5.10 NOISE AND VIBRATION

INTRODUCTION

This section evaluates noise and vibration associated with implementation of the Project. Information in this section is primarily drawn from the *Noise Study Report* (NSR) prepared for the Project (see **Appendix I** of this Draft Environmental Impact Report (Draft EIR)).

Scoping Issues Addressed

No public or agency comments related noise or vibration were received during the public scoping period for this Draft EIR.

REGULATORY SETTING

Federal

Occupational Safety and Health Act

Under the Occupational Safety and Health Act of 1970 (29 U.S.C. §651 et seq.), the US Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations (29 Code of Federal Regulation [CFR] §1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list limits on noise exposure levels as a function of the amount of time during which the worker is exposed. The regulations further specify requirements for a hearing conservation program, a monitoring program, an audiometric testing program, and hearing protection. There are no federal laws governing community noise.

State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare, and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The Act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

Local

City of Dublin

City of Dublin General Plan

The Noise Element of the Dublin General Plan aims to ensure appropriate noise levels considered compatible for community noise environments. The City's normally acceptable exterior noise exposure standard is 60 A-weighted decibels (dBA) community noise equivalent level (CNEL) or less for residential and hotels and 70 dBA CNEL or less for office, retail, industrial, and commercial uses. A detailed explanation of A-weighted decibels is provided in the Principals of Acoustics sub-section below.

The following policies in the General Plan are applicable to Project-related potential noise impacts:

Guiding Policy 9.2.1.A.1:	Where feasible, mitigate traffic noise to levels indicated by Table 9.1: Land Use Compatibility for Community Noise Environments.
Implementing Policy 9.2.1.B.4:	Noise impacts related to all new development shall be analyzed by a certified acoustic consultant.

Eastern Dublin Specific Plan

The Eastern Dublin Specific Plan (EDSP) includes a holistic look at the existing noise environment within the planning area, and identifies Interstate 580 (I-580) as the major noise source in eastern Dublin. The EDSP provides noise policy requiring future hotel and retail developments near I-580 to conform to State Land Use Compatibility Standards, along with Dublin's General Plan Noise Element.

City of Dublin Municipal Code

The Dublin Municipal Code includes standards pertaining to noise control within the City. Municipal Code Section 5.28.020 prohibits any person within the City to make any loud, disturbing, unnecessary, unusual, habitual noise; or any noise which annoys, disturbs, injures, or endangers the health, repose, peace or safety of any reasonable person of normal sensitivity present in the area.

Alameda County

Alameda County General Plan, East County Area Plan

The East County Area Plan includes policies and programs related to noise, with the goal of minimizing the exposure of workers and residents to excessive noise. Policies applicable to the Project include:

Policy 288:	The County shall endeavor to maintain acceptable noise levels throughout East County.

Program 104: The County shall require the use of noise reduction techniques (such as buffers, building design modifications, lot orientation, soundwalls, earthberms, landscaping, building setbacks, and real estate disclosure notices) to mitigate noise impacts generated by transportation-related and stationary sources as specified in the *California Office of Noise Control Land Use Compatibility Guidelines*.

Alameda County Municipal Code

Construction is exempt from the noise limits specified in Alameda County's Municipal Code, provided that construction activities are limited to the hours between 7:00 am to 7:00 pm, Mondays through Fridays, and 8:00 am to 5:00 pm on Saturdays and Sundays.

City of Livermore

City of Livermore General Plan

Livermore's normally acceptable exterior noise exposure standard is 60 dBA CNEL or less for single-family residential, 65 dBA CNEL or less for multi-family and hotels, and 70 dBA CNEL or less for office buildings, commercial, and retail. The following policies are applicable to the Project:

N-1.2.5 During all phases of construction, the City shall take measures to minimize the exposure of neighboring properties to excessive noise levels from construction related activity.

Objective N-1.4 Reduce noise levels from traffic, which is the single largest continual source of unacceptable noise in the City.

N-1.4.2 The City shall minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures.

City of Livermore Municipal Code

Livermore prohibits the operation of any loud equipment used in construction, demolition or other repair work between the hours of 6:00 p.m. Saturday to 7:00 a.m. Monday; 8:00 p.m. to 7:00 a.m. on Monday, Tuesday, Wednesday and Thursdays; 8:00 p.m. Friday to 9:00 a.m. on Saturday; and on city-observed holidays.

Additionally, the city engineer and/or building official shall have the authority to authorize construction activities during the hours specified above for the following reasons:

- A public agency, other than the city, requires as a condition of a permit that the construction be done during the restricted hours.
- Public health, safety or welfare requires the work to be done during the restricted hours.

EXISTING CONDITIONS

Principles of Acoustics

Noise is defined as loud, unexpected, or annoying sound. In the science of acoustics, the fundamental model used to describe noise consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and obstructions between the noise and the receptor determine sound levels and characteristics of the noise perceived by the receptor.

In order to describe environmental noise and to assess impacts on areas sensitive to noise, a frequency weighting measure[1] that simulates human perception is customarily used. The frequency weighting scale known as A-weighting best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighting network approximates the response of the average young ear when listening to most ordinary sounds. When people make a judgment of the relative loudness or annoyance of a sound, their judgment correlates with the A-scale sound levels of those sounds. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. **Table 5.10-1** describes typical A-weighted noise levels for various noise sources.

The human ear is able to begin to detect sound level increases of 3 decibels (dB) in typical noisy environments. A 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound, would generally be barely detectable.

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis:

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. The 1-hour A-weighted equivalent sound level (L_{eq}) is the energy average of A-weighted sound levels occurring during a one-hour period.
- **Percentile-Exceeded Sound Level (L_{xx}):** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L10 is the sound level exceeded 10 percent of the time, and L90 is the sound level exceeded 90 percent of the time).
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10:00 p.m. and 7:00 a.m.

[1] The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network.

Table 5.10-1 Typical A-Weight Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	- 110 -	Rock band
Jet fly-over at 1000 feet		
	- 100 -	
Gas lawn mower at 3 feet		
	- 90 -	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	- 80 -	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	- 70 -	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	- 60 -	
		Large business office
Quiet urban daytime	- 50 -	Dishwasher next room
Quiet urban nighttime	- 40 -	Theater, large conference room (background)
Quiet suburban nighttime		
	- 30 -	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	- 20 -	
		Broadcast/recording studio
	- 10 -	
Lowest threshold of human hearing	- 0 -	Lowest threshold of human hearing

Source: Caltrans 2013

- **Community Noise Equivalent Level (CNEL)**: Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m., and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m.

Principles of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves. At certain levels, vibration can result in irritation to nearby people and building damage. Several different methods are typically used to quantify vibration. For the purposes of this Draft EIR, a Peak Particle Velocity (PPV) descriptor with units of millimeters per second (mm/sec) or inches per second (in/sec) is used to evaluate construction-generated vibration for building damage. The PPV is defined as the maximum instantaneous peak of a vibration wave. The general human response to different levels of groundborne vibration levels is shown below in **Table 5.10-1**.

Table 5.10-2 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013

Acoustical Setting

Noise Study Area

The noise study area includes the Project site plus a surrounding 500-foot buffer, and the nearest sensitive receptors, as shown in **Figure 5.10-1**.

Sensitive Receptors

Sensitive receptors are defined as land uses that are sensitive to noise impacts as determined by noise exposure standards and guidelines. Sensitive receptors include but are not limited to hospitals, schools, churches, libraries, auditoriums, public meeting rooms, motels, hotels, residences, recreational facilities, and lands on which serenity and quiet are of extraordinary importance and which serve an important public need.

A field investigation was conducted at the Project site from December 12 to 14, 2017 to identify land uses that could be subject to traffic and construction noise impacts from the Project. Sensitive receptors were identified along the Project corridor through a review of mapping, aerial photos, and field reconnaissance. The nearest sensitive receptors are residential land uses to the north of the Project site approximately 700 to 1,300 feet from the proposed right-of-way.

Existing Ambient Noise Measurements

The primary existing noise source in the area is vehicles traveling on I-580 and local roads. Local non-traffic related noise sources include aircraft, sounds of nature, and agricultural operations. To quantify existing ambient noise levels in the study area, six short-term noise measurements (S1-S6)[2] were taken within the Project vicinity concurrent with two long-term noise measurements. Noise measurement locations were selected to be representative of sensitive receptor locations, and are shown on **Figure 5.10-1**. Two or more consecutive 10-minute measurements were made at each short-term noise measurement site. At short-term locations, noise levels were measured 5 feet above the ground surface and at least 10 feet from structures or barriers. Short-term noise measurement locations were used as noise modeling receptors for the prediction of existing and future loudest-hour traffic noise levels. As summarized in **Table 5.10-3**, the ambient recorded noise levels ranged from 45 dBA to 60 dBA L_{eq} near the Project site. The maximum loudest-hour noise levels in the Project vicinity ranged from 48 L_{eq} dBA to 65 L_{eq} dBA. Traffic counts and speed observations were made along I-580 and local roads during the short-term noise measurements for model calibration purposes.

Long-term noise measurements were completed at two locations to quantify the overall trend in existing noise levels and to establish the peak traffic noise hour. These long-term noise measurements were taken along the existing portion of Dublin Boulevard to the west of the Project (L1) and along the existing portion of North Canyons Parkway to the east of the Project (L2). Locations L1 and L2 were selected to be representative of traffic noise levels occurring along existing continuous portions of the local roadways. The noise measurements were made over an approximate 48-hour period, from midday on Tuesday, December 12th, 2017 to midday on Thursday, December 14th, 2017. Measurements were taken at heights of about 12 feet above ground level. As summarized in **Table 5.10-4**, the loudest hour was 8:00 a.m. and ambient noise was measured at 70 L_{eq} dBA. The trends in ambient noise levels measured at long-term locations are summarized graphically in **Appendix I** of this Draft EIR.

[2] Results from measurement location S4 were used to determine the existing loudest hour at the adjacent sensitive land use represented by R4.

Table 5.10-3 Summary of Short-Term Noise Measurement Data

Site	Location (see Figure 5.10-1)	Start Time	Measured Noise Levels, dBA				Primary Noise Source
			L10	L50	L90	Leq	
S1	2601 Alliston Loop, Dublin	11:30 a.m.	63	60	56	60	Traffic on Fallon Road
		11:40 a.m.	63	60	56	60	
S2	3899 Camino Loop, Dublin	11:20 a.m.	49	45	43	52	Distant traffic (I-580), intermittent aircraft, occasional local traffic
		11:30 a.m.	47	45	43	46	
S3	Croak Road, north of Central Parkway, Dublin	10:50 a.m.	45	39	35	45	Distant traffic (I-580), intermittent aircraft, occasional local traffic
		11:00 a.m.	48	42	38	45	
S4[1]	Croak Road, 730 feet north of I-580, Dublin	10:10 a.m.	61	58	53	58	Traffic on I-580, police sirens
		10:20 a.m.	58	56	54	57	
S5	500 feet north of I-580, Dublin	10:00 a.m.	60	59	57	59	Traffic on I-580
		10:10 a.m.	62	59	58	61	
S6	901 Doolan Road, Livermore	10:30 a.m.	61	52	50	59	Traffic on I-580 and Doolan Road
		10:40 a.m.	61	51	49	60	

[1] Measurement location S4 was selected to be representative of the adjacent residence, but was not located at the noise sensitive land use due to access restrictions. Measurement results were used to determine the existing loudest hour at the adjacent sensitive land use represented by R4.
Source: Illingworth & Rodkin, Inc., 2018

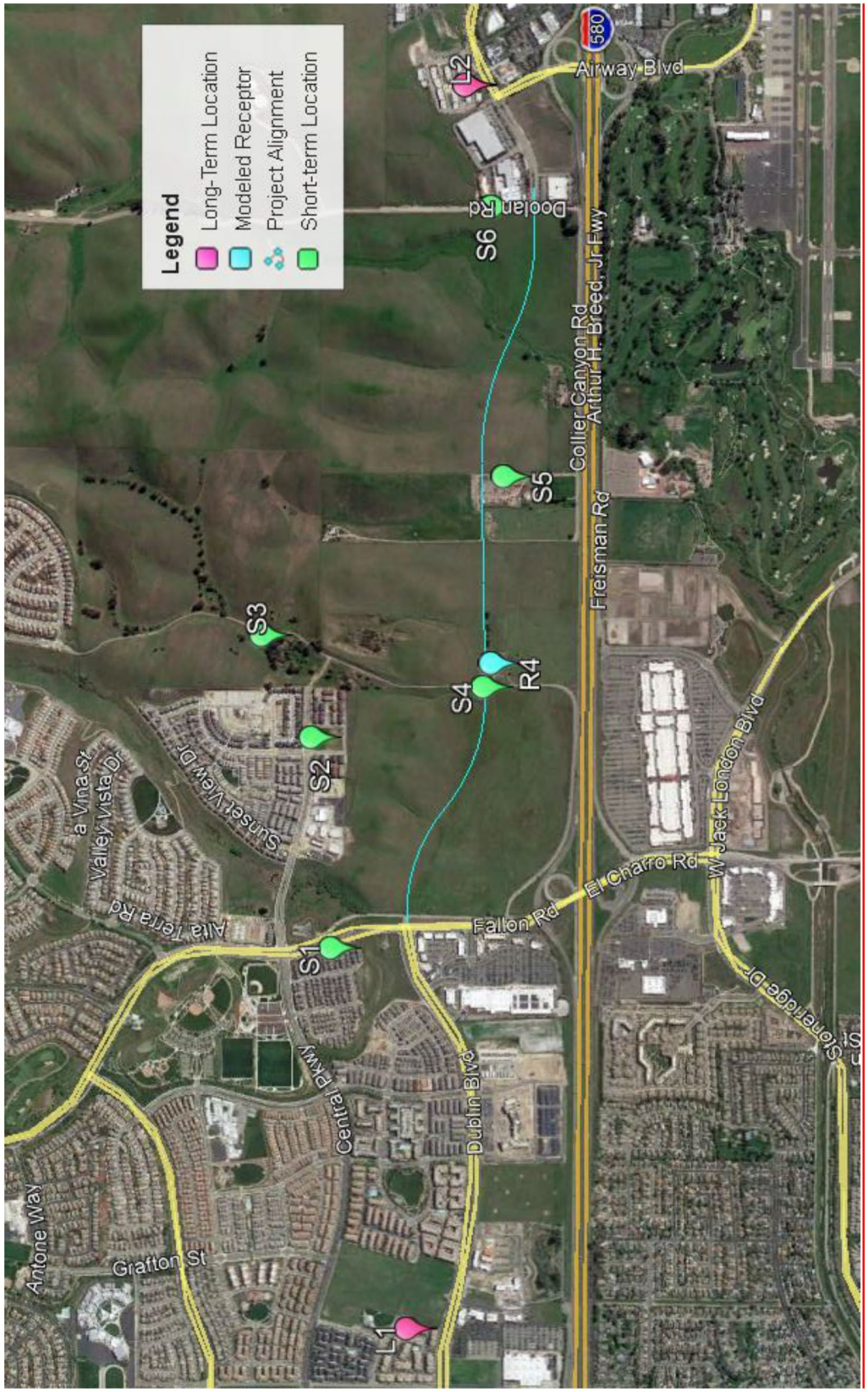

Figure 5.10-1

Noise Measurement Locations

Source: Illingworth & Rodkin, 2018

Table 5.10-4 Summary of Long-Term Noise Measurements

Receptor ID	Location (See Appendix I for Photos)	Date	Loudest Hour(s)	Loudest Hour $L_{eq[h]}$, dBA
L1[1]	3637 Dublin Boulevard, 75 feet north of the center of Dublin Boulevard	12/13/2017	8:00 a.m.	70
L2[1]	1051 Airway Boulevard, 60 feet south of the center of North Canyons Parkway	12/13/2017	7:00 a.m.	70

[1] Location is more than 500 feet from the roadway in the Project limits.
Source: Illingworth & Rodkin, Inc., 2018

IMPACTS AND MITIGATION MEASURES

Significance Criteria

California Environmental Quality Act (CEQA) does not define what construction or operational noise level increase would be considered substantial. A 3 dBA increase represents a doubling of sound energy, and can be perceived by people as a degradation of their noise environment when existing noise is below 65 dBA Ldn.[3] Therefore, a noise increase of 3 dBA Ldn or greater at a residential receptor is typically considered significant when existing ambient noise levels are between 60 and 65 dBA Ldn. A noise increase of 5 dBA Ldn or greater at the receptor would be considered a significant impact when existing ambient noise levels are less than 60 dBA Ldn.[4] Noise due to construction activities is usually considered to be less than significant in terms of CEQA compliance if the construction activity is temporary and the use of heavy construction equipment and noisy activities are limited to daytime hours. As indicated above, Dublin does not have separate noise standards for construction.

Dublin does not provide numerical vibration standards for construction activities. Therefore, the impact discussion uses the Caltrans standard of 0.30 in/sec PPV as the threshold for a significant impact relating to vibration (see **Table 5.10-2**). A significant impact would be identified if Project construction activity or Project-related vehicle traffic would result in vibration levels of 0.3 in/sec PPV or greater at nearby structures.

Quantitative thresholds for the impact of temporary increases in noise due to construction are not specified by Dublin, Livermore, the County, or the state. The threshold for speech interference indoors is 45 dBA. Assuming a 15 dB exterior-to-interior reduction for standard residential construction with windows open and a 25 dB exterior-to-interior reduction for standard commercial construction, assuming windows closed, this would correlate to an exterior threshold of 60 dBA Leq at residential land uses. Therefore, the Project would be considered to generate a

[3] FICON, 1992.
[4] *Ibid.*

significant temporary construction noise impact if Project construction activities exceeded 60 dBA Leq at nearby residences and exceeded the ambient noise environment by 5 dBA Leq or more for a period longer than one year.

The following significance criteria for noise were derived from the Environmental Checklist in CEQA Guidelines Appendix G. These significance criteria have been amended or supplemented, as appropriate, to address lead agency requirements and the full range of potential impacts related to this Project.

An impact of the Project would be considered significant and would require mitigation if it would meet one of the following criteria:

A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies

B. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project

C. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

D. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels

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

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

Methodology

To determine potential impacts, the impact significance criteria identified above were applied to construction and operation of the Project. Baseline noise conditions (2017) were compared to noise that would be generated by construction and operation of the Project. For cumulative analysis, the projected noise environment in the year 2040 without the Project was compared to projected noise in 2040 with implementation of the Project. Traffic noise was calculated using data from the *Transportation Impact Report* (TIA) prepared for the Project (see **Appendix D** of this Draft EIR). **Chapter 4.0, Introduction to Environmental Analysis**, provides a detailed discussion of baseline conditions and the cumulative scenario.

Construction

The Federal Highway Administration (FHWA) has developed the Roadway Construction Noise Model (RCNM), which has become the industry accepted standard model for calculating construction noise levels at specific receptor locations. The FHWA's RCNM was used to calculate the

maximum and average noise levels anticipated during each phase of construction, as shown in **Table 5.10-5**. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed. The usage factors represent the percentage of time that the equipment would be operating at full power. Vehicles and equipment anticipated during each type of construction were input into RCNM to calculate noise levels at a distance of 100 feet. The modeled receptor locations represent the closest existing receiving land uses to the east, north, west, and south of the Project site. The construction modeling assumptions and outputs are provided in **Appendix I** of this Draft EIR.

Operation

Traffic noise impacts were predicted using the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). TNM 2.5 is a computer model based on two FHWA reports: FHWA-PD-96-009 and FHWA-PD-96-010.[5]

TNM calculates traffic noise levels based on the geometry of the site, which includes the positioning of travel lanes, receptors, barriers, terrain, ground type, buildings, etc. The noise source is the traffic flow, as defined by the user, in terms of hourly volumes of automobiles, medium-duty trucks, heavy-duty trucks, buses, and motorcycles. Model input data for local roads included existing traffic and future peak hour traffic volume data and speed estimates. Traffic volumes for I-580 were based on traffic counts available from Caltrans. Traffic volumes and speeds for the Project were based on the TIA prepared for the Project in August 2018. The proposed roadway, existing and future receptors, terrain lines, ground zones, and noise barriers were digitized and input into the traffic noise model. The detailed traffic model input assumptions are presented in **Appendix D** of this Draft EIR.

Impact Analysis

No Impact Summary

There are no "no impact" determinations for this topic.

Impacts of the Project

A. <u>Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies</u>

And

B. <u>A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project</u>

[5] FHWA 1998a, 1998b.

Impact NOI-1: The Project would result in temporary noise increases during construction, which could exceed local standards. **(Less than Significant with Mitigation)**

There are two types of short-term noise impacts associated with construction: noise generated from construction equipment and increase in traffic flow on local streets. Without proper controls, construction could result in temporary, excessive noise levels. Construction would not result in a permanent increase in noise levels. Quantitative measures of construction-related noise impacts are analyzed in **Impact NOI-2**.

Construction Equipment Noise

The Project would be constructed in largely undeveloped areas of Dublin and the County. Some construction activities would take place immediately adjacent to Livermore and may require construction access at the Doolan Road/North Canyons Parkway intersection in Livermore. Construction activities would include but are not limited to demolition, earthwork, paving, pile driving/grinding, concrete/rebar/formwork, utility trenching, and roadway striping. Construction staging would be located at the eastern end of the Project site, south of the roadway extension and north of Collier Canyon Road, as shown in **Figure 3-11**. Land uses along the Project site would be exposed to temporary construction noise.

Noise generated by Project-related construction activities would be a function of the noise levels generated by individual pieces of construction equipment, the type and amount of equipment operating at any given time, the timing and duration of construction activities, the proximity of nearby sensitive land uses, and the presence or lack of shielding at these sensitive land uses. Construction noise levels would vary on a day-to-day basis during each phase of construction depending on the specific task being completed.

Although the overall construction schedule is anticipated to occur in a single phase lasting 1.5 years, roadway construction activities typically occur for relatively short periods of time in any specific location as construction proceeds along the proposed roadway alignment. Most construction activities would be located more than 500 feet from any noise sensitive receptors and residences are located 4,000 feet or greater from pile driving activities.

Construction noise would mostly be of concern in areas where impulse-related noise levels from construction activities would be concentrated for extended periods of time in areas adjacent to noise sensitive receptors, where noise levels from individual pieces of equipment are substantially higher than ambient conditions, or when construction activities would occur during noise-sensitive early morning, evening, or nighttime hours.

With the exception of construction phases involving impact tools, noise levels would not be expected to exceed the quantitative noise limits established in local noise ordinances for the County or Livermore, or qualitative limits established in Dublin. Please refer to **Table 5-10.5** for estimated noise levels from the types of construction equipment that would be used for the Project.

Livermore and the County prohibit construction noise during certain times of day. Project construction activities within those jurisdictions would be limited to the timing windows established by Livermore and the County (see discussion under Regulatory Setting above). As provided for in Livermore's municipal code, construction outside of the hours specified can be allowed with proper approval. Construction within Dublin would be required to adhere to Dublin's General Plan and municipal code policies and standards for noise.

Although construction-period noise would be required to adhere to local regulations and would be limited to the hours described for the County and Livermore above, temporarily increased noise levels within the noise study area above local standards represent a potentially significant impact. The incorporation of Best Management Practices required by **Mitigation Measure NOI-1** would limit unnecessary noise generation. Implementation of **Mitigation Measure NOI-1** would reduce temporary construction noise impacts by restricting the hours of construction, eliminating unnecessary noise such as idling, requiring the use of quiet equipment where possible, limiting the proximity of construction equipment to sensitive receptors, and establishing a noise management plan and noise disturbance coordinator to respond to any complaints. This impact would be less than significant with **Mitigation Measure NOI-1** incorporated.

Mitigation for Impact NOI-1

Mitigation Measure NOI-1: The following measures will be implemented during Project construction.

- The Project contractor shall submit a Construction Noise Management Program that identifies measures proposed to minimize construction noise impacts on existing residents.
- All construction equipment will conform to Section 14-8.02, Noise Control, of the latest Standard Specifications.
- In Dublin, all construction operations shall comply with local noise standards and be limited to normal daylight hours where feasible. All stationary equipment shall be adequately muffled and located away from sensitive receptors. The construction contractor shall limit all on-site noise-producing construction activities, including deliveries and warming up of equipment, to the daytime hours of 7:00 a.m. to 7:00 p.m., daily, where feasible. If work is necessary outside of these hours, the contractor shall acquire appropriate permits from the local jurisdiction and implement a construction noise monitoring program, providing additional mitigation where practical and feasible.
- In the County and Livermore, construction activities generating excessive noise will be limited to the hours specified in the appropriate local ordinance, where feasible. If work is necessary outside of these hours, the contractor shall acquire appropriate permits from the local jurisdiction and implement a construction noise monitoring program, providing additional mitigation where practical and feasible.

- Pile driving activities in all jurisdictions will be limited to daytime hours only, when feasible. If pile driving outside of typical construction hours specified in this measure is required, the contractor shall acquire appropriate permits from the local jurisdiction and implement a construction noise monitoring program, providing additional mitigation where practical and feasible.
- Equip all internal combustion-engine driven equipment with manufacturer recommended intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment and self-powered lighting systems as far as possible from sensitive receptors when sensitive receptors adjoin or are near the construction footprint.
- Utilize "quiet" air compressors and other "quiet" equipment where such technology exists.
- Prohibit unnecessary idling of internal combustion engines within 100 feet of residences.
- Avoid staging of construction equipment within 200 feet of noise-sensitive uses.
- The construction contractor shall designate a noise disturbance coordinator who would be responsible for responding to any local complaints about construction noise. When a complaint is received, the disturbance coordinator shall notify Dublin within 24 hours of the complaint and determine the cause of the noise complaints (starting too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem, as deemed acceptable by the City of Dublin Community Development Department. The construction contractor shall conspicuously post the contact name and telephone number for the noise disturbance coordinator at the construction site.

C. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

Impact NOI-2: Project construction activities could result in substantial temporary and periodic noise increases as a result of construction equipment operation and construction activities in the vicinity of sensitive receptors. **(Less than Significant with Mitigation)**

As described under **Impact NOI-1**, construction activities would include demolition, earthwork, paving, pile driving, concrete/rebar/formwork, utility trenching, and roadway striping. Anticipated construction activities and resulting noise are qualitatively discussed in **Impact NOI-1**. Although the overall construction schedule is anticipated to occur in a single phase lasting 1.5 years, roadway construction activities typically occur for relatively short periods of time in any specific location as construction proceeds along the proposed roadway alignment.

Existing short-term noise levels along the Project site were measured between 45 and 60 dBA Leq (**Table 5.10-3**), with the long-term loudest hour measuring 70 dBA Leq (**Table 5.10-4**). Much of construction would be located more than 500 feet from any noise sensitive receptors, resulting in noise levels that are 14 dBA or more below the levels indicated in **Table 5.10-5**. As indicated in **Table 5.10-5**, most construction activities would generate average noise levels that would exceed ambient daytime noise levels at adjacent land uses (noise measurement locations S4, S5, and S6) by 10 to 15 dBA Leq.

Unshielded noise levels at 100 feet from the center of construction activities would generally range from 76 to 85 dBA Leq during peak periods without pile driving and about 88 dBA Leq during periods with pile driving. Residences are located 4,000 feet or greater from pile driving activities proposed to construct the bridge over Cottonwood Creek. At a distance of 4,000 feet, pile driving activities would generate hourly average noise levels of about 56 dBA Leq and maximum instantaneous noise levels of about 63 dBA Lmax. Noise produced by construction equipment typically attenuates over distance at a rate of about 6 dB per doubling of distance.

Table 5.10-5 Noise Levels by Construction Activity at 100 feet

Construction Phase	Construction Noise		Existing Noise Levels		
	Maximum Noise Level (Lmax, dBA)	Hourly Average Noise Level (Leq[h], dBA)	Location S4: 57-58 dBA	Location S5 59-60 dBA	Location S6 59-61 dBA
			Temporary Construction Noise Increase		
Site Preparation	84	85	*28*	*26*	*26*
Grading and Excavation	79	82	*25*	*23*	*23*
Sewer Trenching and Installation	75	79	*22*	*20*	*20*
Utility Trenching and Installation	75	79	*22*	*20*	*20*
Bridge Foundations	75	77	*20*	*18*	*18*
Impact Pile Driving	95	88	*31*	*29*	*29*
Bridge Abutment and Piers	75	76	*19*	*17*	*17*
Bridge Superstructure/ Barriers	75	76	*19*	*17*	*17*
Landscaping, Irrigation, and Lighting	75	76	*19*	*17*	*17*
Paving	77	80	*23*	*21*	*21*

*Detailed equipment assumptions for each construction activity are provided in Appendix I.
Source: Illingworth & Rodkin, Inc., 2018

Existing peak-hour noise levels are in the range of 48 to 63 dBA Leq at adjacent residences. Construction noise levels at these residences, which are located between 300 to more than 4,000 feet from Project construction, would range from:

- 66 to 75 dBA Leq at noise measurement location R4
- 60 to 69 dBA Leq at noise measurement location S1
- 52 to 61 dBA Leq at noise measurement location S2
- 50 to 59 dBA Leq at noise measurement location S3

Average noise levels could exceed ambient daytime noise levels at adjacent residential land uses by 0 to 6 dBA Leq during most construction phases and by 6 to 15 dBA Leq during site preparation. Pile driving activities at Cottonwood Creek bridge would generally be below 60 dBA Leq at residences due to the large distance between residences and Cottonwood Creek. Maximum instantaneous noise levels generated by typical construction activities would generally be 5 to 10 dBA above existing maximum noise levels generated by traffic on I-580. Maximum instantaneous noise levels generated by impact pile driving activities would generally be 20 to 30 dBA above existing maximum noise levels generated by traffic on I-580.

Hourly average construction noise levels would exceed 60 dBA Leq and ambient noise levels by as much as 15 dBA Leq during short periods of site preparation work located closest to residences, but would be 5 dBA Leq or less above ambient levels during most phases of construction. Although construction is anticipated to occur in one phase with a maximum duration of 1.5 years of continuous construction, the duration of noise generating activities at individual locations along the Project site would be significantly shorter as construction moves along the proposed roadway alignment. Therefore, construction noise levels at residences would not be anticipated to exceed 60 dBA Leq and the ambient noise environment by 5 dBA Leq or more for a period longer than one year. However, without proper controls on the timing of construction to avoid disruptive night time construction noise, temporary noise associated with construction could be considered substantial. This is a potentially significant impact. With implementation of **Mitigation Measure NOI-1**, construction work would comply with construction work hours within each jurisdiction, as feasible, and additional noise reduction and prevention measures such as mufflers would ensure temporary construction noise is not substantial. With implementation of **Mitigation Measure NOI-1**, this impact would be less than significant.

Mitigation for Impact NOI-2

Mitigation Measure NOI-1 (described above)

Less than Significant Impacts

Construction Traffic Noise

Construction noise may be generated by large trucks moving materials to and from the Project site. Large trucks would be necessary to deliver building materials and remove excavated soil.

Excavation and cut and fill would be required, resulting in approximately 100,000 net cubic yards exported from the site. Construction period truck trips were computed using the RoadMod Version 8.1.3 emissions model along with projected construction activity, as analyzed in **Section 5.2, Air Quality**. Soil import and export, concrete truck trips, and asphalt truck trips were input to the model. The model estimates that the Project would generate an average of 83 truck trips per day during the most intensive phases of construction. Construction would occur in a single phase lasting up to a maximum of 1.5 years of continuous construction, but these intensive phases would be much shorter in duration. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and vehicle mix do not also change) would result in a noise level increase of 3 dBA. As shown in the existing traffic conditions discussion, intersections in the immediate Project vicinity have traffic volumes ranging from approximately 1,300 to 4,500 vehicles during the morning and evening peak periods. Therefore, Project construction trips would not double the existing traffic volumes, and would not result in a noticeable or significant increase in noise. This impact would be **less than significant**.

Operation

Traffic noise increases were analyzed throughout the roadway network in the vicinity of the Project. Typically, a permanent increase in the day-night average noise level of 3 dBA CNEL or greater at noise-sensitive receptors would be considered significant, as described above. An increase of 5 dBA CNEL or greater would be considered significant when projected noise levels would continue to meet those considered satisfactory for the affected land use. Both Dublin and Livermore define a noise level of 60 dBA CNEL or less to be normally acceptable for residential land use, and 60 dBA CNEL or less to be normally acceptable for commercial land uses.

Traffic data from the TIA (see **Appendix D** of this Draft EIR) was reviewed to calculate potential traffic noise level increases attributable to the Project along the adjacent roadway network and the Project itself. Roadways evaluated in the analysis included Dublin Boulevard, North Canyons Parkway, Hacienda Drive, Tassajara Road, Fallon Road, the I-580 ramps, El Charro Road, Airway Boulevard, Doolan Road, Isabel Avenue, Portola Avenue, and Murrieta Boulevard.

As shown in **Table 5.10-6**, traffic noise increases at existing land uses along the Project site are calculated to increase by 0 to 2 dBA Leq. This analysis takes into consideration future traffic noise increases (in year 2040) not attributable to the Project, to demonstrate noise increases specifically attributable to the Project. As the increase is below the applicable significance threshold of an increase of 3 dBA CNEL, this impact would not be considered significant. All other existing land uses would be considered compatible with the noise environment and would experience Project generated noise increases of less than the applicable significance threshold of an increase in 5 dBA CNEL. Therefore, this impact would be **less than significant**.

Table 5.10-6 Existing and Future Traffic Noise Levels

Receiver	Calculated CNEL, dBA			Noise Increase Over Existing, dBA		Future Plus Project 2040 Noise Increase Over Future (No Project), dBA
	Existing	Future (No Project) 2040	Future Plus Project 2040	Future (No Project) 2040	Future Plus Project 2040	
S1	63	64	65	1	2	**1**
S2	50	50	51	0	1	**1**
S3	48	48	48	0	0	**0**
R4	63	63	64	0	1	**1**
S5	67	67	67	0	0	**0**
S6	63	63	65	0	2	**2**

Source: Illingworth & Rodkin, 2018
Notes: R=Residential, A=Agricultural, O=Office

D. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels

Project-related vehicle traffic is not anticipated to generate perceptible levels of groundborne vibration at nearby structures. Project construction equipment would include concrete saws, excavators, graders, dozers, backhoes, forklifts, cement mixers, bore/drill rigs, aerial lifts, cranes, welders, generators, pavers, paving equipment, rollers, and pick-up trucks. Additionally, pile driving may take place during construction of the Cottonwood Creek bridge. Construction activities with the greatest potential of generating perceptible vibration levels would include pile driving, the removal of pavement and soil, the movement of heavy tracked equipment, and vibratory compacting of roadway base materials by use of a roller. Table 5.10-7 summarizes typical vibration levels associated with varying pieces of construction equipment at a distance of 25 feet.

Table 5.10-7 Vibration Source Levels for Construction Equipment at 25 feet

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.170
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006

Vibration levels generated by proposed activities and equipment other than pile driving would not exceed the 0.3 in/sec PPV criteria when construction occurs at distances of 25 feet or more from structures. Pile driving activities would be below the 0.3 in/sec PPV criteria when construction occurs at distances of 100 feet or greater from structures. There are no existing structures located within 100 feet of the Project site and architectural or structural damage to normal structures greater than 100 feet away would not be anticipated. Therefore, impacts related to vibration would be **less than significant**.

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

And

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

The Project is located within the 55 CNEL noise contour for the Livermore Municipal Airport. However, the Project does not propose noise sensitive land uses and would therefore not contribute to the exposure of persons to excessive noise levels. During Project operation, traffic

noise levels due to the Project are anticipated to increase by up to 1 dBA Leq during the worst-hour along all existing roadways in the network. Traffic noise increases at existing land uses along the Project site are calculated to increase by up to 2 dBA Leq. These noise increases would not be considered significant because the noise increases would be less than 3 dBA CNEL. Therefore, the Project would not expose existing sensitive receptors to excessive noise levels. Given this, implementation of the Project would result in a **less-than-significant** impact associated with an airport or private airstrip.

CUMULATIVE IMPACTS

Cumulative impacts arise due to the linking of impacts from past, present, and foreseeable future projects in the region. Other projects in the area include past and planned residential, commercial, and infrastructure development projects that could increase ambient noise levels (see **Chapter 4.0, Introduction to Environmental Analysis**). Future development activities in Dublin, Livermore, and elsewhere around the noise study area would result in similar construction and operational noise and vibration impacts that would occur during implementation of the Project.

Cumulative Construction Noise and Vibration

The Project's construction activities would result in a temporary increase in ambient noise levels that would cease upon completion of construction activities. If other developments near the Project site are under construction concurrent with Project construction, the Project could contribute to a cumulative noise impact. However, based on the noise analysis above, impacts from Project construction noise would be less than significant with mitigation. It is reasonably assumed that other projects in the area would be similarly subject to local regulations for noise control, and would implement similar construction noise attenuation measures as typically required by Dublin, the County, and Livermore. Therefore, with **Mitigation Measure NOI-1**, no cumulative impact would occur. The Project would result in a less than cumulatively considerable contribution to any significant cumulative impact.

As discussed above, Project construction would not result in vibration levels which could result in damage to nearby structures. However, if nearby projects are under construction concurrent with the Project, the combined vibration levels could potentially result in an impact. It is reasonably assumed that other projects would be subject to the same or similar thresholds for construction vibration impacts, and would reduce, avoid, or mitigate appropriately, ensuring that the combined vibration levels at nearby structures would not exceed the established threshold. Therefore, no cumulative impact would occur. The Project would result in a less than cumulatively considerable contribution to any significant cumulative impact.

Cumulative Operational Noise

Cumulative operational noise impacts describe the extent to which noise levels are anticipated to increase over existing conditions with the development of the Project and other foreseeable projects. Cumulative operational noise increases would occur primarily as a result of increased

traffic on local roadways due to buildout of the Project and other projects within the vicinity. Cumulative increases in traffic noise levels were estimated by comparing existing conditions (2017), Future Plus Project 2040, and Future (No Project) 2040 scenarios.

A cumulative impact would occur if a 3.0 dB increase over "Existing" conditions occurs and the resulting noise level exceeds the applicable exterior standard at a sensitive use. **Table 5.10-6** compares existing conditions against Future Plus Project 2040 and Future (No Project) 2040 scenarios and demonstrates that a 3.0 dB increase over existing conditions would not occur. Therefore, the Project, in combination with cumulative background traffic noise levels, would not result in a cumulative impact. The Project would result in a less than cumulatively considerable contribution to any significant cumulative impact.

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