.2 Vibration

Construction

Cumulative development in the Project vicinity may result in the exposure of people to or the generation of excessive ground-borne vibration. The nearest cumulative project is located at 101, 125, 139, 140, and 150 Market Street (Project No. 30) located approximately 100 feet from the proposed guideway. As shown in **Table 4.10-23** above, construction vibration impacts to building damage would occur with impact pile drivers located within 55 feet of the nearest receptor. Should construction of Project No. 30 overlap with the proposed Project, impacts to vibration sensitive receptors would be potentially significant.

As previously discussed for vibration, the forecasted vibration levels due to construction vibration velocities would exceed the structural damage threshold of 0.2 in/sec PPV at certain sensitive receptors during various construction phases.

Table 4.10-23 shows the forecasted vibration levels due to construction activities would exceed the building damage significance threshold at certain locations along the proposed Project. Additionally, **Table**

4.10-24 shows the forecasted vibration levels due to construction activities would exceed human annoyance significance thresholds. Implementation of **Mitigation Measure MM 4.10-2** would provide a community affairs liaison to investigate noise disturbance and undertake all feasible measures are implemented to reduce construction vibration levels as deemed appropriate. Implementation of **Mitigation Measure MM 4.10-3** would require a preparation of a Construction Vibration Reduction Plan to ensure minimization of construction vibration at nearby sensitive receptors from vibration created by construction activities. **Mitigation Measure MM 4.10-4** and **MM 4.10-5** would require vibration-generating equipment to be located at specified distances from adjacent noise receptors.

Table 4.10-25 provides the adjusted distances required to reduce vibration to below the perceptible levels of 72 VdB. Additionally, there are no vibration-sensitive receptors that would be adjacent to both the proposed Project and Project No. 30, as the area mostly consists of commercial uses. Therefore, Proposed Project impacts would not be affected by cumulative project construction activity. Cumulative impacts related to construction vibration would be less than significant.

Operation

Cumulative noise impacts attributable to stationary sources that operate on a daily basis occur when these sources are located in relative proximity to one another. The cumulative projects located in the proximity to the Project area mentioned above generally consist of residential, retail, or other types of commercial uses. These types of uses are not typically associated with excessive exterior stationary source noise. Noise levels from stationary sources within each cumulative project development site would also be reduced to less than significant levels at the property line due to IMC requirements limiting noise from stationary sources, such as Section 5-39.

Additionally, the vibration sensitive land uses nearest to the guideway include commercial and residential uses along Market Street, Manchester Boulevard and Prairie Avenue which would be approximately 30 feet from the guideway centerline. Based on the adjusted vibration level curve, the estimated ground-borne vibration levels would be approximately 67 VdB for monorail trains (rapid transit or light rail vehicles) and 64 VdB for rubber-tired APM trains. Consequently, the maximum vibration level of the uses along the guideway would be below the FTA recommended maximum acceptable level threshold of 72 VdB.[84] As such, transit-related ground-borne vibration for rubber-tired APM train vehicles would be less than significant.

84 Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123, September 2018

The proposed Project would not increase vibration in the area; as such impacts are considered less than significant. When combined with other related project within the immediate area (see **Section 4.0**, *4.0.6*) the effects of vibration would not be cumulatively considerable.

4.10.9 GENERAL PLAN CONSISTENCY

General Plan Noise Element

The proposed Project is consistent with goals listed in the General Plan Noise Element as discussed below:

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.*

Consistent. As discussed in **Table 4.10-15** through **4.10-18**, construction noise levels would exceed ambient noise levels. However, this increase would be temporary in nature and would not result in the type of long term exposure that is known to result in hearing loss. Additionally, the proposed Project includes various mitigation measures (**MM 4.10-1** through **4.10-2**) for construction, which integrates several features to reduce noise levels to less than significant levels. The identified mitigation measures are meant to protect and maintain acceptable limits and prevent degradation of the environment. For these reasons, construction noise would be consistent with Goal 1.

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.*

Consistent. As discussed in **Table 4.10-15** through **4.10-18**, construction noise levels would exceed ambient noise levels. However, this increase would be temporary in nature and would not result in the type of long term exposure that is known to result in hearing loss. Additionally, the proposed Project includes various mitigation measures (**MM 4.10-1** through **4.10-2**) for construction, which integrates several features to reduce noise levels to less than significant levels. The identified mitigation measures are meant to protect and maintain acceptable limits and prevent degradation of the environment. For these reasons, construction noise would be consistent with Goal 3.

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 compatibilities 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.*

Consistent. As shown in **Table 4.10-19**, operational noise levels from either the Rubber-tired APM Train or monorail would not result in increase of 3 dBA to or within the

"normally unacceptable" or "clearly unacceptable" compatibility category for land uses. Consistent with Goal 4, the proposed Project would not result in noise conflicts concerning community noise levels.

General Plan Environmental Justice Element

The proposed Project is consistent with goals listed in the General Plan Environmental Justice Element as discussed below:

Policy EJ-2.11: *Continue to enforce the City's Noise Ordinance to ensure compliance with noise standards.*

Consistent. As discussed in **Table 4.10-15** through **4.10-18**, construction noise levels would exceed ambient noise levels. However, this increase would be temporary in nature and would not result in the type of long term exposure that is known to result in hearing loss. Additionally, the proposed Project includes various mitigation measures (**MM 4.10-1** through **4.10-2**) for construction, which integrates several features to reduce noise levels to less than significant levels. The identified mitigation measures are meant to protect and maintain acceptable limits and prevent degradation of the environment. For these reasons, construction noise would be consistent with Policy EJ-2.11.