

3.11 Noise

This section addresses potential noise impacts that may result from implementing the proposed Larkspur Ferry Service Expansion and Parking Project (Project). It describes the regulatory and environmental setting for noise in the Project area, analyzes effects related to noise that would result from implementation of the proposed Project and other Build Alternatives, and provides mitigation measures to reduce the effects of any potentially significant impacts. The noise study area includes areas within a half-mile radius of the Project area. Impacts related to the No-Project Alternative are discussed in Chapter 5, Alternatives to the Project.

3.11.1 Fundamentals of Noise and Vibration

3.11.1.1 Noise

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, the logarithmic decibel scale is used to keep sound intensity numbers at a convenient and manageable level.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels when exposed to steady, single-frequency (pure-tone) signals in the mid-frequency (1,000 to 8,000 hertz) range. It is widely accepted, however, that people are able to begin to detect sound level changes of 3 dB in typical noisy environments. Furthermore, a 10-dB increase is generally perceived as a doubling of loudness. Therefore, doubling sound energy (for example, doubling the volume of traffic on a highway), which would result in a 3-dB increase in noise, is generally perceived as a detectable but not a substantial increase in sound level.

The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies that humans are more sensitive to in a process called "A-weighting." Because humans are less sensitive to low-frequency sound than to high-frequency sound, A-weighted decibel (dBA) levels de-emphasize low-frequency sound energy to better represent how humans hear. Table 3.11-1 summarizes typical A-weighted sound levels.

Table 3.11-1. Typical A-Weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock band
Jet flyover at 1,000 feet		
	—100—	
Gas lawnmower 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 lawnmower, 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 in 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—	
	—0—	

Source: Appendix G

mph = mile(s) per hour

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (L_{xx}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). The following are brief definitions of these measurements and other terminology used in this section:

- **Sound:** A vibratory disturbance created by a vibrating object that, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone
- **Noise:** Sound that is loud, unpleasant, unexpected, or otherwise undesirable
- **Ambient noise:** The composite of noise from all sources near and far in a given environment, exclusive of particular noise sources to be measured
- **Decibel (dB):** A unitless measure of sound; a sound level measurement in dB describes the logarithmic ratio of a measured sound pressure level to a reference sound pressure level of 20 micropascals

- **A-Weighted Decibel (dBA):** An overall frequency-weighted sound level that approximates the frequency response of the human ear
- **Maximum and Minimum Sound Levels ($L_{\max}$ and $L_{\min}$):** The maximum or minimum sound level measured during a specified interval
- **Equivalent Sound Level (L_{eq}):** An average of the sound energy occurring over a specified period (in effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The duration of the measurement is commonly indicated in the subscript; for example, a 1-hour L_{eq} sound level would be indicated as dBA $L_{\text{eq}}[1\text{h}]$)
- **Exceedance sound level (L_{xx}):** The sound level exceeded "XX" percent of the time during a sound level measurement period (for example, L_{90} is the sound level exceeded 90% of the time, and L_{10} is the sound level exceeded 10% of the time. L_{90} is typically considered to represent the ambient noise level)
- **Day-night level (L_{dn}):** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community noise equivalent level (CNEL):** The energy-average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 PM to 7:00 AM

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

For a point source, such as a stationary compressor, sound attenuates based on geometry at rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance. Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers, such as buildings and topography that block the line of site between a source and receiver, also increase the attenuation of sound over distance.

Auditory and non-auditory effects can result from excessive or chronic exposure to elevated noise levels. Auditory effects of noise on people can include temporary or permanent hearing loss. Non-auditory effects of exposure to elevated noise levels include sleep disturbance, speech interference, and psychological effects such as annoyance. Land use compatibility standards for noise typically are based on research related to these non-auditory effects.

3.11.1.2 Vibration

In contrast to airborne sound, groundborne vibration is not a phenomenon that most people experience every day. Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration.

The background vibration velocity level in residential areas is usually much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources within buildings, such as

mechanical equipment while in operation, people moving, or doors slamming. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. Dynamic construction equipment, such as pile drivers, can create vibrations that radiate along the surface and downward into the earth. These surface waves can be felt as groundborne vibration. Vibration can result in effects that range from annoyance to structural damage. Variations in geology and distance result in different vibration levels with different frequencies and displacements.

Groundborne vibration can be expressed in terms of root-mean-square (RMS) vibration velocity to evaluate human response to vibration levels. RMS is defined as the average of the squared amplitude of the vibration signal. The vibration amplitude is expressed in terms of vibration decibels (VdB), which use a reference level of 1 micro-inch per second. Vibration can also be measured by peak particle velocity (PPV), defined as the maximum instantaneous peak of the vibration signal in inches per second.

Table 3.11-2 summarizes typical vibration levels generated by construction equipment at a reference distance of 25 feet and other distances.

Table 3.11-2. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 Feet	PPV at 50 Feet	PPV at 75 Feet	PPV at 100 Feet
Impact pile driver	1.518	0.054	0.2920	0.190
Vibratory roller	0.210	0.074	0.040	0.026
Auger drill	0.089	0.032	0.017	0.011
Hoe ram	0.089	0.032	0.017	0.011
Large bulldozer	0.089	0.032	0.017	0.011
Loaded trucks	0.076	0.027	0.015	0.010
Jackhammer	0.035	0.012	0.007	0.004
Small bulldozer	0.003	0.001	0.001	< 0.001

Source: FTA 2018

3.11.2 Existing Conditions

3.11.2.1 Regulatory Setting

The Golden Gate Bridge, Highway and Transportation District, as the owner of the Larkspur Ferry Terminal (LFT), is the California Environmental Quality Act Lead Agency for the Project and has prepared this Draft Environmental Impact Report to evaluate potential impacts and identify required mitigation to avoid or reduce potentially significant impacts. The federal, state, and regional and local regulations applicable to the Project are provided in this section.

Federal

Noise Control Act of 1972

The Noise Control Act of 1972 (Public Law 92 574) established a requirement for all federal agencies to administer their programs in a manner that promotes an environment that is free of noise that jeopardizes public health or welfare. The U.S. Environmental Protection Agency (EPA) was given the following responsibilities:

- Providing information to the public regarding the identifiable effects of noise on public health and welfare
- Publishing information on the levels of environmental noise to protect the public health and welfare with an adequate margin of safety
- Coordinating federal research and activities related to noise control
- Establishing federal noise emission standards for selected products distributed in interstate commerce

U.S. Environmental Protection Agency Standards for Environmental Noise

In 1974, EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, a comprehensive document that identifies noise levels consistent with the protection of public health and welfare against hearing loss, annoyance, and activity interference.

In response to the requirements of the Noise Control Act, EPA identified indoor and outdoor noise limits to protect public health and welfare. Outdoor L_{dn} limits of 55 dB and indoor L_{dn} limits of 45 dB were identified as desirable for protecting against speech interference and sleep disturbance in residential areas and at educational and healthcare facilities. The sound-level criterion for protecting against hearing damage in commercial and industrial areas is identified as the 24-hour L_{eq} value of 70 dB (both outdoors and indoors). Based on attitudinal surveys, EPA determined that a 5-dB increase in L_{dn} or L_{eq} is the minimum required for a change in community reaction (EPA 1974).

The Noise Control Act also directed federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. Although EPA was given a major role in disseminating information to the public and coordinating with federal agencies, each federal agency retained authority to adopt noise regulations pertaining to agency programs. EPA can, however, require federal agencies to justify their noise regulations in terms of Noise Control Act policy requirements.

Critical federal agencies that have adopted noise regulations and standards are listed as follows:

- Housing and Urban Development: Noise standards for federally funded housing projects
- Federal Aviation Administration: Noise standards for aircraft
- Federal Highway Administration: Noise standards for federally funded highway projects
- Federal Transit Administration (FTA): Noise standards for federally funded transit projects
- Federal Railroad Administration: Noise standards for federally funded rail projects

Federal Transit Administration Standards for Construction Noise

FTA has developed methods for evaluating construction noise levels, which are discussed in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). The manual does not contain standardized criteria for assessing construction noise impacts but provides guidelines for suggested noise limits for different land use types exposed to construction noise to describe levels that may result in a negative community reaction. These guidelines are summarized in Table 3.11-3.

Table 3.11-3. Federal Transit Administration Construction Noise Impact Guidelines

Land Use	1-hour L_{eq} (dBA), Day	1-hour L_{eq} (dBA), Night
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA 2018

Thresholds for construction noise may also be set at the local level according to expected hours of equipment operation and the noise limits specified in the noise ordinances of the applicable jurisdictions.

Federal Transit Administration Standards for Transit Noise

The U.S. Department of Transportation has implemented and published impact assessment procedures and criteria pertaining to noise based on the aforementioned standards. Noise impact criteria have been adopted by FTA to assess noise contributions and potential impacts from transit sources on the existing environment. Noise impact criteria defined in the FTA manual (2018) are based on the objective of maintaining a noise environment considered acceptable for land uses that are noise sensitive. For noise from transit operations, FTA's three land use categories are as follows:

- **Category 1:** Tracts of land where quiet is an essential element in their intended purpose, such as outdoor amphitheaters, concert pavilions, and national historic landmarks with significant outdoor use
- **Category 2:** Residences and buildings where people normally sleep, including homes, hospitals, and hotels
- **Category 3:** Institutional land uses (schools, places of worship, libraries) with use typically during the daytime and evening; other uses in this category can include medical offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities

Noise exposure values are reported as the L_{dn} for residential land uses (Category 2) or hourly equivalent sound level ($L_{eq}[h]$) for other land uses (Categories 1 and 3). Commercial and industrial uses are not included in the vast majority of cases because they are generally considered compatible with higher noise levels. Exceptions would include commercial uses with a feature that receives substantial outdoor use, such as a playground, or uses that require quiet as an important part of their function, such as recording studios.

In the FTA manual (2018), the noise impact criteria for construction and operation of transit facilities consider a project's contribution to existing noise levels using a sliding scale based on land uses affected. The criteria correspond to heightened community annoyance because of the introduction of a new transit facility relative to existing ambient noise conditions.

Noise impacts are assessed by comparing existing outdoor exposures with future Project-related outdoor noise levels, as illustrated on Figure 3.11-1. The criterion for each degree of impact is based on a sliding scale that is dependent on the existing noise exposure and the increase in noise exposure because of a project. The noise impact categories are as follows:

- **No Impact:** A project, on average, will result in an insignificant increase in the number of instances where people are "highly annoyed" by new noise.

- **Moderate Impact:** The change in noise is noticeable to most people but may not be enough to cause strong, adverse community reactions.
- **Severe Impact:** A significant percentage of people would be highly annoyed by the noise, perhaps resulting in vigorous community reaction.

Note that the proposed Project's contribution relative to existing noise levels follows a sliding scale according to the level of existing noise exposure. The justification for this sliding scale is that people who are already exposed to high levels of noise in the ambient environment should be expected to tolerate smaller increases in noise in their community compared to locations where existing noise exposure is relatively low. For example, according to Figure 3.11-1, a project contribution of 59 dBA L_{dn} would be considered a Severe Impact at a Category 2 receiver with an existing noise exposure of up to 50 dBA L_{dn} , whereas a project contribution of 69 dBA L_{dn} would result in a Severe Impact at a Category 2 receiver with an existing noise exposure of up to 70 dBA L_{dn} .

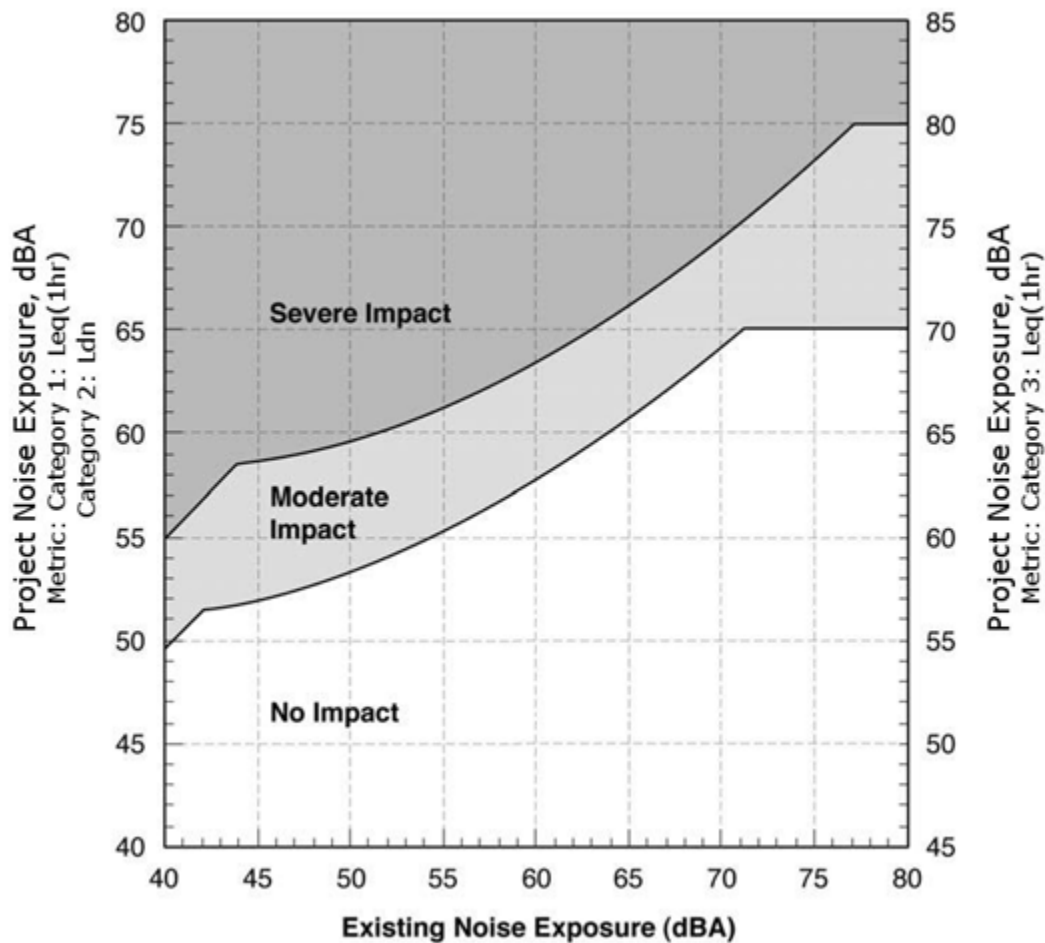


Figure 3.11-1. Federal Transit Administration Noise Impact Criteria for Transit Projects

State

California Noise Control Act

The California Noise Control Act was enacted in 1973. In preparing its general plan noise element, a city or county must identify local noise sources and analyze and quantify to the extent practicable current and projected noise levels from various sources, including highways and freeways; passenger and freight railroad operations; ground rapid transit systems; commercial, general, and military aviation and airport operations; and other stationary ground noise sources.

The *State of California General Plan Guidelines* (Governor's Office of Planning and Research 2017) provides noise compatibility guidelines for land use planning according to the existing community noise levels; however, these guidelines offer no information regarding construction noise. The state has also published its *Model Community Noise Ordinance* (California Office of Noise Control 1977), which provides guidance to cities and counties on how to develop a community noise ordinance.

California Department of Transportation Vibration Standards

The California Department of Transportation (Caltrans) provides guidelines regarding vibration associated with construction and operation of transportation infrastructure. Table 3.11-4 provides the Caltrans vibration guidelines for potential damage to different types of structures.

Groundborne vibration and noise can also disturb people. Numerous studies have been conducted to characterize the human response to vibration. In general, people are more sensitive to vibration during nighttime hours when sleeping than during daytime waking hours. Table 3.11-5 provides the Caltrans guidelines regarding vibration annoyance potential (expressed here as PPV).

Table 3.11-4. Caltrans Vibration Guidelines for Potential Damage to Structures

Maximum Peak Particle Velocity (PPV, in/sec)		
Structure Type and Condition	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2020

Note: Transient sources create a single, isolated vibration event (for example, blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

in/sec = inch(es) per second

Table 3.11-5. Caltrans Guidelines for Vibration Annoyance Potential

Maximum PPV (in/sec)		
Human Response	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans 2020

Note: Transient sources create a single, isolated vibration event (for example, blasting or drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

County

The single-family homes to the south of the proposed Project are in unincorporated Marin County. Therefore, Project noise to those receptors will be governed by County of Marin standards, which are presented as follows.

Marin County General Plan

California requires that a noise element be included in the general plan of each county and city in the state. The noise element establishes the local government's goals, objectives, and policies related to noise control. The Built Environment Element of *The Marin Countywide Plan* (County of Marin 2023) establishes goals and policies for ensuring that existing and proposed land uses are compatible with their noise environments. Therefore, the County of Marin (County) has adopted quantitative exterior noise compatibility criteria for various land uses. The purpose of these criteria is to reduce the potential adverse noise effects of new developments on people, including sleep disturbance, interference with speech communication, and the general sense of dissatisfaction that is often associated with high noise exposure.

Land use compatibility noise standards are included in the County's Built Environment Element (refer to Table 3.11-6).

The following goals and policies from *The Marin Countywide Plan* Built Environment Element pertain to noise and relate to the proposed Project (County of Marin 2023):

Goal NO-I: Protection from Excessive Noise. Ensure that new land uses, transportation activities, and construction do not create noise levels that impair human health or quality of life.

Policy NO-1.1: Limit Noise from New Development. Direct the siting, design, and insulation of new development to ensure that acceptable noise levels are not exceeded.

Policy NO-1.2: Minimize Transportation Noise. Ensure that transportation activities do not generate noise beyond acceptable levels, including in open space, wilderness, wildlife habitat, and wetland areas.

Policy NO-1.3: Regulate Noise Generating Activities. Require measures to minimize noise exposure to neighboring properties, open space, and wildlife habitat from construction-related activities, yard maintenance equipment, and other noise sources, such as amplified music.

Table 3.11-6. County of Marin Acceptable Noise Levels

Land Use	55	60	65	70	75	80
Residential-Low Density Single Family, Duplexes and Mobile Homes						
Residential Multi-Family Dwellings						
Transient Lodging: Motels, Hotels						
Schools, Libraries, Churches, Hospitals, Nursing Homes						
Auditoriums, Concert Halls, Amphitheaters						
Sports Arenas, Outdoor Spectator Sports						
Playgrounds, Neighborhood Parks						
Golf Courses, Riding Stables, Water Recreation, Cemeteries						
Office Buildings, Businesses, Commercial and Professional						
Industrial, Manufacturing, Utilities, Agriculture						

Normally Acceptable: Specified land uses is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation or requirements.	Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.	Normally Unacceptable: New construction and development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.	Clearly Unacceptable: New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.
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Source: Marin County Community Development Agency 2024

It should be noted that the standards in Table 3.11-6 are for purposes of planning and siting land uses. The standards are not a noise ordinance and are not to be used to achieve the same objectives as a noise ordinance. The standards are also not to be used for regulating existing noise sources or enforcement concerning noise problems.

Implementing Program NO-1.b: **Comply with Acceptable Noise Levels.** Require discretionary permits for residential land other noise-sensitive land uses proposed near noise sources that may exceed acceptable noise levels and/or benchmarks to provide acoustical analyses; and, if necessary, commit to measures to comply with the applicable standards set out in Program NO-1.a. Amend the Development Code to include these requirements.

Implementing Program NO-1.b: **Require Project-Specific Noise Mitigation.** Require all development to mitigate its noise impacts where the project would:

- Raise the L_{dn} by more than 5 dBA.
- Raise the L_{dn} by more than 3 dBA and exceed the Normally Acceptable standard.
- Raise the L_{dn} by more than 3 dBA and the Normally Acceptable standard is already exceeded.

Implementing Program NO-1.i: **Regulate Noise Sources.** Sections 6.70.030(5) and 6.70.040 of the Marin County Code establish allowable hours of operation for construction-related activities. As a condition of permit approval for projects generating significant construction noise impacts during the construction phase, construction management for any project shall develop a construction noise reduction plan and designate a disturbance coordinator at the construction site to implement the provisions of the plan.

Marin County Noise Ordinance

The County's Municipal Code also contains noise regulations. Though there are no countywide specific decibel limits, Chapter 6.70, Loud and Unnecessary Noises, of the County's Municipal Code contains noise limitations and exclusions for construction noise. Section 6.70.30 (5) states:

(5) Construction Activities and Related Noise.

a. Hours for construction activities and other work undertaken in connection with building, plumbing, electrical, and other permits issued by the community development agency shall be limited to the following:

- i. Monday through Friday: seven a.m. to six p.m.
- ii. Saturday: 9 am to 5 pm
- iii. Prohibited on Sundays and Holidays (New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.)

b. Loud noise-generating construction-related equipment (e.g., backhoes, generators, jackhammers) can be maintained, operated, or serviced at a construction site for permits administered by the community development agency from eight a.m. to five p.m. Monday through Friday only.

c. Special exceptions to these limitations may occur for:

- i. Emergency work as defined in Section 22.130.030 of this code provided written notice is given to the community development director within forty-eight hours of commencing work;

- ii. Construction projects of city, county, state, other public agency, or other public utility;
- iii. When written permission of the community development director has been obtained, for showing of sufficient cause;
- iv. Minor jobs (e.g., painting, hand sanding, sweeping) with minimal/no noise impacts on surrounding properties;
- v. Modifications required by the review authority as a discretionary permit condition of approval.

However, Project construction permits will not be issued by the County of Marin Community Development Agency, so their restrictions on construction hours do not apply.

Local

Larkspur General Plan

The Noise Element of *The City of Larkspur 2040 General Plan* (City of Larkspur 2024) establishes goals and policies for ensuring that existing and proposed land uses are compatible with their noise environments. Therefore, the City of Larkspur has adopted quantitative exterior noise compatibility criteria for various land uses. The purpose of these criteria is to reduce the potential adverse noise effects of new developments on people, including sleep disturbance, interference with speech communication, and the general sense of dissatisfaction that is often associated with high noise exposure.

Land use compatibility noise standards are included in the City's Noise Element (refer to Table 3.11-7). According to the Noise Element as outlined under Goal SAF-11: Reduction in the adverse effects of noise upon persons living or working in Larkspur, noise levels up to 55 dBA L_{dn} are considered acceptable for all new residential projects. In common outdoor areas in downtown, mixed-use residential, and high-density residential districts, up to 65 dBA L_{dn} is allowed if determined acceptable through development review. New nonresidential projects are not permitted to increase noise levels in a nonresidential or mixed-use district by more than 5 dB or create noise impacts that would increase noise levels to more than 75 dBA L_{dn} for office, retail, and industrial uses.

Table 3.11-7. Land Use Compatibility Standards for New Development

Land Use Category	Community Noise Level						
	CNEL or Ldn (dB)						
	55	60	65	70	75	80	85
Residential, hotels, and motels							
Schools, libraries, churches, hospitals, nursing homes, museums, meeting halls							
Auditoriums, concert halls, amphitheaters, sports arenas							
Outdoor sports and recreation, neighborhood parks and playgrounds, golf courses, riding stables, cemeteries							
Office buildings, business commercial and professional							
Industrial, manufacturing, utilities, agriculture							
Key:							
<i>Normally Acceptable:</i> Specified land use is satisfactory based upon the assumption that any buildings are of normal construction without any special noise insulation requirements.							
<i>Conditionally Acceptable:</i> New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.							
<i>Unacceptable:</i> New construction or development should generally not be undertaken because mitigation is usually not feasible							

Source: City of Larkspur 2024

The following goals and policies from *The City of Larkspur 2040 General Plan Noise Element* pertain to noise and relate to the proposed project (City of Larkspur 2024).

Goal SAF-11: Ensure that all new living and work areas are developed with acceptable noise environments.

Action Program SAF-11.1.c: Require thorough noise assessments in all environmental analyses of major projects.

Action Program SAF-11.1.d: Revise the Municipal Code to require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to the building. A vibration limit of 0.30 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Prior to issuance of any demolition, grading, or building permits (whichever occur first), the project applicant shall provide a vibration construction plan to reduce construction impacts at buildings where vibration level would exceed the vibration limits.

Action Program SAF-11.1.e: Require new development near the SMART Station to provide adequate mitigation to avoid vibration damage from rail operations in Larkspur.

Goal SAF-12: Reduction in noise levels in areas where the existing noise exceeds "normally acceptable" levels, to levels compatible with land uses in those areas

Policy SAF-12.2: Control unnecessary, excessive, and annoying noises within the city, where not preempted by federal or State control.

Action Program SAF-12.2.a: Continue to implement the City's Noise Control Ordinance to minimize impacts on sensitive receptors, and update as necessary, the noise ordinance to address activities and/or changes in technology that generate disturbing and/or annoying noise (e.g., leaf blowers, updated mechanical equipment).

Goal SAF-13: No significant escalation of noise levels in areas where noise sensitive uses exist Policy

Policy SAF-13.1: Analyze in detail the potential noise impacts of any actions the City may take that could significantly alter noise levels in the community.

Action Program SAF-13.1.a: Review all public works projects for potential noise impact. Conduct public outreach to inform neighbors in advance major construction and roadway improvement projects, particularly where nighttime work is necessary.

Action Program SAF-13.1.b: Consider noise emission when purchasing vehicles, construction equipment, etc. This consideration shall be balanced against the required performance and cost.

Policy SAF-13.2: Encourage creative solutions when potential conflicts arise between noise levels and land use.

Larkspur Municipal Code

The City's Municipal Code also contains noise regulations. Chapter 9.5, Noise Control Regulations, of the City's Municipal Code contains noise limitations and exclusions for land uses within the City to maintain noise levels that are not detrimental to the health and welfare of people. The noise ordinance addresses noise limits that would constitute a noise disturbance, primarily as measured at residential land uses. The City's Municipal Code regulations, provided as follows, would be applicable to the proposed Project. General noise limits are outlined in Section 9.54.040 in Chapter 9.5, Noise Control Regulations.

Section 9.54.040 – Exterior Noise Limits

A. A summary of exterior noise limits is included in Section 9.54.040.

Section 9.54.040. Exterior Noise Limits

Receiving land use	Time	Noise level not to be exceeded for more than 30 minutes per hour (dBA)
Residential	7 AM – 10 PM	50
	10 PM – 7 AM	40
Commercial	Any time	60

B. The exterior noise limit shall be adjusted as follows:

Condition	Adjustment to exterior limit (dBA)
Noise contains a steady discordant tone such as a whine or screech	-5
Noise is repetitive or impulsive (e.g., hammering, riveting)	-5
Noise consists of speech or music	-5
Noise occurs more than fifteen but less than thirty minutes per hour	+5
Noise occurs more than five but less than fifteen minutes per hour	+10
Noise occurs more than one but less than five minutes per hour	+15
Noise occurs less than one minute per hour	+20

C. If the ambient noise level is less than that permitted by subsection (A) of this section, then the measured ambient noise level plus five dBA shall be considered the "exterior noise limit," but in no case shall the noise level exceed the maximum permitted by subsection (A) of this section.

D. If the ambient noise level exceeds that permitted by subsection (A) of this section, then the measured ambient level shall be considered the "exterior noise limit."

E. For the purposes of this chapter, schools, hospitals and convalescent homes shall be considered residential land uses. (Ord. 1048 § 2, 2020; Ord. 1030 § 2(7), 2018; Ord. 697 § 1 (part), 1983).

9.54.060 Exemptions.

The following activities shall be exempted from the provisions of this chapter:

A. School bands, school athletic and school entertainment events.

B. Outdoor gatherings, public dances, shows and sporting and entertainment events, provided said events are conducted pursuant to a license or permit by the City.

C. Activities conducted in parks, public playgrounds and school grounds, provided such parks, playgrounds and school grounds are owned and operated by a public entity or private school.

D. Any mechanical device, apparatus, machinery, equipment, portable generator or manpower related to or connected with an emergency response or emergency work as defined in Larkspur Municipal Code Section 9.54.010.

E. A stationary generator as defined in Larkspur Municipal Code Section 9.54.010, installed and used during emergencies or utility power outages as defined in Larkspur Municipal Code Section 9.54.010, or for routine testing and maintenance as defined in Larkspur Municipal Code 9.54.010.

F. The sounding of any fire, burglar or civil defense alarm, siren, whistle or similar stationary emergency signaling device for emergency purposes or for their testing.

G. Devices used in conjunction with places of religious worship, such as bells, carillons, chimes and the like.

H. Noise sources exceeding the prescribed standards that are associated with construction, repair, remodeling, demolition, or paving of any real property, including noise from vehicles and equipment associated with these activities, occurring during the following time periods, except as otherwise provided in subsection (H)(3) of this section:

- Monday – Friday (excluding holidays) Seven a.m. to six p.m.
- Saturday (excluding holidays) Nine a.m. to five p.m.
- Sunday/holidays No exemption from prescribed standards
 1. This exemption is granted on the condition that all powered construction equipment is equipped with intake and exhaust mufflers recommended by the manufacturers thereof; pavement breakers and jackhammers shall also be equipped with acoustical attenuating shields or shrouds recommended by the manufacturers thereof.
 2. In lieu of or in the absence of manufacturers' recommendations, the Public Works Director and/or Community Development Director or their designee shall have the authority to prescribe such means of accomplishing maximum noise attenuation as deemed necessary in the public interest, considering the available technology and economic feasibility.
 3. The Community Development Director or their designee may grant exceptions to the time limitations for work performed on private property for:
 - a. Resolution of unforeseen or unavoidable conditions occurring during a construction project and the nature of the project necessitates that work in progress be continued until a specific phase is completed.
 - b. Work that the Planning Commission, City Council or Community Development Director have determined should occur during certain hours because of special considerations, including, but not limited to, the existence of public safety concerns, if the work was performed during daytime hours.
 - c. When sufficient cause has been demonstrated to the Community Development Director, for reasons other than those listed above.
 4. The Public Works Director or their designee may grant exceptions to the time limitations for work performed on public facilities and/or within the public right-of-way for:
 - a. Construction projects of City, County, State, other public agency, or other public utility.
 - b. When sufficient cause has been demonstrated to the Public Works Director, for reasons other than those listed above.
 5. Requests for an exception permit from the time limitations as established in subsections (H)(3) and (H)(4) of this section are subject to the following requirements and procedures:
 - a. Payment of a fee in the amount set by resolution of the City Council. This fee may be waived for emergency work.

- b. A written description of the request. The written description shall include, but not necessarily be limited to:
 - i. Applicant's name;
 - ii. Property owner's name (if different);
 - iii. Location of proposed work;
 - iv. Type of work proposed, and reason for the exception request;
 - v. A description of all equipment and manpower required to perform such work.
- c. Any additional documents as determined necessary, such as:
 - i. Site plan with work location identified;
 - ii. Reports by consulting professionals that provide factual information to support the need for an exception permit;
 - iii. Application for building permit(s), if proposed work is not associated with a previously issued permit;
 - iv. Application for encroachment permit for any work, staging or storage of materials in the public right-of-way, if proposed work is not associated with a previously issued permit.
- d. Upon receipt of all required information, to the satisfaction of the Director of Public Works or Community Development Director, a determination for approval or denial shall be issued in writing. If approved, the Director may include conditions as determined necessary to protect the health, safety and welfare of residents and/or the general public, including requiring the applicant to provide notice to all properties within three hundred feet of the subject site/location no less than three days prior to beginning work. However, a longer noticing time period may be required by the Director if warranted by the scope of work and specific request. (Ord. 1062 § 14, 2022; Ord. 1048 § 2, 2020; Ord. 1030 § 2(7), 2018; Ord. 1010 § 1, 2016)

3.11.2.2 Environmental Setting

Noise Sources in the Project Area

The Project is along San Francisco Bay on the eastern coast of Marin County in the City of Larkspur. Existing noise sources in the Project area include traffic (primarily from United States Highway 101 [US 101] and Sir Francis Drake Boulevard), ferries coming and going from the LFT, locomotive horns and rail car movements from the Sonoma-Marin Rail Transit (SMART) train passing through Larkspur Train Station, bus traffic to and from the existing transit center, and aircraft overflights. The nearest airport to the Project area is the San Rafael Airport (also called Marin Ranch Airport), a small, privately owned airport approximately 7.5 miles north of the Project area. The areas immediately surrounding the Project area include a mix of the following uses: residential homes and condominiums/apartments, residential/office, commercial/office, mixed use, and street retail characteristic of a downtown urban area, as well as protected wetlands directly south of the Project area, with a residential community directly south of the proposed site adjacent to the wetlands and San Francisco Bay to the east.

Noise Measurements

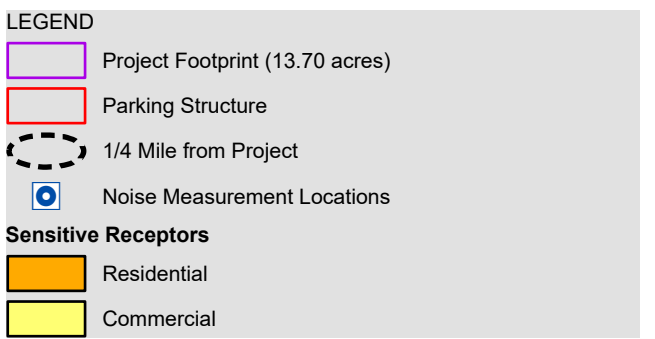
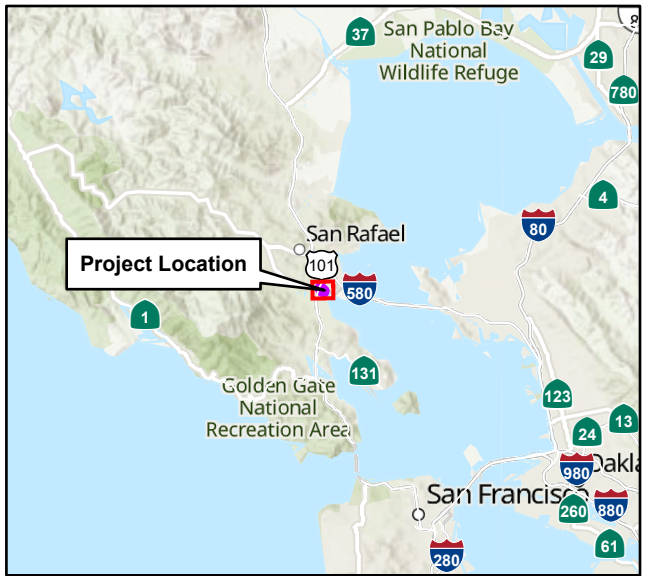
Noise-sensitive land uses in the Project area consist primarily of single- and multifamily residences, mixed-use buildings with residential uses, and outdoor recreational areas. Other land uses in the Project area include retail, office, and commercial uses, which are typically considered to be less sensitive to noise. The existing ambient noise environment in the Project area is characteristic of an urban environment (for example, highway and local vehicular traffic, train operations, people walking, aircraft overflights, commercial noise). Noise from vehicular traffic traveling on the nearby US 101, major roadways (such as Sir Francis Drake Boulevard), and the SMART commuter train are the dominant noise sources in the Project area.

To quantify existing ambient noise levels in the Project area, long-term (24-hour) and short-term (15-minute) ambient noise measurements were conducted between Wednesday, June 17 and Thursday, June 18, 2026. Measurements were conducted at locations in and adjacent to the Project area.

Two long-term measurement locations were selected to capture noise levels in residential areas that are sensitive to noise. Larson Davis 831 sound level meters were installed at both long-term sites. Conditions were clear at time of long-term meter installation, with wind gusts up to 14 mph and temperatures ranging from 70 to 71 degrees Fahrenheit. The LT-1 and LT-2 locations recorded 24-hour noise levels of 55.6 and 56.0 L_{dn} , respectively.

Short-term measurement locations were chosen to represent other noise-sensitive locations. These measurements were taken using a TSI Quest sound level meter. Conditions were clear to partly cloudy at time of short-term measurements, with wind gusts up to 16 mph and temperatures ranging from 64 to 71 degrees Fahrenheit. Noise levels at these locations ranged from 52.4 to 62.5 dBA, depending on their proximity to existing major noise sources.

The locations of the noise measurement sites are shown on Figure 3.11-2. Table 3.11-8 and Table 3.11-9 summarize the results of the noise measurement survey. For the complete dataset of measured noise levels, refer to Appendix F.



Service Layer Credits: World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
 Bing Maps Hybrid: © 2026 Microsoft Corporation © Maxar ©CNES (2026) Distribution Airbus DS © Mapbox © 2026 TomTom
 World Hillshade: Esri, CGIAR, USGS

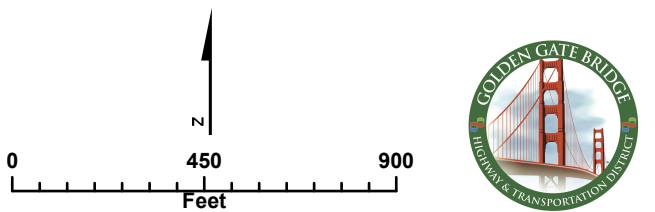


Figure 3.11-2
Sensitive Receptors and
Noise Measurement Locations
Larkspur Ferry Service and Parking Expansion
Golden Gate Bridge Highway and Transportation District
Marin County, California

Table 3.11-8. Long-Term Noise Measurements

Site	Site Description	Date and Time	Daytime Average L _{eq} (dBA)	Nighttime Average L _{eq} (dBA)	Loudest Daytime Hour L _{eq} (dBA)	Quietest Daytime Hour L _{eq} (dBA)	L _{dn} (dBA)
LT-1	63 Greenbrae Boardwalk, On dock, 65 feet from structure	Start: Wednesday, June 17, 2026, 2:00 PM End: Thursday, June 18, 2026, 2:00 PM	52.8	48.2	54.7 2:00 PM	50.4 10:00 AM	55.6
LT-2	147 Greenbrae Boardwalk, End of dock	Start: Wednesday, June 17, 2026, 3:00 PM End: Thursday, June 18, 2026, 2:00 PM	53.4	48.3	55.9 3:00 PM	50.5 9:00 AM	56.0

Table 1.11-9. Short-Term Noise Measurements

Site	Site Description	Date and Time	Duration	L _{eq} (dBA)	L _{max} (dBA)
ST-1	Trail benches across from Ferry Loading, adjacent to Sir Francis Drake Boulevard	Thursday, June 18, 2026, 10:26 AM	15 minutes	62.4	75.5
ST-2	Southwest corner of ferry parking lot, adjacent to marsh	Wednesday, June 17, 2026, 4:26 PM	15 minutes	56.3	60.8
ST-3	West side of ferry parking lot	Wednesday, June 17, 2026, 4:08 PM	15 minutes	52.4	62.6
ST-4	North Lot Site	Thursday, June 18, 2026, 12:12 PM	15 minutes	62.5	67.1
ST-5	Marin Country Mart	Thursday, June 18, 2026, 11:25 AM	15 minutes	59.6	71.2
ST-6	Lincoln Village Circle, adjacent to hotel and apartments	Wednesday, June 17, 2026, 4:52 PM	15 minutes	56.8	65.5
ST-7	125 E Sir Francis Drake Boulevard, vacant restaurant site	Thursday, June 18, 2026, 10:55 AM	15 minutes	55.2	63.3
ST-8	Remillard Park	Thursday, June 18, 2026, 9:32 AM	15 minutes	55.4	61.0

Surrounding Noise-Sensitive Land Uses

Some land uses are more sensitive to noise impacts than others. Consistent with the Governor's Office of Planning and Research's *State of California General Plan Guidelines*, noise-sensitive receptors are defined in this document as residential land uses, schools, open spaces, nursing homes, hospitals, convalescent homes, and churches (Governor's Office of Planning and Research 2017). Potential noise-related impacts on biological resources are disclosed in Section 3.3, Biological Resources. In addition, the Golden Gate Bridge, Highway and Transportation District considers hotels, motels, libraries, and cemeteries to be noise-sensitive receptors. As noted, sensitivity to noise may vary with the source of the noise and the land use context. An important way of predicting a human reaction to a new noise environment is to compare it with the existing ambient noise level. In general, the more a new noise source exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. The noise analysis in this section accounts for the downtown urban environment and proximity of the Project area to US 101, the existing transit center, and the SMART train station. Therefore, the existing ambient noise level is louder than non-urban uses.

Existing noise-sensitive land uses in the vicinity of the Project area include residences, a hotel, a school, a nursing home, and a neighborhood park. These sensitive land uses are divided into Categories 1, 2, or 3, per the FTA standard for transit noise, as described in Section 3.11.2.1. Table 3.11-10 summarizes the sensitive receptors within 0.5 mile of the Project.

Table 3.11-10. Sensitive Receptors within 0.5 Mile of the Alternatives

Sensitive Receptor Type	Name	Address
Category 1		
None	N/A	N/A
Category 2		
Residential	Various	All surrounding zoning that falls into the following categories: Any zoning with an "R" and downtown residential zoning including the following: 4SRC, HO, CSMU, 2/3 MUE, 2/3, 2/3 MUW, WEV, and 5/MR/O
Hospitals	By the Bay Health	17 Sir Francis Drake Boulevard
Hotel	Courtyard by Marriott	2500 Larkspur Landing Circle
Category 3		
Schools	The Children's Cottage Cooperative Preschool	2900 Larkspur Landing Circle
	Tutu School Larkspur	1201B Larkspur Landing Circle
Parks and Open Spaces	Remillard Park Corte Madera Marsh Ecological Reserve	E Sir Francis Drake Boulevard 750 feet South of the Main Lot Project Area

Note: Information taken from Google Maps search in August 2026.

N/A = not applicable

Vibration-Sensitive Buildings

Existing structures within 178 feet of Project construction may be affected by groundborne vibration during Project construction activities, and occupants within buildings even farther away may be annoyed because of groundborne vibration. The degree of impact will depend on the vibration of the offending equipment, the distance to the affected structure, the type of structure, and the type of soil. Table 3.11-4 lists thresholds for potential damage to existing structures by the type of structure and whether the source is continuous or intermittent, and Table 3.11-5 lists thresholds for potential annoyance depending on whether the source is transient or continuous.

As shown in Table 3.11-4, historic buildings are considered the most sensitive to vibration, according to the Caltrans Vibration Guidance Manual. Currently, there are two historic structures within the area of impact of the Project, a segment of the Northwestern Pacific Railroad and the Green Brae Brick House at 125 E Sir Francis Drake Boulevard. Neither will be directly impacted by the construction of the Project or is close enough to be harmed by noise or vibration that results from the construction.

3.11.3 Environmental Impacts

This section describes the environmental impacts associated with noise that would result from implementation of the proposed Project. It describes the methods used to determine the effects of the proposed Project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (that is, avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided.

3.11.3.1 Methodology

Construction Noise

The noise study area includes areas within a half-mile radius of the Project area. The assessment of potential construction noise levels was based on methodology developed by FTA (2018) and construction noise criteria from applicable local guidance (such as local general plan documents or noise ordinances). Noise levels produced by commonly used construction equipment are shown in Table 3.11-11. Individual types of construction equipment are expected to generate maximum noise levels ranging from 80 to 90 dBA at 50 feet. The construction noise level at a given receiver location depends on the type of construction activity and the distance and shielding between the activity and noise-sensitive receivers.

Table 3.11-11. Commonly Used Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Heavy truck	84
Excavator	85
Bulldozer	85
Pump	81
Generator	81
Mixer	80
Grader	85

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Compactor	82
Impact hammer (hoe ram)	90
Back hoe	80
Crane	83
Drill rig	85
Pile Driver (Impact)	101
Pavement saw	90

Source: FTA 2018

The construction equipment used would vary by component or construction phase of the proposed Project and would involve the use of excavators, bulldozers, heavy trucks, pumps, generators, graders, compactors, impact hammers, and other heavy equipment. The source levels used to calculate noise exposure are based on the L_{max} of equipment noise levels developed by FTA. Usage factors for construction noise are used in the analysis to develop reasonable worst-case L_{eq} noise exposure values. The L_{eq} value accounts for the energy-average of noise over a specified interval (usually 1 hour), and usage factors represent the amount of time a type of equipment is used during a typical interval.

Potential noise levels resulting from construction of the proposed Project were evaluated by combining the noise levels of the two loudest pieces of equipment that would likely operate at the same time (for example, an excavator, bulldozer, and truck being operated simultaneously during the site preparation phase) and applying the appropriate usage factor (percentage of time equipment is in operation) to each piece of equipment. Sound levels from construction activities are calculated as a function of distance from the source(s), based on point-source attenuation over hard (that is, acoustically reflective) ground, noting that 6 dB of reduction per doubling of distance can be assumed over hard ground.

All construction activities would occur within daytime hours. Daytime is defined as the hours between 7:00 AM and 6:00 PM on weekdays and 9:00 AM to 5:00 PM on Saturdays. No construction would occur on Sundays or holidays.

Construction Haul Truck Noise

Construction haul truck noise is assessed qualitatively based on the likelihood of a noticeable increase in traffic noise at sensitive land uses along proposed Project haul routes. Based on the average number of trips per day estimated by the Project design team, it is conservatively estimated that up to 125 one-way daily trips would be made by haul trucks during construction. These trucks are assumed to access or leave the Main and North Lot sites by way of Sir Francis Drake Boulevard to access US 101. These additional trips do not represent a doubling of traffic on any haul route roadways and so would not result in an impact. Therefore, construction haul truck noise will not be discussed further in this section.

Operational Noise

Ferry Terminal

The noise and vibration assessment was conducted in accordance with the FTA *Transit Noise and Vibration Impact Assessment Manual* guidelines (described in Section 3.11.2.1) (FTA 2018). The FTA manual

specifies that criteria are applied for a comparison between future project noise and existing noise and not between future project noise and projections of future “no-build” noise exposure.

An FTA general noise assessment was performed for the closest sensitive receptor using the FTA General Noise Assessment Spreadsheet. This tool uses predefined noise levels for stationary noise sources including the ferry terminal and proposed parking garage.

Existing noise levels for receptor locations were taken from results of the noise-monitoring program conducted in the area. The number of ferry landings and parking movements per hour were calculated using information provided in the Project traffic study (Appendix G). Calculated Project noise levels were then compared with the “moderate impact” and “severe impact” criteria based on the existing ambient conditions recorded for a given receptor location.

Vehicle Traffic

To determine whether the proposed Project would result in a substantial permanent increase in ambient noise levels from traffic, model calculations were developed to determine the change in Project-related traffic volumes along segments with assigned Project-generated traffic. An increase of 3 dB would be considered a noticeable increase in noise levels relative to existing conditions. Ambient noise levels obtained from sound level monitoring are also considered to determine whether an increase in traffic along a given roadway segment would result in a noticeable increase in noise levels, based on all sources of noise present in the area.

Traffic noise modeling for existing conditions and Year 2050 conditions was conducted using standard acoustical methods. For the assessment of Project-level traffic noise impacts, PM peak-hour traffic volumes were used to determine traffic noise levels under existing and Year 2050 conditions.

Construction Vibration

Potential vibration impacts during construction were evaluated using the construction vibration modeling methods recommended by the U.S. Department of Transportation, along with construction equipment data provided by the Project engineering team. Reasonable worst-case construction vibration levels are provided and compared to the Caltrans vibration guidelines for damage and annoyance (refer to Tables 3.11-4 and 3.11-5 respectively) (Caltrans 2020).

Vibration source levels for a variety of typical construction equipment types are shown in Table 3.11-2. Source levels are shown in terms of PPV at 25 feet, 50 feet, 75 feet, and 100 feet, based on FTA guidelines.

The potential for damage to adjacent architectural resources from Project-related construction vibration was investigated, in addition to the modeled noise- and vibration-sensitive receivers discussed previously. Using assumptions provided by the Project engineers and the FTA methodology, as outlined previously, the potential for construction vibration damage to structures was analyzed.

3.11.3.2 Thresholds of Significance

The following State California Environmental Quality Act Guidelines Appendix G thresholds identify significance criteria to be considered for determining whether a project could have significant impacts related to noise and vibration.

Would the proposed project result in:

- Generation of 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?
- Generation of excessive groundborne vibration or groundborne noise levels?
- Placement of project-related activities in the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, resulting in exposure of people residing or working in the project area to excessive noise levels?

More specifically, the Project may result in a substantial increase in ambient noise levels and a potentially significant impact if any of the following thresholds are met.

Operational Noise

Project operation may result in a substantial increase in ambient noise levels and a potentially significant impact if:

1. Operation results in a moderate or severe impact to a Category 1, 2 or 3 land use in light of Figure 3.11-1, FTA Noise Impact Criteria for Transit Projects.
2. Operational noise would raise the L_{dn} outside of City of Larkspur boundaries by:
 - a. More than 5 dBA
 - b. More than 3 dBA and exceed the Normally Acceptable standard (refer to Table 3.11-6)
 - c. More than 3 dBA and the Normally Acceptable standard is already exceeded
3. Operational noise causes an increase in noise levels in nonresidential or mixed-use districts within the City of Larkspur to increase by more than 5 dB.
4. Causes ambient noise levels to exceed 75 dBA L_{dn} at office, retail, or industrial land uses within the City of Larkspur.
5. Project-generated traffic results in an increase in traffic noise levels of 3 dB or more relative to future no-project conditions at a location where traffic noise exceeds 60 L_{dn} .

Construction Noise

1. Project construction noise exceeds 90 dBA Leq between the hours of 7 AM and 6 PM at residential land uses.
2. Project construction noise exceeds 100 dBA Leq at commercial or industrial land uses at any time.

Construction Vibration

1. Project construction could result in damage to a structure per Caltrans standards (refer to Table 3.11-4).
2. Project construction could result in human annoyance per Caltrans standards (refer to Table 3.11-5).
3. Project construction exceeds the City of Larkspur standards of 0.08 in/sec PPV for sensitive historic structures or 0.30 in/sec PPV for normal construction.

Airport Noise

There would be no impacts related to the influence of noise from aircraft or airports for the proposed Project. The nearest airport to the Project site is San Rafael Airport, a private airport, approximately 7.5 miles north of the Project area. The proposed project would not add sensitive uses that would potentially be affected by aircraft noise. Therefore, there would be no impact, and this topic related to aircraft noise at public airports or private airstrips is not discussed further in this section.

3.11.3.3 Impacts

Project noise impacts would be substantively the same for both Alternative 1 and Alternative 2. Within this section, impacts for Alternative 1 and Alternative 2 are discussed together as the Build Alternatives.

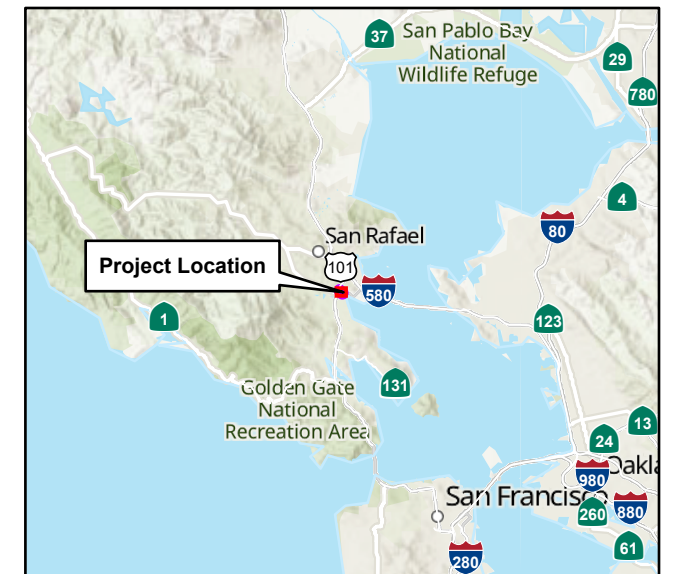
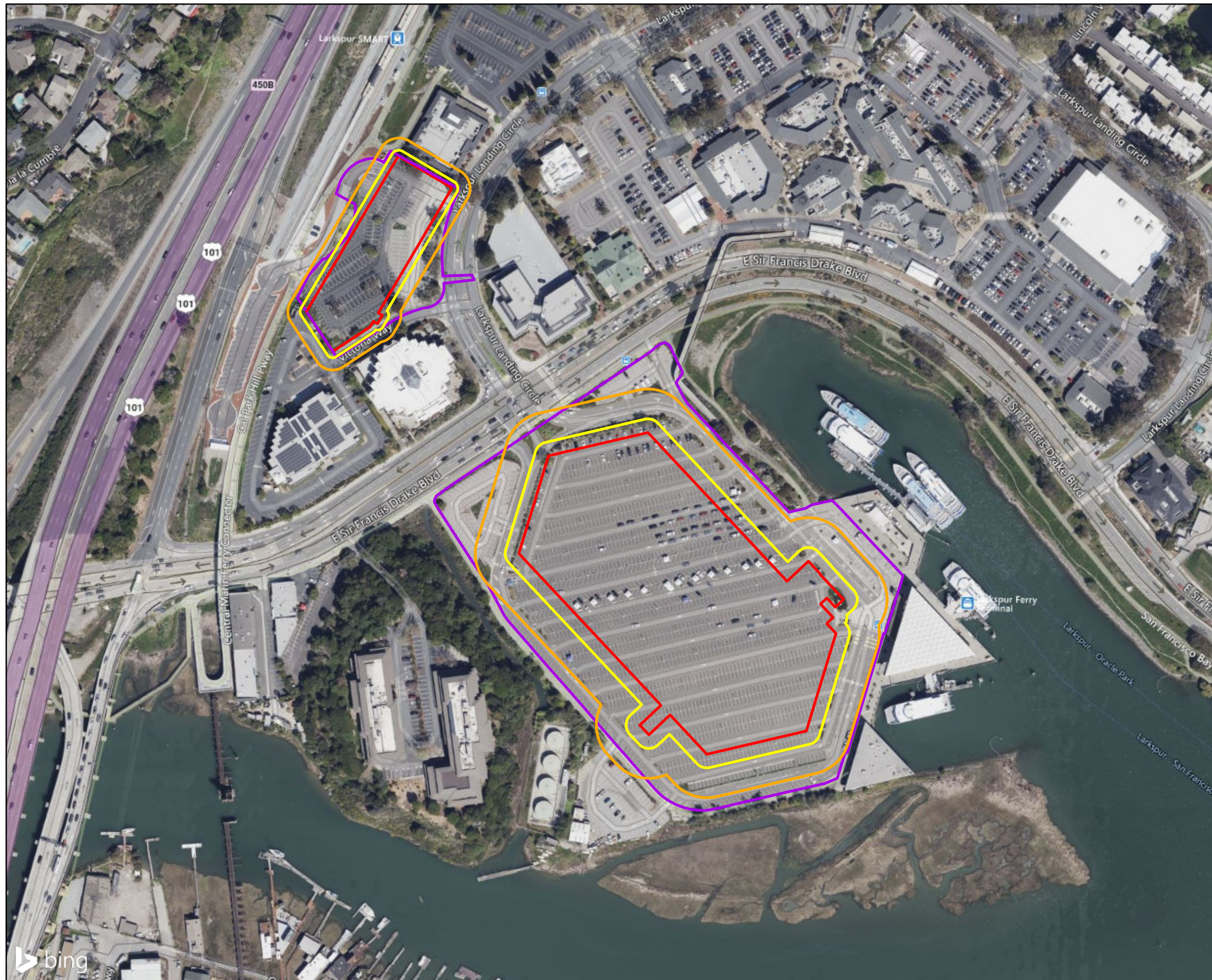
Generation of Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies

Construction

Build Alternatives

The City of Larkspur regulates construction noise by exempting daytime construction from compliance with each noise ordinance. The City has not established quantitative thresholds for the purpose of evaluating whether a project may result in a substantial increase in ambient noise levels during construction activities, and according to the FTA (FTA 2018), local noise ordinances are typically not very useful in evaluating construction noise. They often define nuisances and hours of allowed activity and sometimes specify limits in terms of maximum levels but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels produced during construction activities, the duration of the construction, and the adjacent land uses. The FTA standards for construction noise impacts on residential, commercial, and industrial land uses were used for purposes of this analysis. FTA construction noise standards are provided in Table 3.11-3. Standards presented in Table 3.11-3 are dependent upon the period (daytime or nighttime) and the type of land use being affected by the noise. The descriptor is a 1-hour L_{eq} .

Construction noise contours were created for the FTA construction noise standards and are described in Tables 3.11-12 and 3.11-13 for the North Lot and Main Lot, respectively. They are also shown on Figure 3.11-3.



LEGEND

- Project Footprint (13.70 acres)
- Parking Structure

Construction Noise Contours (Loudest Phase), Applicable Standards

(City of Larkspur: 7 AM to 6 PM) (Unincorporated Marin County: 8 AM to 5 PM)

- 90 dBA, FTA Residential
- 100 dBA, FTA Commercial

Service Layer Credits: Shoreline Access Inventory:
 World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
 Bing Maps Hybrid: © 2026 Microsoft Corporation © Maxar ©CNES (2026) Distribution Airbus DS © Mapbox © 2026 TomTom
 World Hillshade: Esri, CGIAR, USGS

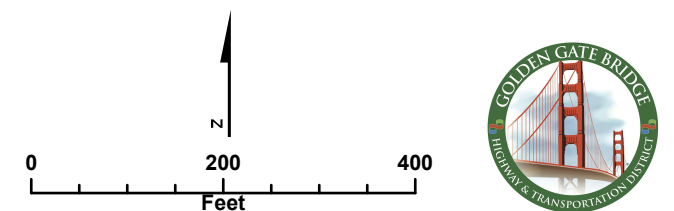


Figure 3.11-3
Construction Noise Contours
(Loudest Phase), Applicable Standards
 Larkspur Ferry Service and Parking Expansion
 Golden Gate Bridge Highway and Transportation District
 Marin County, California

North Lot Site

Daytime Noise (FTA Standards)

All construction activities would take place during daytime hours. The nearest residential receptors are single-family homes approximately 500 feet west of the Project site and on the other side of US 101. This distance substantially exceeds the maximum residential impact distance of 38 feet associated with the loudest phase of construction at the North Lot. Therefore, no residential receptors would be exposed to daytime construction noise levels exceeding applicable FTA criteria.

The nearest Category 2 receptor, by the Bay Health hospice facility, is approximately 80 feet from the Project site, which is beyond the calculated impact area for daytime construction noise. The nearest commercial receptor, CinemaWest Larkspur Landing, is approximately 45 feet from the Project site. This distance also exceeds the maximum commercial impact distance of 13 feet during the loudest phase of construction. Accordingly, daytime construction activities at the North Lot would not result in exceedances of applicable FTA noise impact criteria. Construction noise impacts at the North Lot would be ***less than significant***. No mitigation required.

Main Lot Site

Daytime Noise (FTA Standards)

All construction activities would take place during daytime hours. The nearest residential receptors are single-family homes along the Greenbrae Boardwalk approximately 500 feet south of the Main Lot Project site. This distance is substantially greater than the maximum residential impact distance of 89 feet associated with the loudest phase of construction. Therefore, no residential receptors would be exposed to daytime construction noise levels exceeding applicable FTA criteria.

Table 3.11-12. Construction Noise Levels by Activity and Distance to Allowable Sound Levels, North Lot

Construction Activity	Loudest Equipment Used	Combined Source Level at 50 Feet (L_{eq} , dBA)	Distance to Exceedance of FTA Commercial/Industrial Sound Level Limit of 100 dBA L_{eq} (feet) ^[a]	Distance to Exceedance of FTA Residential Sound Level Limit of 90 dBA L_{eq} (feet) ^[a]
Site Preparation	Excavator, planer	85	<10	26
Earthwork	Excavator, dozer	85	<10	28
Foundations	Crane, loader	83	<10	21
Superstructure	Crane, lift	85	<10	27
Parking Lot Improvements	Paver, grader	88	13	38
MEP, Architectural, and Finishes	Crane, lift	83	<10	75

Note: Distance calculation does not include the effects, if any, of local shielding from walls, topography, or other barriers, which may further reduce sound levels.

^[a] The maximum distance where the combined equipment level may potentially exceed the FTA construction noise limit of 100 dBA L_{eq} for commercial and industrial land uses and 90 dBA L_{eq} for residential. This standard applies during the daytime when construction noise is exempt from the City noise ordinance. Daytime is defined as the hours between 7:00 AM and 6:00 PM (9:00 AM to 5:00 PM on Saturdays) for the City of Larkspur.

MEP = mechanical, electrical, plumbing

Table 2.11-13. Construction Noise Levels by Activity and Distance to Allowable Sound Levels, Main Lot

Construction Activity	Loudest Equipment Used	Combined Source Level at 50 Feet (L_{eq} , dBA)	Distance to Exceedance of FTA Commercial/Industrial Sound Level Limit of 100 dBA L_{eq} (feet) ^[a]	Distance to Exceedance of FTA Residential Sound Level Limit of 90 dBA L_{eq} (feet) ^[a]
Site Preparation	Excavator, planer	87	12	35
Earthwork	Excavator, dozer	89	14	42
Foundations (Impact Driven Piles)	Grader, crane	95	28	89
Foundations (Drilled Auger Cast Piles)	Pile hammer, crane	89	14	43
Superstructure	Crane, lift	87	12	36
Parking Lot Improvements	Paver, grader	88	13	39
MEP, Architectural, and Finishes	Crane, lift	89	14	43

Note: Distance calculation does not include the effects, if any, of local shielding from walls, topography, or other barriers, which may further reduce sound levels.

^[a] The maximum distance where the combined equipment level may potentially exceed the FTA construction noise limit of 100 dBA L_{eq} for commercial and industrial land uses and 90 dBA L_{eq} for residential. This standard applies during the daytime when construction noise is exempt from the City noise ordinance. Daytime is defined as the hours between 7:00 AM and 6:00 PM (9:00 AM to 5:00 PM on Saturdays) for the City of Larkspur.

There are no Category 1, Category 2, or Category 3 noise-sensitive receptors within the calculated daytime noise impact area. Likewise, no commercial receptors are within the maximum commercial impact distance of 38 feet. Accordingly, daytime construction activities at the Main Lot would not result in exceedances of applicable FTA noise impact criteria. Construction noise impacts would be ***less than significant***. No mitigation required.

Construction noise at both the North and Main Lots would be further reduced through implementation of best noise control practices during construction. Standard construction best practices to minimize construction noise include the following:

- Locating stationary equipment (for example, generators, pumps, cement mixers, idling trucks) as far as possible from noise-sensitive land uses
- Requiring that all construction equipment powered by gasoline or diesel engines have sound-control devices, such as exhaust mufflers that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation

- Using equipment powered by electric motors instead of gasoline or diesel-powered engines (when feasible)
- Preventing excessive noise by shutting down idle vehicles or equipment
- Using noise-reducing enclosures around noise-generating stationary equipment
- Constructing barriers between noise sources and noise-sensitive land uses or taking advantage of existing barrier features (such as terrain, structures) to block sound transmission to noise-sensitive land uses; the barriers should be designed to obstruct the line of sight between the noise-sensitive land use and onsite construction equipment
- Notifying nearby residents in advance of construction work

Operation

Build Alternatives

Ferry Terminal Operations

The FTA general noise assessment prepared for the proposed ferry terminal operation found that the expanded operation and parking garage would result in no change to the existing L_{dn} at the closest sensitive receptor, the single-family homes along the Greenbrae Boardwalk. All other sensitive receptors are farther away and have higher existing ambient noise levels; therefore, they are also projected to have no change in L_{dn} because of ferry terminal operations. Noise levels would not exceed the threshold for moderate or severe impacts at any sensitive receptors as defined by the FTA. This impact is considered to be ***less than significant***. No mitigation required.

Ferry Terminal Traffic

The proposed Project would expand parking capacity at the LFT through construction of the garages at the North and Main Lots. The additional parking supply would accommodate increased ferry ridership and associated vehicle trips to and from the ferry terminal. As identified in the Project traffic analysis, the Project would result in increases in traffic volumes on roadways in the vicinity of the terminal as commuters access the expanded parking facilities.

Traffic noise increases with increasing traffic volumes. A 100% increase in traffic volume (that is, a doubling of traffic) typically results in a 3-dBA increase in noise levels. As discussed previously, a 3-dBA increase is generally considered the minimum change that would be readily perceptible to the human ear; therefore, increases of less than 3 dBA are not considered substantial.

Traffic noise levels were calculated using peak-hour traffic volume data provided by the Project traffic consultant and standard acoustical analysis methods. The Project area is within an urban environment where existing ambient noise levels are dominated by roadway traffic, including traffic on local streets and the adjacent elevated section of US 101, which is approximately 200 feet from the North Lot and approximately 750 feet from the Main Lot.

As shown in Table 3.11-14, Project-generated traffic associated with ferry terminal operations would increase traffic noise levels by up to 1 dBA on roadways in the vicinity of the Project area under future Project conditions. In addition, all but two roadway segments analyzed would experience a similar increase in traffic noise levels under the No-Build condition because of anticipated regional traffic growth. The maximum Project-related increase of 1 dBA would not be perceptible over existing ambient noise levels and would not result in severe or moderate impacts.

Table 3.11-14. Increase in Traffic Noise Along Project Street Segments

Street	Segment Location	2050 No Project, dBA L _{eq}	2050 Project Versus No Project Increase, dBA L _{eq}
Bon Air Road	South of Sir Francis Drake Boulevard	57	+1
Sir Francis Drake Boulevard	West of Bon Air Road	61	0
Sir Francis Drake Boulevard	Bon Air Road to Barry Street	62	+1
Sir Francis Drake Boulevard	Barry Street to US 101 SB Off-Ramp	62	0
Sir Francis Drake Boulevard	US 101 SB Off-Ramp to US 101 NB Off-Ramp	60	+1
Sir Francis Drake Boulevard	US 101 NB Off-Ramp to LFT	63	0
Sir Francis Drake Boulevard	LFT to Larkspur Landing Circle	62	+1
Larkspur Landing Circle	Larkspur Landing Circle to Victoria Way	54	0
Eliseo Drive	North of Sir Francis Drake Boulevard	53	+1

Because the projected increase in traffic noise would be limited to approximately 1 dBA, traffic-related operational noise associated with the proposed Project would not result in a substantial increase in ambient noise levels. Therefore, the impact would be *less than significant*. No mitigation required.

Mitigation Measures

No mitigation required.

Generation of Excessive Groundborne Vibration or Groundborne Noise Levels

Construction

Build Alternatives

Construction of the proposed Project would involve the use of construction equipment that would generate groundborne vibration. Typical vibration levels associated with construction equipment as a function of distance are shown in Table 3.11-15.

Table 3.11-15. Construction Equipment Vibration Levels by Distance

Distance (feet)	Bulldozer, Hoe Ram		Vibratory Roller		Truck		Pile Driver (Impact)	
	VdB ^[a]	PPV ^[b]	VdB ^[a]	PPV ^[b]	VdB ^[a]	PPV ^[b]	VdB ^[a]	PPV ^[b]
10	99	0.352	106	0.83	98	0.300	124	6.00
15	94	0.191	101	0.452	92	0.164	119	3.266
20	90	0.124	97	0.294	88	0.106	115	2.121
25	87	0.089	94	0.21	86	0.076	112	1.518
30	85	0.068	92	0.16	83	0.058	110	1.155
35	83	0.054	90	0.127	81	0.046	108	0.916
40	81	0.044	88	0.104	79	0.038	106	0.750
45	79	0.037	86	0.087	78	0.031	104	0.629
50	78	0.031	85	0.074	77	0.027	103	0.537
55	77	0.027	84	0.064	75	0.023	102	0.465
60	76	0.024	83	0.057	74	0.020	101	0.408
65	74	0.021	82	0.05	73	0.018	100	0.362
70	74	0.019	81	0.045	72	0.016	99	0.324
75	73	0.017	80	0.04	71	0.015	98	0.292

Note: Based on FTA vibration reference levels

^[a] RMS Velocity Level re 1 micro-inch per second

^[b] PPV, in/sec

Annoyance

As shown in Table 3.11-15, groundborne vibration levels from operation of a bulldozer or hoe ram would exceed the FTA criterion for annoyance of 0.04 in/sec PPV at 40 to 45 feet from a sensitive receptor. Vibration levels from the operation of pile drivers would exceed the FTA criterion for annoyance until approximately 300 feet from the sensitive receivers. Because no occupied structures aside from the existing ferry terminal lie within these distances, the FTA vibration criterion for annoyance would not be exceeded at any sensitive receptors. Therefore, vibration levels during use of heavy equipment would not exceed annoyance thresholds and would be ***less than significant***. No mitigation required.

Damage

Construction of the LFT parking garage would not require operation of heavy equipment near any historic buildings. The closest historic structure to the Project area is a section of the Northwestern Pacific Railroad, approximately 700 feet from the edge of the construction zone, which would result in 0.01 in/sec PPV to the historic building structure, which would fall below the Caltrans vibration criteria for fragile buildings.

Construction of the LFT parking garage would require use of heavy equipment near other building structures, but these structures are of modern construction, and while operation of pile drivers would exceed the vibration standard of 0.3 in/sec PPV up to a distance of 67 feet, the closest vibration-sensitive receptor to the Main Lot site where pile drivers would be operating is 150 feet away, which would

experience a vibration level of 0.1 in/sec PPV. The existing ferry terminal building is approximately 90 feet from the closest pile driving location, which would experience a vibration level of 0.193 in/sec. Large bulldozers are the heaviest construction vehicles planned to be used at the North Lot site. The closest structure to the North Lot is approximately 40 feet away and would experience vibration of 0.044 in/sec PPV. No vibration levels would exceed City of Larkspur or Caltrans building damage thresholds. Therefore, vibration levels during use of heavy equipment would be ***less than significant***. No mitigation required.

Operational

Build Alternatives

No conditions exist that would result in a significant vibration impact from rubber-tired vehicles or from the operation of the ferry terminal or the ferries themselves. Operation conditions would be similar to existing conditions. As such, this vibration impact would be ***less than significant***. No mitigation required.

Mitigation Measures

No mitigation required.