3.14 Noise and Vibration

3.14.1 Introduction

This section describes the regulatory setting and affected environment for noise and vibration. It addresses noise and vibration sources known to occur or that have the potential to occur in the noise RSA and describes the potential impacts on sensitive land uses during construction and operation of the proposed Project. This section also identifies the potential for cumulative impacts of the proposed Project related to noise and vibration when considered in combination with other relevant projects.

3.14.1.1 Noise Fundamentals

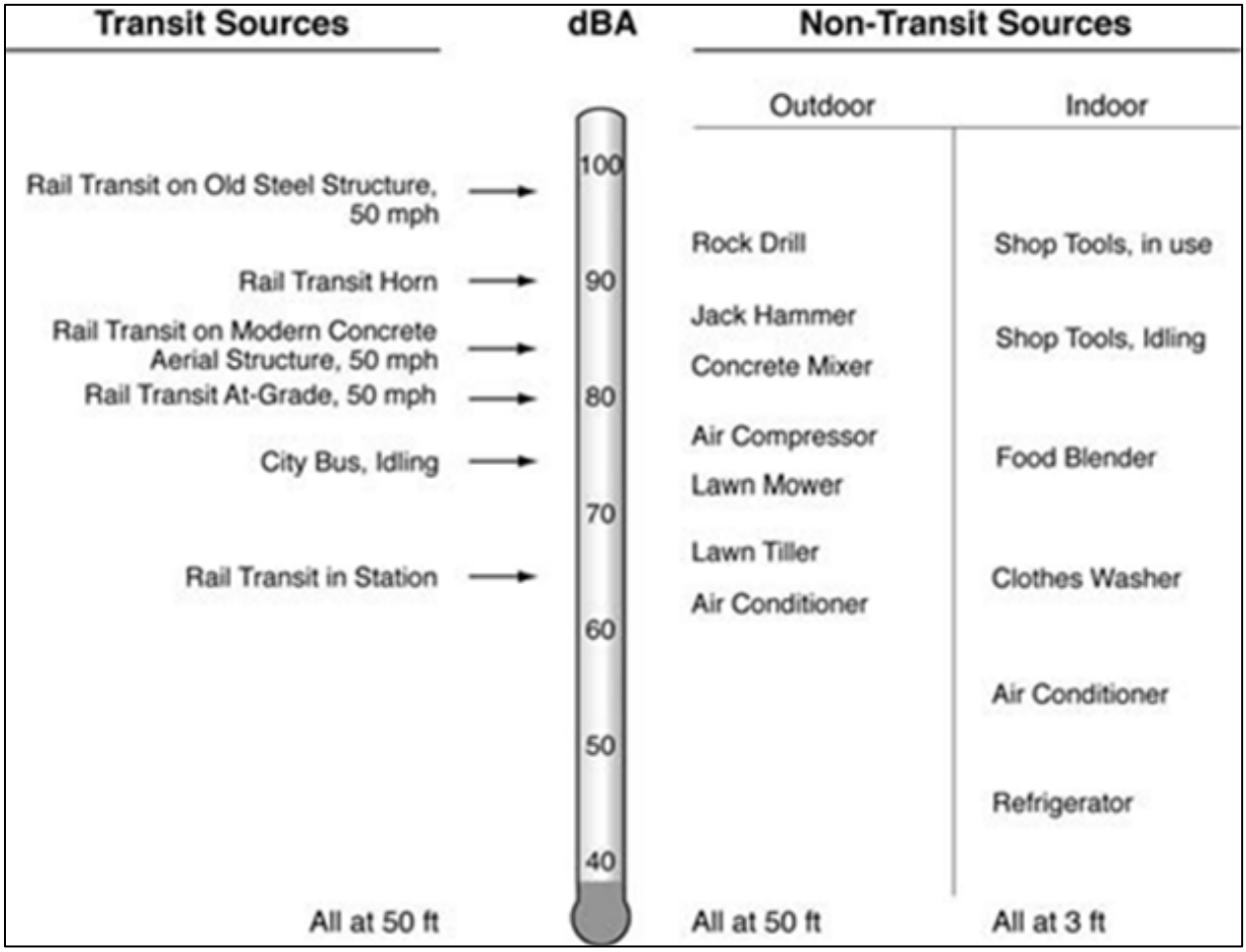
Sound is defined as small changes in air pressure above and below the standard atmospheric pressure and noise is usually considered to be unwanted sound. The three parameters that define noise include:

- **Level:** The level of sound is the magnitude of air pressure change above and below atmospheric pressure and is expressed in decibels (dB). Typical sounds fall within a range between 0 dB (the approximate lower limit of human hearing) and 120 dB (the highest sound level generally experienced in the environment). A 3 dB change in sound level is perceived as a barely noticeable change outdoors and a 10 dB change in sound level is perceived as a doubling (or halving) of loudness.
- **Frequency:** The frequency (pitch or tone) of sound is the rate of air pressure change and is expressed in cycles per second, or Hertz (Hz). Human ears can detect a wide range of frequencies from around 20 Hz to 20,000 Hz; however, human hearing is not as sensitive at high and low frequencies, and the A weighting system, which measures what humans hear in a more meaningful way by reducing the sound levels of higher and lower frequency sounds, is used to provide a measure (dBA) that correlates with human response to noise. Figure 3.14-1 shows typical maximum A-weighted sound levels for transit and non-transit sources. The A-weighted sound level has been widely adopted by acousticians as the most appropriate descriptor for environmental noise.
- **Time Pattern:** Because environmental noise is constantly changing, it is common to condense all of this information into a single number, called the "equivalent" sound level (L_{eq}). The L_{eq} represents the changing sound level over a period of time, typically 1 hour or 24-hours in transit noise assessments. For assessing the noise impact of rail projects at residential land use, the Day-Night Sound Level (L_{dn}) is the noise descriptor commonly used, and it has been adopted by many agencies as the best way to describe how people respond to noise in their environment. L_{dn} is a 24-hour cumulative A-weighted noise level that includes all noises that occur during a day, with a 10-dB penalty for nighttime noise (10 pm to 7 am). This nighttime penalty means that any noise events at night are equivalent to ten similar events during the day. Typical L_{dn} values for various transit operations and environments are shown in Figure 3.14-2.

In addition to the L_{eq} and L_{dn}, there is another descriptor used to describe noise. The loudest 1 second of noise over a measurement period, or maximum A-weighted sound pressure level (L_{max}), is

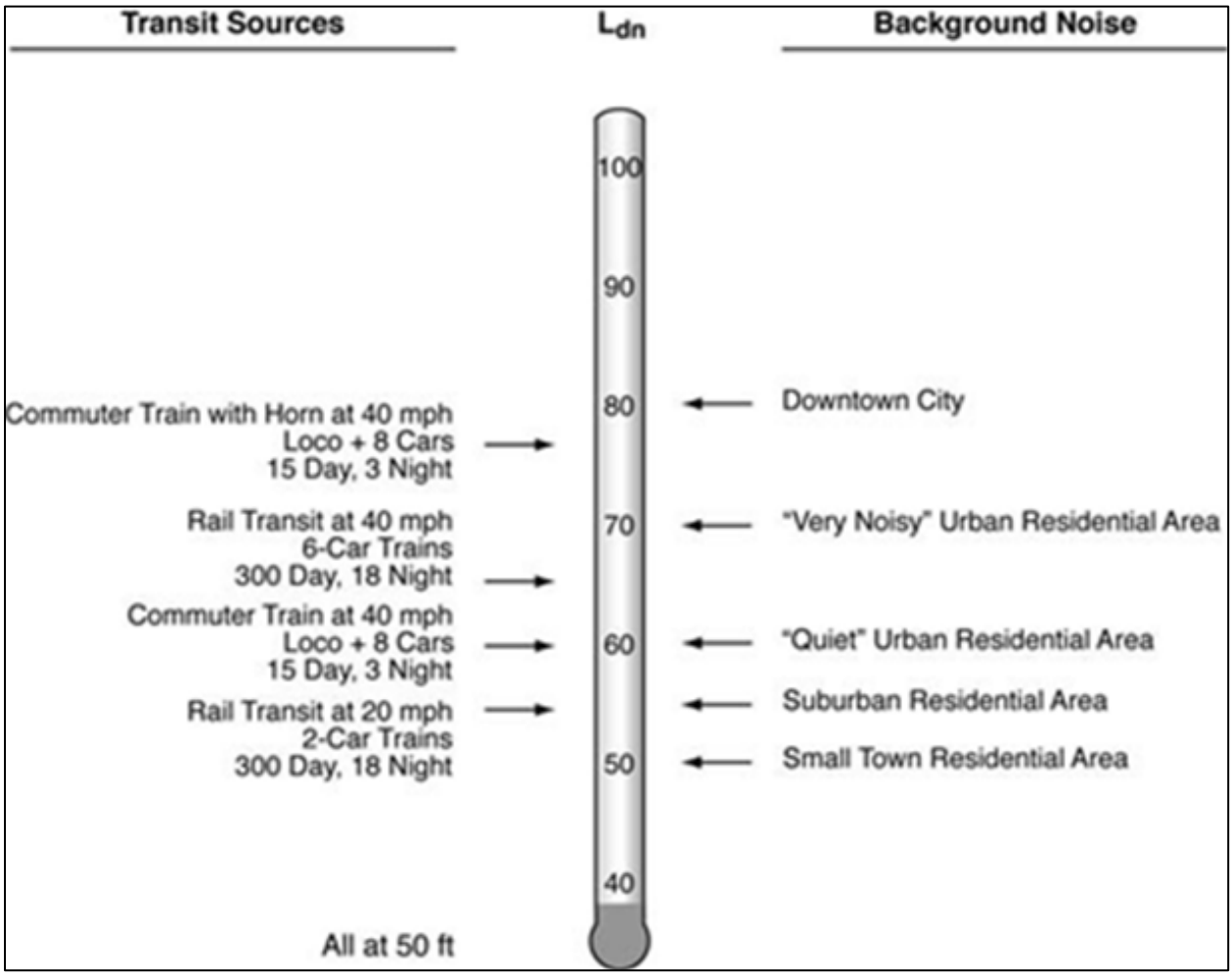
used in many local and state ordinances for noise emitted from private land uses and for construction noise impact evaluations.

Figure 3.14-1. Typical A-Weighted Sound Levels



Source: FTA, 2018

Figure 3.14-2. Typical L_{dn} Noise Exposure Levels



Source: FTA, 2018

3.14.1.2 Vibration Fundamentals

Ground-borne vibration from trains refers to the fluctuating or oscillatory motion experienced by persons on the ground and in buildings near railroad tracks. Vibration can be described in terms of displacement, velocity, or acceleration. Displacement is the easiest descriptor to understand. For a vibrating floor, the displacement is simply the distance that a point on the floor moves away from its static position. Velocity represents the instantaneous speed of the floor movement, and acceleration is the rate of change of the speed. Although displacement is easier to understand, the response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration.

Two methods are used for quantifying vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous positive or negative peak of the vibration signal. PPV often is used in monitoring of blasting vibration, since it is related to the stresses experienced by buildings.

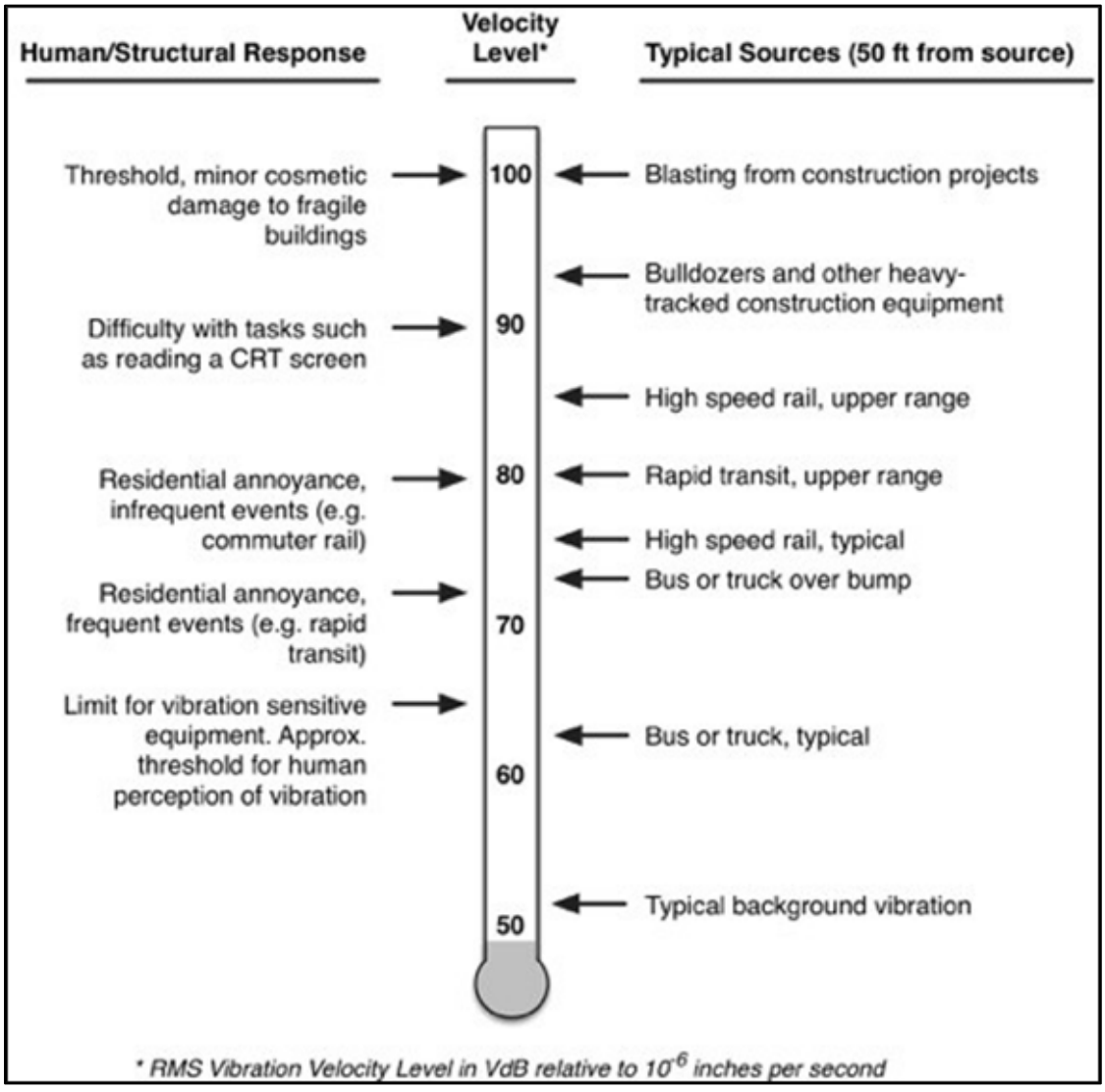
Although PPV is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response. It takes some time for the human body to respond to vibration

impulses. In a sense, the human body responds to an average of the vibration amplitude. Because the net average of a vibration signal is zero, the root mean square (RMS) amplitude is used to describe the "smoothed" vibration amplitude.

PPV and RMS velocities are normally described in inches per second in the U.S. and in meters per second in the rest of the world. Although it is not universally accepted, decibel notation is in common use for vibration. Decibel notation compresses the range of numbers required to describe vibration. Vibration levels in this report are referenced to 1×10^{-6} inches per second (in/sec). Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Common vibration sources and human and structural responses to ground-borne vibration are illustrated in Figure 3.14-3. Typical vibration levels can range from below 50 VdB to 100 VdB (0.000316 in/sec to 0.1 in/sec). The human threshold of perception is approximately 65 VdB.

Figure 3.14-3. Typical Levels of Ground-Borne Vibration



Source: FTA, 2018

Ground-borne noise is a low-volume, low-frequency rumble inside buildings, resulting when ground vibration causes the flexible walls of the building to resonate and generate noise. Ground-borne noise is normally not a consideration when trains are elevated or at grade. In these situations, the airborne noise usually overwhelms ground-borne noise, so the airborne noise level is the major consideration. However, ground-borne noise becomes an important consideration where there are sections of the corridor that are in a tunnel or where sensitive interior spaces are well isolated from the airborne noise. In these situations, airborne noise is not a major path and ground-borne noise becomes the most important path into the building. Ground-borne noise may also need to be considered in cases where the airborne noise from a project is mitigated by a sound wall.

3.14.2 Regulatory Setting

This section identifies federal, state, regional, and local laws, regulations, and orders relevant to the analysis of noise impacts. It also addresses the proposed Project's consistency with the regulations described herein.

3.14.2.1 Federal

Noise Control Act of 1972

The Noise Control Act of 1972 (42 U.S.C. 4910) was the first comprehensive statement of national noise policy. The Noise Control Act declared, "it is the policy of the U.S. to promote an environment for all Americans free from noise that jeopardizes their health or welfare." Although the Noise Control Act, as a funded program, was ultimately abandoned at the federal level, it served as the catalyst for comprehensive noise studies and the generation of noise assessment and mitigation policies, regulations, ordinances, standards, and guidance for many states, counties, and municipal governments. For example, the noise elements of community general plan documents and local noise ordinances considered in this analysis were largely created in response to the passage of the Noise Control Act.

U.S. Environmental Protection Agency Railroad Noise Emission Standards

Interstate rail carriers must comply with EPA (40 CFR § 201) noise emission standards, which are expressed as maximum measured noise levels and applicable to locomotives manufactured after 1979. These standards are as follows:

- 100 feet from geometric center of stationary locomotive, connected to a load cell and operating at any throttle setting except idle—87 dBA (at idle setting, 70 dBA).
- 100 feet from geometric center of mobile locomotive—90 dBA.
- 100 feet from geometric center of mobile railcars, at speeds of up to 45 miles per hour (mph)—88 dBA—or speeds greater than 45 mph (93 dBA).

Federal Railroad Administration Guidelines and Noise Emission Compliance Regulations

FRA has developed a guidance manual for assessing noise and vibration impacts from major rail projects. Although not at the level of a rule or a standard, FRA guidance is intended to satisfy

environmental review requirements and assist project sponsors in addressing predicted construction and operation noise and vibration during the design process.

FRA also has a regulation governing compliance of noise emissions from interstate railroads. FRA's Railroad Noise Emission Compliance Regulations (49 CFR Part 210) prescribes compliance requirements for enforcing railroad noise emission standards adopted by the USEPA (40 CFR 201). FRA also has a rule regarding the sounding of horns at public highway-rail grade crossings (49 CFR 222).

Federal Transit Administration Guidelines

Similar to FRA, the Federal Transit Administration (FTA) has developed a guidance manual for assessing noise and vibration impacts from major rail projects intended to satisfy environmental review requirements and assist project sponsors in addressing predicted construction and operation noise and vibration during the design process (FTA, 2018). The FTA noise and vibration impact criteria are discussed in detail below.

3.14.2.2 State

California Noise Control Act

At the state level, the California Noise Control Act, enacted in 1973 (Health and Safety Code Section 46010, et seq.), requires the Office of Noise Control in the Department of Health Services to provide assistance to local communities developing local noise control programs. The Office of Noise Control also works with the Office of Planning and Research to provide guidance for preparing required noise elements in city and county general plans, pursuant to Government Code Section 65302(f). In preparing the noise element, a city or county must identify local noise sources and analyze and quantify, to the extent practicable, current and projected noise levels for 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 ground stationary noise sources. These noise sources also would include commuter rail alignments. The California Noise Control Act stipulates the mapping of noise-level contours for these sources, using community noise metrics appropriate for environmental impact assessment as defined in 3.14.2.4 Local. Cities and counties use these as guides to make land use decisions to minimize the community residents' exposure to excessive noise.

3.14.2.3 Regional

Interstate Commerce Commission Termination Act

The CCJPA, a state joint powers agency, proposes improvements located within and outside of the UPRR ROW. The Interstate Commerce Commission Termination Act (ICCTA) affords railroads engaged in interstate commerce considerable flexibility in making necessary improvements and modifications to rail infrastructure, subject to the requirements of the Surface Transportation Board. ICCTA broadly preempts state and local regulation of railroads, and this preemption extends to the construction and operation of rail lines. As such, activities within the UPRR ROW are exempt from local building and zoning codes and other land use ordinances. Project improvements outside of the UPRR ROW, however, would be subject to regional and local plans and regulations. Though ICCTA does broadly preempt state and local regulation of railroads, CCJPA intends to obtain local

agency permits for construction of facilities that fall outside the UPRR ROW even though CCJPA has not determined that such permits are legally necessary and such permits may not be required.

3.14.2.4 Local

The proposed Project traverses and is located in the jurisdictions of Alameda County and cities of Fremont, Newark, Union City, Hayward, San Leandro, and Oakland.

City of Fremont General Plan

The *City of Fremont General Plan Safety Element* (City of Fremont 2011) contains the following noise and vibration policies that are applicable to the proposed Project:

- **Policy 10-8.3: Noise Environment Protection.** Protect existing residential neighborhoods from noise. In general, the City will require the evaluation of mitigation measures for projects under the following circumstances:

    1. The project would cause the L_{dn} to increase by 5 dB(A) or more but would remain below 60 dB(A), or;

    2. The project would cause the L_{dn} to increase by 3 dB(A) or more and exceed 60 dB(A), or;

    3. The project has the potential to generate significant adverse community response due to the unusual character of the noise.

- **Policy 10-8.5: Construction Noise Levels.** Control construction noise at its source to maintain existing noise levels, and in no case to exceed the acceptable noise levels.

- **Policy 10 8.6: Sensitive Uses.** Protect schools, hospitals, libraries, places of religious worship, convalescent homes, and other noise sensitive uses from noise levels exceeding those allowed in residential areas.

- **Policy 10 8.10: Vibration Equipment.** A vibration environment which meets acceptable guidelines as provided by the Federal Transit Administration (FTA).

City of Hayward General Plan

The *2040 Hayward General Plan Hazards Element* (City of Hayward 2014) contains the following noise and vibration policies that are applicable to the proposed Project:

- **Goal HAZ-8.** Minimize human exposure to excessive noise and ground vibration.

    - **HAZ-8.1 Locating Noise Sensitive Uses.** The City shall strive to locate noise sensitive uses, (e.g., residences, schools, hospitals, libraries, religious institutions, and convalescent homes) away from major sources of noise.

    - **HAZ-8.12 Transportation Noise.** The City shall consider potential noise impacts when evaluating proposals for transportation projects, including road, freeway, and transit projects, and will strive to minimize noise impacts through the implementation of mitigation measures.

- **HAZ-8.21 Construction and Maintenance Noise Limits.** The City shall limit the hours of construction and maintenance activities to the less sensitive hours of the day (7:00am to 7:00pm Monday through Saturday and 10:00am to 6:00 pm on Sundays and holidays)
- **HAZ-8.22 Vibration Impact Assessment.** The City shall require a vibration impact assessment for proposed projects in which heavy-duty construction equipment would be used (e.g. pile driving, bulldozing) within 200 feet of an existing structure or sensitive receptor. If applicable, the City shall require all feasible mitigation measures to be implemented to ensure that no damage or disturbance to structures or sensitive receptors would occur.

City of Newark General Plan

The *City of Newark General Plan – Environmental Hazards* (City of Newark 2013) contains the following noise and vibration policies that are applicable to the proposed Project:

- **Goal EH-6.** Maintain the peace and quiet of Newark neighborhoods and promote an environment where noise does not adversely affect sensitive land uses.
  - **Policy EH-6.4. Railroad Noise.** Actively coordinate with Union Pacific, Caltrans, neighboring jurisdictions, and other transportation service providers during the planning and design of proposed rail-related projects so that noise impacts to the community are minimized and appropriate mitigation measures are provided.
  - **Policy EH-6.6. Construction Noise – Regulating Construction Hours.** Reduce noise associated with construction activities by prohibiting construction in residential neighborhoods between the hours of 7 PM and 7 AM Monday through Friday and at all times on Saturdays, Sundays, and State/federal holidays.
  - **Policy EH-6.7. Construction Noise – Addressing Sources of Construction Noise.** Reduce noise associated with construction activities by requiring properly maintained mufflers on construction vehicles, requiring the placement of stationary construction equipment as far as possible from developed areas, and requiring temporary acoustical barriers/ shielding to minimize construction noise impacts at adjacent receptors. Special attention should be paid to noise-sensitive receptors (including residential, hospital, school, and religious land uses).

City of Oakland General Plan

The City of Oakland General Plan – Noise Element (City of Oakland 2015) contains the following noise and vibration policies that are applicable to the proposed Project:

- **Policy 1.** Ensure the compatibility of existing and, especially, of proposed development projects not only with neighboring land uses but also with their surrounding noise environment.
- **Policy 2.** Protect the noise environment by controlling the generation of noise by both stationary and mobile noise sources.
- **Policy 3.** Reduce the community's exposure to noise by minimizing the noise levels that are received by Oakland residents and others in the City.

City of San Leandro General Plan

The *San Leandro 2035 General Plan – Environmental Hazards Element* (City of San Leandro 2016) contains the following noise and vibration policies that are applicable to the proposed Project:

- **Goal EH-7.** Ensure that noise associated with the day-to-day activities of San Leandro residents and businesses does not impede the peace and quiet of the community.
    - **Policy EH-7.4. Degradation of Ambient Noise Levels.** If a neighborhood is well within acceptable noise standards, do not automatically allow noise levels to degrade to the maximum tolerable levels shown in Chart 7-2. A project's noise impacts should be evaluated based on the potential for adverse community response, as well as its conformance to the adopted standards. For CEQA purposes, an increase of 3 dB Ldn should generally be considered a significant adverse impact.
    - **Policy EH-7.9. Vibration Impacts.** Limit the potential for vibration impacts from construction and ongoing operations to disturb sensitive uses such as housing and schools.
- **Goal EH-8.** Reduce the effects of surface transportation noise, including vehicular noise and noise associated with railroad and BART traffic.
    - **Policy EH-8.5. Train Noise.** Work with the appropriate parties and agencies to reduce or mitigate the noise and vibration from trains traveling through San Leandro.

City of Union City General Plan

The *Union City 2040 General Plan Safety Element* (City of Union City 2019) provides the long-term vision for the physical, economic, and social evolution in Union City and outlines the policies, standards, and programs to guide city development decisions. The following goals and policies are relevant to the proposed Project:

- **Policy S-8.1: Noise Sensitive Land Uses.** The City shall consider the following land uses to be "noise sensitive":
    1. single- and multi-family residential;
    2. group homes;
    3. hospitals and other medical facilities;
    4. schools and other learning institutions;
    5. libraries; and
    6. similar uses as may be determined by the City.
- **Policy S-8.7: Reduce Impacts from New Noise Generating Uses.** The city may require operational limitations and implementation of noise buffering measures for new uses with the potential to generate significant noise (including, but not limited to, industrial uses, auditoriums, concert halls, amphitheaters, sports arenas, outdoor spectator sports fields, and outdoor spectator sports) near existing noise sensitive land uses as identified in Policy S-8.1. A noise impact analysis may be required to evaluate potential noise impacts and identify appropriate buffering measures.

- **Policy S-8.8: Limit Construction Hours.** To minimize the potential noise impacts of construction activities on surrounding land uses, the City shall limit construction activities between the hours of 8:00 a.m. and 8:00 p.m. on Monday through Friday, 9:00 a.m. and 8:00 p.m. on Saturdays, and 10:00 a.m. and 6:00 p.m. on Sundays and holidays. The City Manager may make specific exceptions to the construction hours when utility work in the streets would have a severely negative impact on traffic flow and public safety.
- **Policy S-8.9: Construction Noise Control Measures.** The City shall include the following noise control measures as standard conditions of approval for projects involving construction:

    1. Properly muffle and maintain all construction equipment powered by internal combustion engines.
    2. Prohibit unnecessary idling of combustion engines.
    3. Locate all stationary noise-generating construction equipment such as air compressors as far as practical from existing nearby residences and other noise-sensitive land uses. Such equipment shall also be acoustically shielded.
    4. Select quiet construction equipment particularly air compressors, whenever possible. Fit motorized equipment with proper mufflers in good working order.
    5. Residences adjacent to project sites shall be notified in advance in writing of the proposed construction schedule before construction activities commence. The construction schedule shall comply with Policy S-8.8.
    6. The project applicant shall designate a "noise disturbance coordinator" responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of any noise complaint (e.g., starting too early, bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. A telephone number for the disturbance coordinator shall be posted at the construction site.

- **Policy S-8.10: Construction Vibration Control Measures.** The City shall include the following measures as standard conditions of approval for applicable projects involving construction to minimize exposure to construction vibration:

    1. Avoid the use of vibratory rollers (i.e., compactors) within 50 feet of buildings that are susceptible to damage from vibration.
    2. Schedule construction activities with the highest potential to produce vibration to hours with the least potential to affect nearby institutional, educational, and office uses that the Federal Transit Administration identifies as sensitive to daytime vibration (FTA 2006).
    3. Notify neighbors of scheduled construction activities that would generate vibration.

Consistency with Plans, Policies, and Regulations

Section 15125(d) of the CEQA Guidelines requires an EIR to discuss "any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans." Applicable plans, policies, and regulations were considered during the preparation of this analysis and were reviewed to assess whether the proposed Project would be consistent with the plans of relevant jurisdictions. The proposed Project would be consistent with most of the applicable goals, policies,

and objectives related to noise and vibration identified in local planning documents. There are instances, however, in which the proposed Project could be inconsistent with the local goals, policies, and objectives related to noise and vibration. The noise and vibration impact and mitigation requirements prescribed for the proposed Project are based on FRA and FTA standards.

3.14.3 Methods for Evaluating Environmental Impacts

This section defines the RSA and describes the methods used to analyze noise and vibration impacts within the RSA.

Resource Study Area

As defined in Section 3.1, *Introduction*, RSAs are the geographic boundaries within which the environmental analyses specific to each resource topic were conducted. Noise-sensitive land use within the RSA was identified based on GIS data, aerial photography, drawings, plans, and a field survey. The RSA is displayed in Figure 3.14-4 and Figure 3.14-5 through Figure 3.14-7, from north to south. For the purposes of this analysis, the RSA for noise and vibration is defined as the area within approximately 500 feet of either side of the track centerline.

Data Sources

Noise Measurement Locations and Procedures

To document the existing noise conditions for the proposed Project, a series of noise measurements was conducted in July and August 2019 along the proposed routes. Figure 3.14-8 illustrates where noise measurements were taken within the RSA. These measurements were used to supplement previous measurements in the area conducted in August 2016 for the ACEforward Project. Because the thresholds for impact in the noise criteria are based on the existing noise levels, measuring the existing noise and characterizing noise levels at sensitive locations is an important step in the impact assessment. The noise measurements included both long-term (24-hour) and short-term (one-hour) monitoring of the A-weighted sound level at noise-sensitive land uses within the RSA.

The noise measurements were performed with NTi Audio model XL2 noise monitors that conform to American National Standard Institute (ANSI) standards for Type 1 (precision) sound measurement equipment. Calibrations, traceable to the National Institute of Standards and Technology (NIST) were conducted before and after each measurement. The noise monitors were set to continuously monitor and record multiple noise level metrics, as well as obtain audio recordings, where appropriate, during the measurement periods.

At each site, the measurement was conducted at the approximate set back of the building or buildings relative to the proposed Project alignment. The measurement microphones were protected with windscreens and positioned approximately 5 feet above the ground and at least 10 feet away from any major reflecting surface. There was little or no precipitation during the measurements and the winds were not above a speed where the measurements would be compromised.

Figure 3.14-4. Noise and Vibration Overview Figure

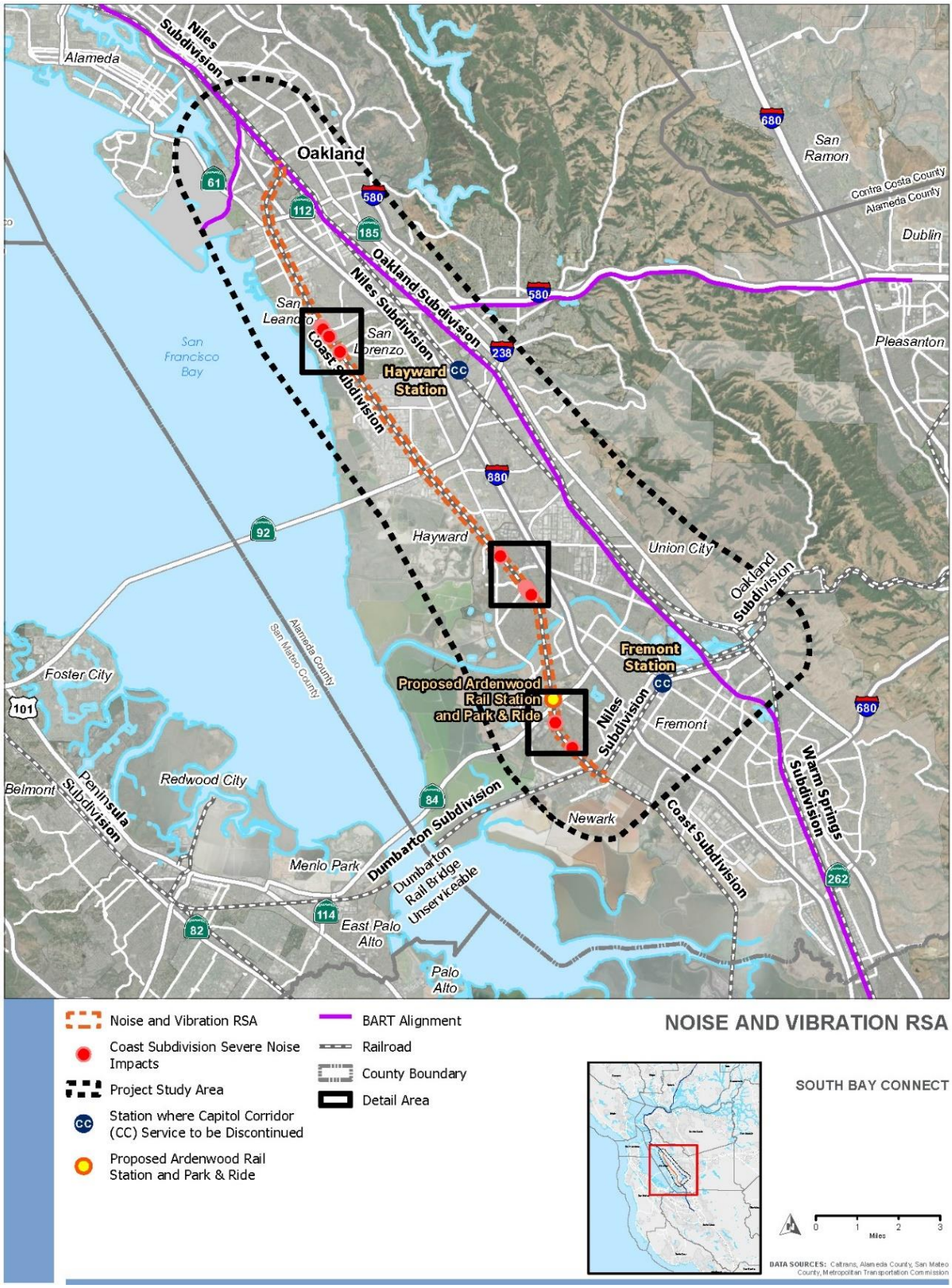


Figure 3.14-5. Communities with Severe Noise Concerns (Section 1)

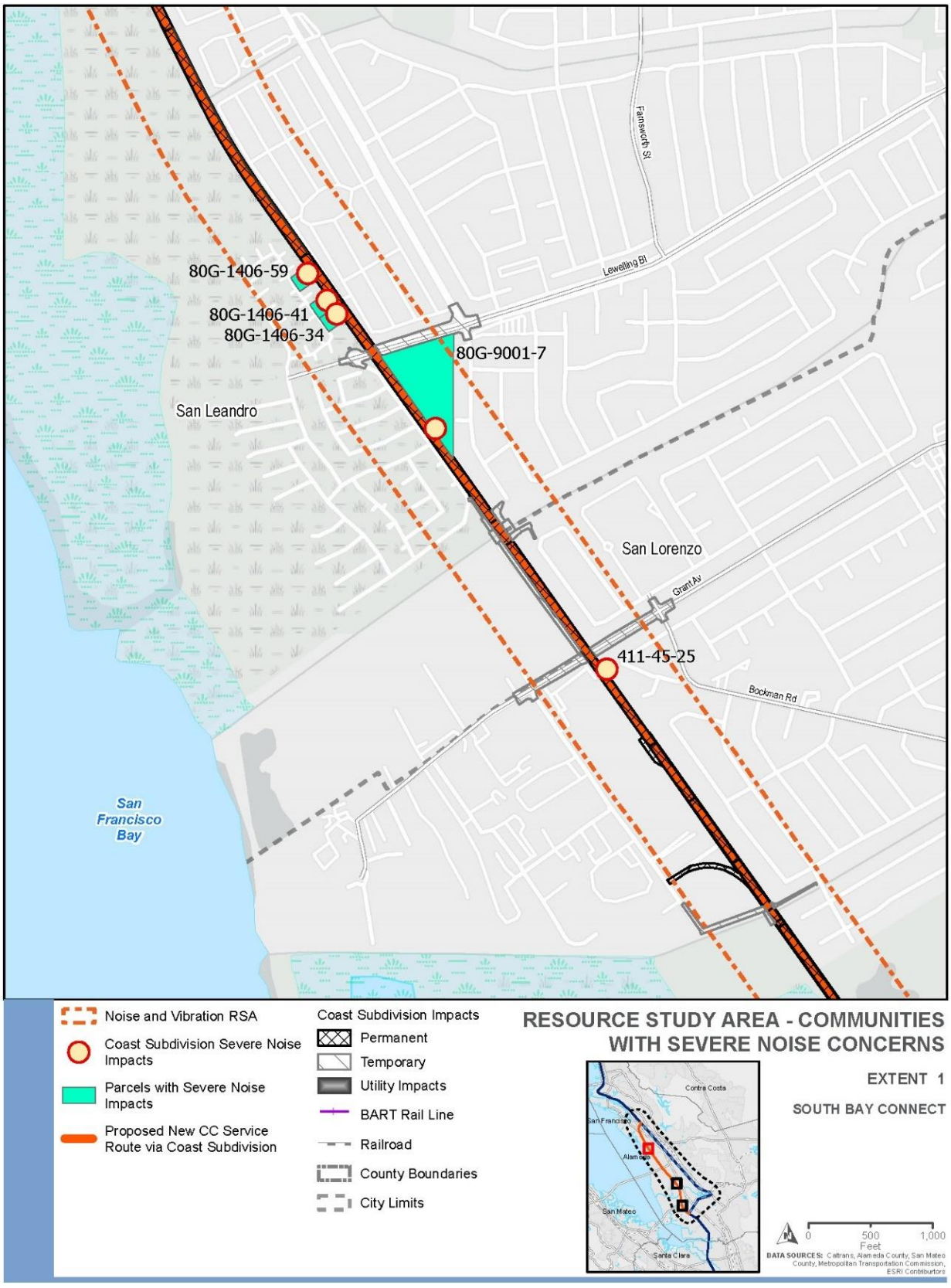


Figure 3.14-6. Communities with Severe Noise Concerns (Section 2)

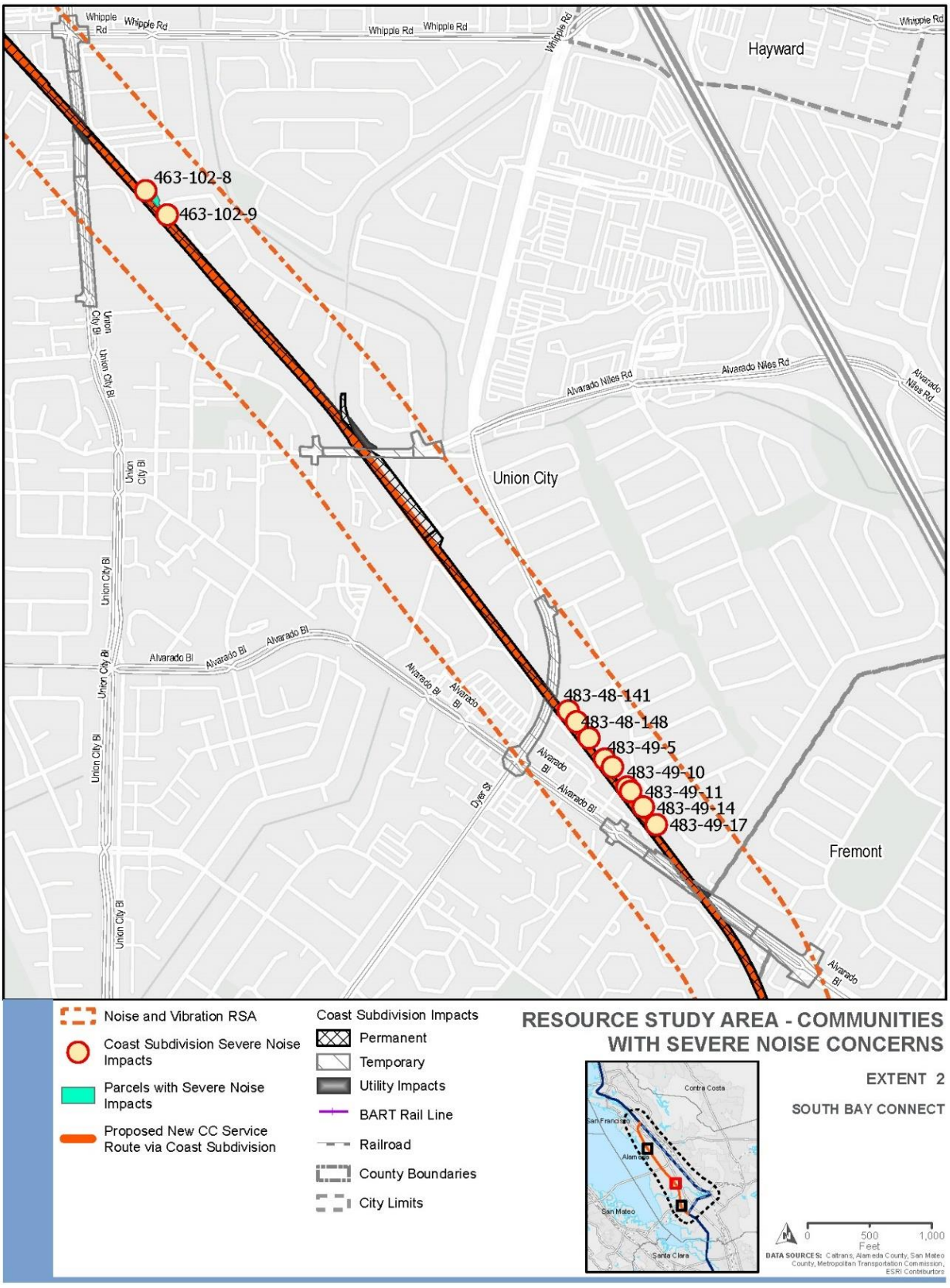


Figure 3.14-7. Communities with Severe Noise Concerns (Section 3)

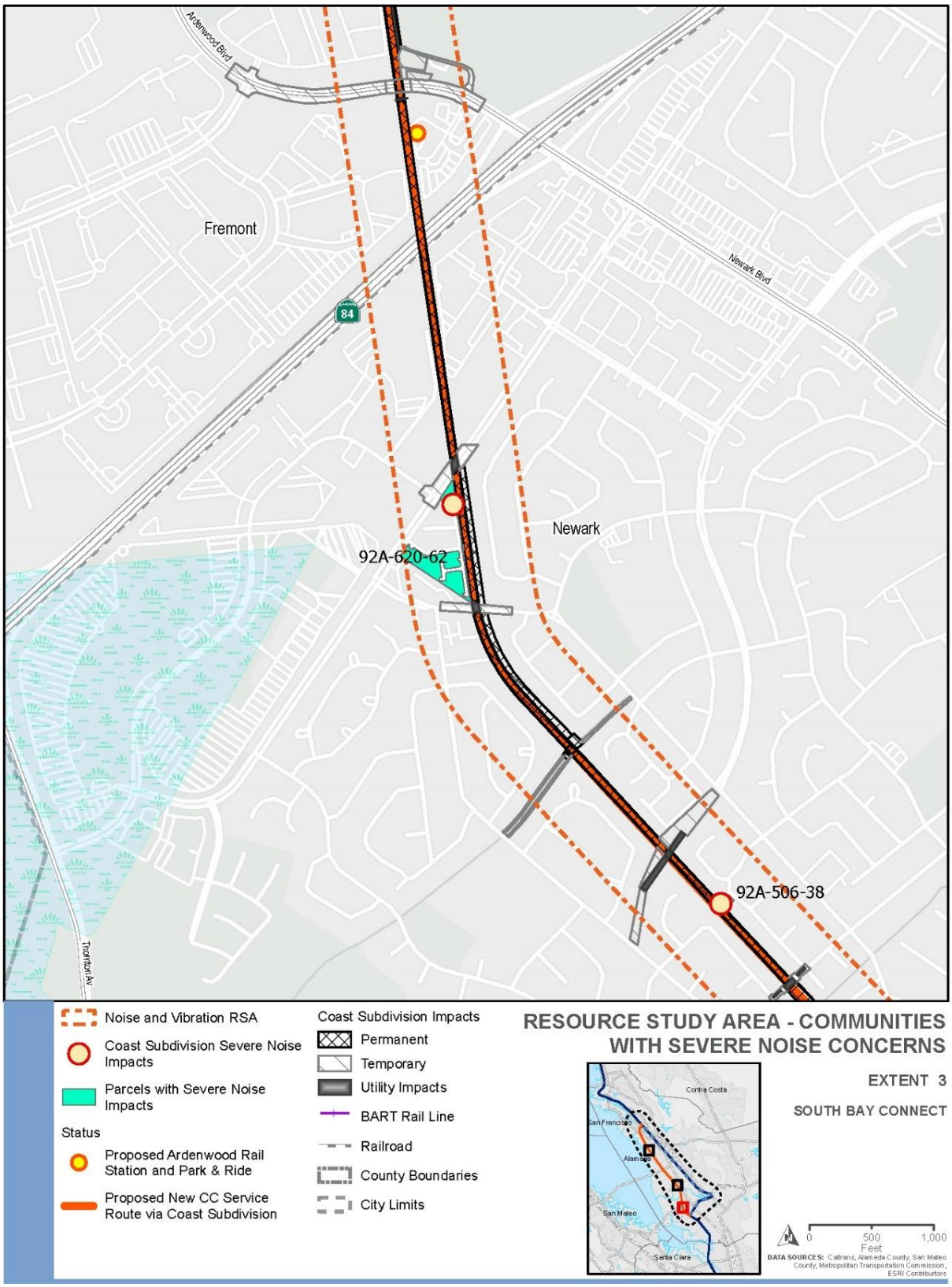
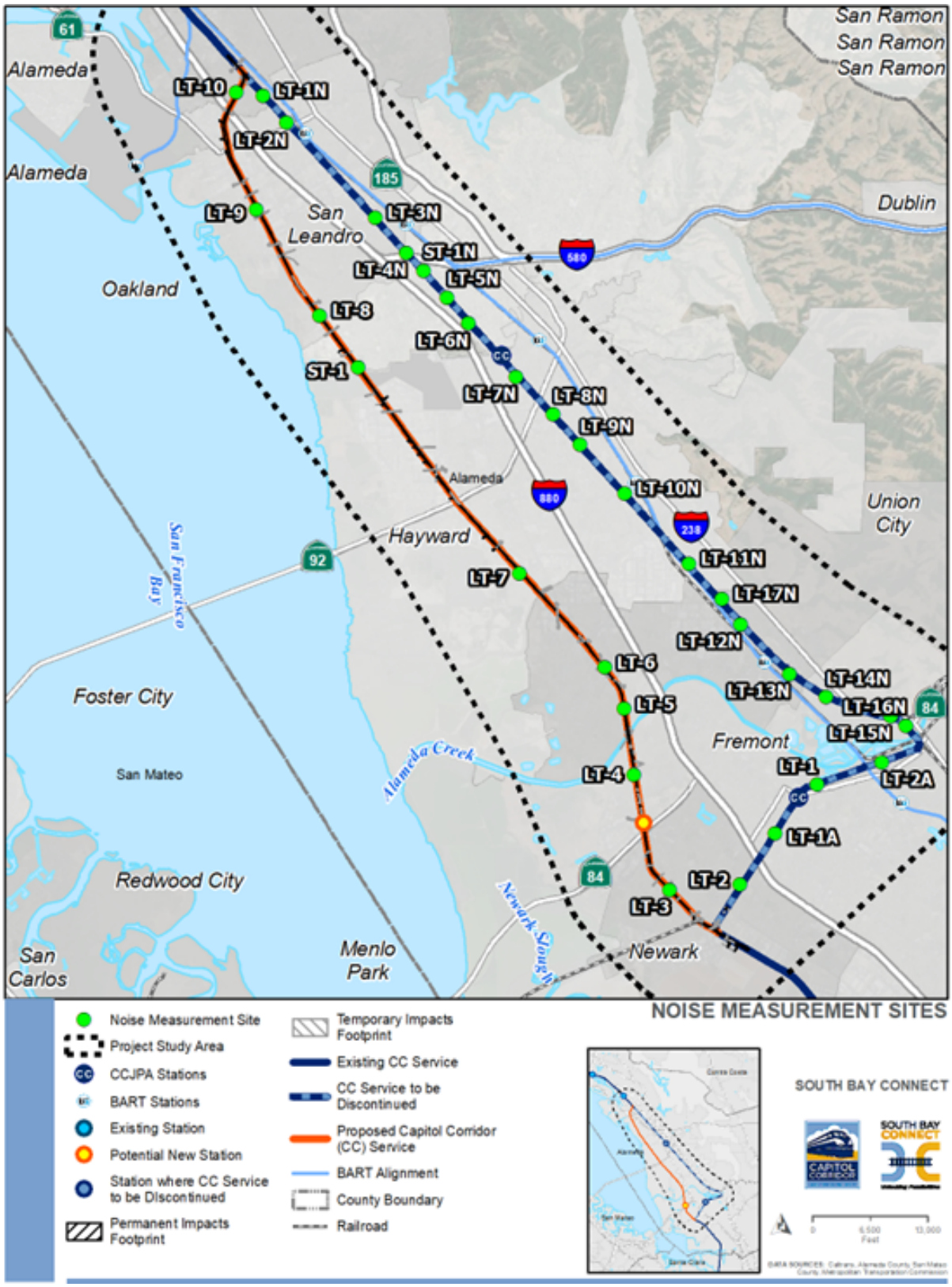


Figure 3.14-8. Noise Measurement Locations



Construction Noise Impact Assessment Methodology

Construction activities required for infrastructure improvements (such as sidings, additional main line track, wayside signals, drainage, grade-separation structures) and station facilities would result in short-term increases in noise in, and around, the construction sites of the proposed Project. Noise during construction would be generated by construction equipment and vehicles during soil disturbance, earthwork, and other construction activities. The noise that could be generated would vary depending on the length of the construction period, specific construction activity (e.g., grading, paving, pile driving), types of equipment, and number of personnel.

Although construction equipment may operate in many different areas as rail infrastructure and station improvements are constructed, the highest noise levels are expected at those sites where the duration and intensity of construction activities would be greatest. Construction may occur within areas containing sensitive noise receptors and could potentially generate noise that would affect these sensitive noise receptors. Construction at a given location would be intermittent and short term for the noise-sensitive receptors adjacent to construction sites. Construction noise would cease once the rail infrastructure or station improvement is complete.

Construction noise and impacts are assessed using a combination of the methods and construction source data contained in the FTA guidance manual and the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) from the FHWA Construction Noise Handbook (Final Report FHWA-HEP-06-015, August 2006). CCJPA, UPRR, and their contractors will make decisions regarding specific construction procedures and equipment that will be used for the Project. However, for this analysis, construction scenarios for typical railroad construction projects were used to predict noise impacts. The construction noise methodology includes the following information:

- Noise emissions from typical equipment used by contractors;
- Construction methods;
- Scenarios for equipment usage;
- Estimated site layouts of equipment along the ROW;
- Proximity of construction activities to nearby noise-sensitive receptors; and
- FTA construction noise assessment criteria.

The combination of noise from several pieces of equipment operating during the same time period was obtained from decibel addition of the L_{eq} of each single piece of equipment. Table 3.14-1 shows typical noise levels generated by representative pieces of equipment.

Table 3.14-1. Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source	Usage Factor, %
Air Compressor	80	40
Backhoe	80	40

Table 3.14-1. Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source	Usage Factor, %
Ballast Equalizer	82	50
Ballast Tamper	83	50
Compactor	82	20
Concrete Mixer	85	40
Concrete Pump	82	20
Crane, Derrick	88	16
Crane, Mobile	83	16
Dozer	85	16
Generator	82	50
Grader	85	40
Impact Wrench	85	50
Jack Hammer	88	20
Loader	80	40
Paver	85	50
Pile Driver (Impact)	101	20
Pile Driver (Vibratory)	95	20
Pneumatic Tool	85	50
Pump	77	50

Table 3.14-1. Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source	Usage Factor, %
Rail Saw	90	20
Rock Drill	85	20
Roller	85	20
Saw	76	20
Scarifier	83	20
Scraper	85	40
Shovel	82	40
Spike Driver	77	20
Tie Cutter	84	20
Tie Handler	80	20
Tie Inserter	85	20
Truck	84	40

Source: FTA, 2018 and FHWA, 2006

Construction Vibration Impact Assessment Methodology

The FTA Guidance Manual (FTA, 2018) also provides the methodology for the assessment of construction vibration impacts. Estimated construction scenarios have been developed for typical railroad construction projects allowing a quantitative construction vibration assessment to be conducted. Construction vibration is assessed quantitatively where the potential for blasting, pile driving, vibratory compaction, demolition, or excavation close to vibration-sensitive structures exists. The methodology included the following information:

- Vibration source levels from equipment used by contractors;
- Estimated site layouts of equipment along the ROW;
- Relationship of construction activities to nearby vibration-sensitive receptors; and

- FTA vibration impact criteria for annoyance and building damage.

Table 3.14-2 lists typical vibration levels generated by representative pieces of equipment.

Table 3.14-2. Construction Equipment Vibration Source Levels

Equipment	PPV 25 feet from source (in/sec)	Approximate L_V[1] at 25 feet from source
Pile Driver (impact) Upper Range	1.518	112
Pile Driver (impact) Typical	0.644	104
Pile Driver (vibratory) Upper Range	0.734	105
Pile Driver (vibratory) Typical	0.170	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall) In Soil	0.008	66
Hydromill (slurry wall) In Rock	0.017	75
Vibratory roller	0.210	94
Hoe ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Note: 1. RMS Velocity in decibels (VdB) re 1 micro-inch/second (L_V).
Source: FTA, 2018

Operational Noise Assessment Methodology

The primary components of wayside noise from train operations are locomotive horns, locomotive engine/exhaust noise, and wheel/rail noise from steel wheels rolling on steel rails. Secondary sources, such as vehicle air-conditioning and other ancillary equipment, will sometimes be audible, but are not expected to be significant factors. The projection of wayside noise from train operations was carried out using the commuter train model specified in the FTA Guidance Manual, with the following assumptions:

- Commuter trains as described in the FTA methodology are representative of CCJPA trains because CCJPA trains use the same locomotives and similar double-deck passenger cars typically found on commuter trains.
- Commuter trains would consist of one diesel locomotive and four rail cars.
- Commuter train diesel locomotives generate a sound exposure level (SEL) of 92 dBA, in accordance with FTA methodology (FTA, 2018).
- Commuter train locomotive horns generate an SEL of 103 dBA, based on measurements of ACE Commuter trains conducted for the ACEforward Project, in accordance with FTA methodology (FTA, 2018). It is assumed that the horns would begin to be sounded 20 seconds, but not more than ¼ mile, in advance of grade crossings in accordance with FRA regulations.
- Commuter rail cars generate an SEL of 82 dBA, in accordance with FTA methodology (FTA, 2018).
- Commuter train speeds were modeled at 79 mph on the Coast Subdivision.
- The schedule of commuter train operations is expected to include six trains in each direction during daytime hours (between 7:00 AM and 10:00 PM) and one train in each direction during nighttime hours (between 10:00 PM and 7:00 AM). This schedule corresponds to a total of 14 trains passing by a given location during a 24-hour weekday.
- Wheel impacts at crossovers and turnouts are assumed to cause localized noise increases of 5 dB at sensitive receiver locations up to 300 feet away.
- This assessment assumed that there would be no change in freight rail service frequency due to the implementation of the South Bay Connect Project on the Coast Subdivision.
- Freight trains would consist of an average of three diesel locomotives and 140 rail cars.
- Freight locomotives generate an SEL of 97 dBA, as specified in the FRA CREATE model (FRA, 2006).
- Freight locomotive horns generate an SEL of 113 dBA, in accordance with FTA methodology (FTA, 2018). It is assumed that the horns would begin to be sounded 20 seconds, but not more than 0.25 mile, in advance of grade crossings in accordance with FRA regulations.
- Freight rail cars generate an SEL of 85.4 dBA, as specified in the FRA CREATE model (FRA, 2006).
- Freight train speeds were modeled at 50 mph on the Coast Subdivision.

Operational Vibration Assessment Methodology

Because freight train events are much longer in duration than commuter rail or rail transit events, subdivisions with freight operations would be considered heavily used. The proposed Project is on the Coast Subdivision, which is in the heavily used category, either due to the proposed passenger rail (Capitol Corridor) service, existing Amtrak long-distance service, or the existing UPRR freight service. Additionally, at no location would the total number of trains double due to the proposed Project, so there would not be a significant increase (according to FTA vibration criteria) in the number of events per day. The vibration levels of the passenger rail trains and freight trains are similar, so the Project vibration levels would not be greater than the existing levels; therefore, at most locations, there would be no vibration impact due to the proposed Project, based on the criteria for existing train operations described in Section 6.4 of the *FTA Manual* (FTA, 2018). The vibration levels from trains are mostly dependent on the unsprung mass of the vehicle, rather than the overall weight of the vehicle. Locomotives and rail cars are assessed separately because this value is different for each. In the FTA guidance, freight and passenger locomotives are grouped together, and all rail cars are also grouped together with regards to vibration levels. Because the vibration source levels are the same for locomotives, regardless of whether they are freight or passenger, and the vibration source levels are the same for rail cars, the vibration levels will not increase over the existing vibration levels, with the introduction of the proposed Project. The only locations where there would be the potential for vibration impacts would be locations within 200 feet of new crossovers or turnouts associated with sidings proposed as a part of the Project. This is discussed further in Section 3.14.6.2.

FTA Noise and Vibration Impact Criteria

Construction Noise Impact Criteria

FTA has developed methods for evaluating construction noise levels (FTA, 2018). The FTA's *Transit Noise and Vibration Impact Assessment Manual* does not specify standard criteria for construction noise impacts (FTA, 2018). However, the manual does provide guidelines that can be considered reasonable criteria for assessment, which are shown in Table 3.14-3. According to the FTA (2018), exceeding these criteria may result in an adverse community reaction. The last column applies to construction activities that extend over 30 days near any given receiver. The L_{dn} is used to assess impacts in residential areas, and 24-hour L_{eq} is used in commercial and industrial areas. The 8-hour L_{eq} and the 30-day average L_{dn} noise exposure from construction noise calculations uses the noise emission levels of the construction equipment, their location, and operating hours. The construction noise limits are typically assessed at the noise-sensitive receiver property line.

Table 3.14-3. FTA Construction Noise Criteria

Land Use	Daytime 8-hour L_{eq} (dBA)	Nighttime 8-hour L_{eq} (dBA)	Noise Exposure 30-day Average (dBA)
Residential	80	70	75
Commercial	85	85	80

Table 3.14-3. FTA Construction Noise Criteria

Land Use	Daytime 8-hour L_{eq} (dBA)	Nighttime 8-hour L_{eq} (dBA)	Noise Exposure 30-day Average (dBA)
Industrial	90	90	85

Source: FTA, 2018

Operational Noise Criteria

The FTA operational noise impact criteria are based on well-documented research on community response to noise and are based on both the existing level of noise and the change in noise exposure due to a project. The FTA noise criteria compare the project with the existing noise (not the no-project noise). This is because comparison of a noise projection with an existing noise condition is more accurate than comparison of a projection with another noise projection. Because background noise may increase by the time the proposed Project is operational, this approach of using existing noise conditions is conservative.

The FTA noise criteria are based on the land use category of the sensitive receptor. The descriptors and criteria for assessing noise impact vary according to land use categories adjacent to the track. For Category 2 land uses where people live and sleep (e.g., residential neighborhoods, hospitals, and hotels), the L_{dn} is the assessment parameter. For other land use types (Category 1 or 3), where there are noise-sensitive uses (e.g., outdoor concert areas, schools, and libraries), the L_{eq} for an hour of noise sensitivity that coincides with train activity is the assessment parameter. Table 3.14-4 summarizes the three land use categories.

Table 3.14-4. Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Land Use Type	Noise Metric (dBA)	Policy Summary
1	High Sensitivity	Outdoor $L_{eq}(h)^*$	Land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and National Historic Landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.
2	Residential	Outdoor L_{dn}	This category is applicable to all residential land use and buildings where people normally sleep, such as hotels and hospitals.

Table 3.14-4. Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Land Use Type	Noise Metric (dBA)	Policy Summary
3	Institutional	Outdoor $L_{eq}(h)^*$	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and churches, where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also included in this category.

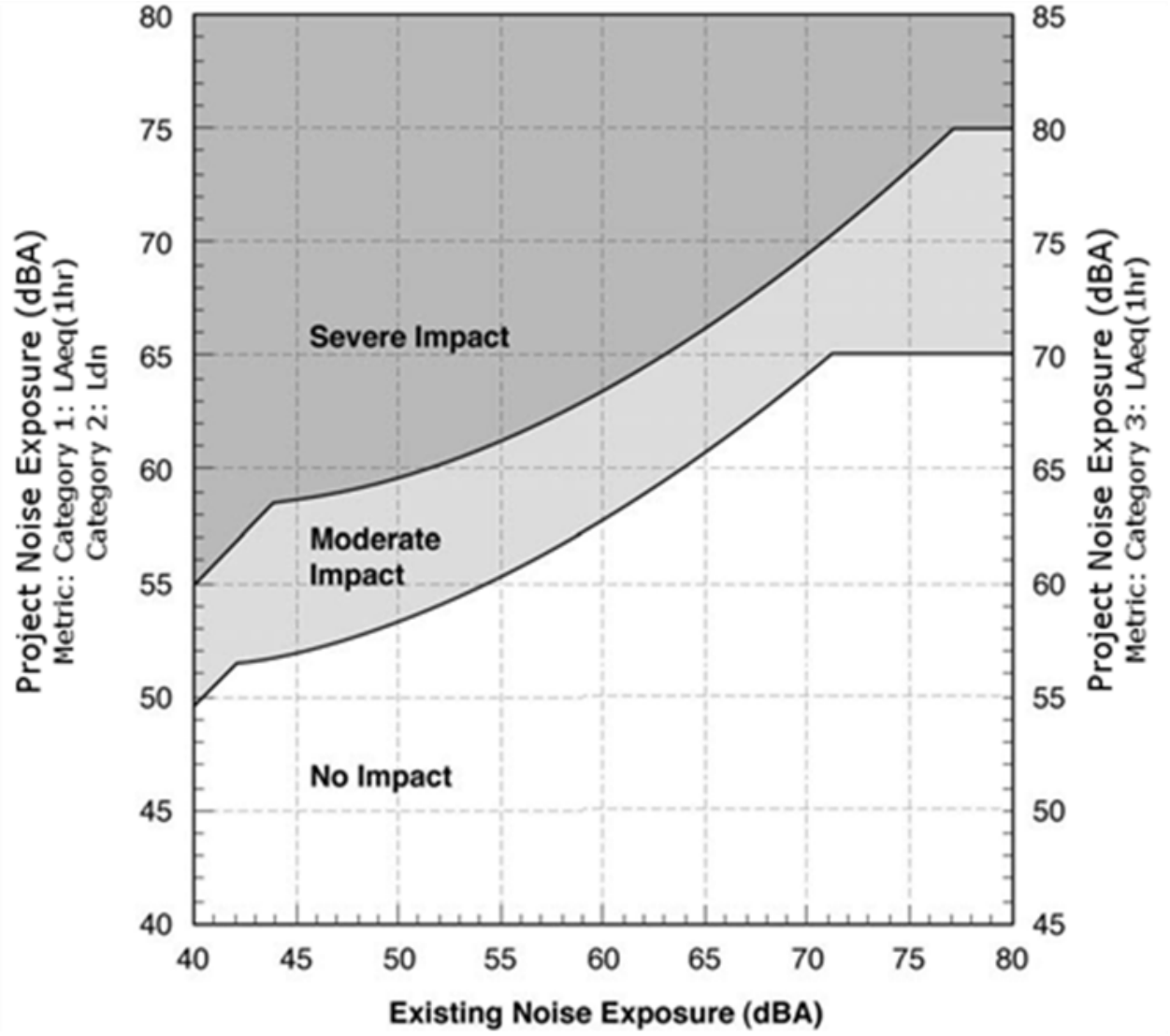
** L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity*
Source: FTA, 2018

The noise impact criteria are defined by the two curves shown in Figure 3.14-9, which allow increasing project noise as existing noise levels increase, up to a point at which impact is determined based on project noise alone. The FTA noise impact criteria include three levels of impact, as shown in Figure 3.14-9, which include:

- **No Impact:** Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable by FTA and mitigation is not required.
- **Moderate Impact:** Project-generated noise in this range is considered to cause impact at the threshold of measurable annoyance. Moderate impacts serve as an alert to project planners for potential adverse impacts and complaints from the community. Mitigation should be considered at this level of impact based on project specifics and details concerning the affected properties.
- **Severe Impact:** Project-generated noise in this range is likely to cause a high level of community annoyance. If it is not practical to avoid severe impacts by changing the location of the project, mitigation measures must be considered.

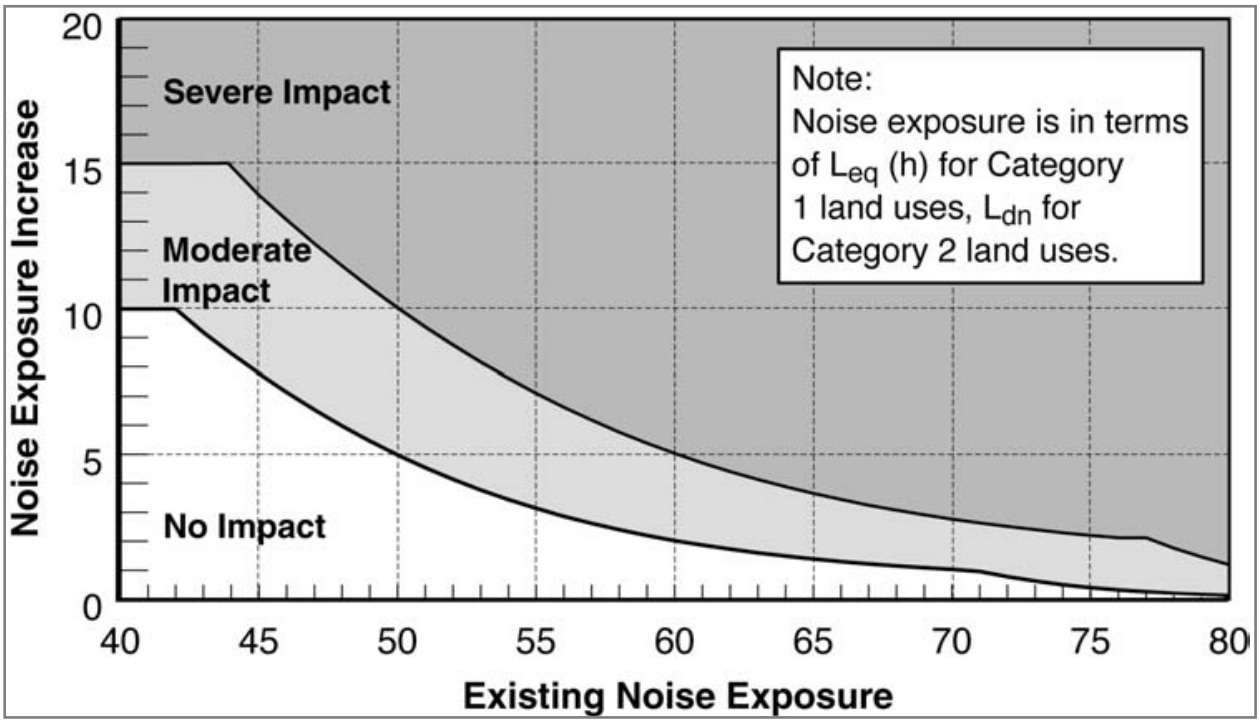
Although the curves in Figure 3.14-9 are defined in terms of the project noise exposure and the existing noise exposure, the increase in the cumulative noise—when project-generated noise is added to existing noise levels—is the basis for the criteria. To illustrate this point, Figure 3.14-10 shows the noise impact criteria for Category 1 and Category 2 land uses in terms of the allowable increase in the cumulative noise exposure. Because L_{dn} and L_{eq} are measures of total acoustic energy, any new noise source in a community will cause an increase, even if the new source level is lower than the existing level. In Figure 3.14-10, the criterion for a moderate impact allows a noise exposure increase of 10 dB if the existing noise exposure is 42 dBA or less, but only a 1 dB increase when the existing noise exposure is 70 dBA.

Figure 3.14-9. FTA Noise Impact Criteria



Source: FTA, 2018

Figure 3.14-10. FTA Cumulative Noise Impact Criteria



Source: FTA, 2018

Construction Vibration Impact Criteria

In addition to the vibration criteria for human annoyance and interference with equipment and spaces described in this section, there are also vibration criteria for damage from construction activities. Typical transit operations do not have the potential to cause damage, so only certain construction activities, such as pile driving, are assessed for damage to structures. In most cases, damage is limited to superficial effects, such as cracks in plaster walls. Structural damage typically does not occur from construction vibration.

The thresholds for damage to structures are typically several orders of magnitude above the thresholds for human response to vibration. Table 3.14-5 shows the FTA's criteria for vibration damage to structures (FTA, 2018). This is based on the structure and construction type, rather than whether is designated as historic building. Table 3.14-5 includes criteria in both VdB and PPV.

Table 3.14-5. FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate RMS Velocity (VdB re: 1 micro-inch/sec)
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98

Table 3.14-5. FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate RMS Velocity (VdB re: 1 micro-inch/sec)
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: FTA, 2018

Operational Vibration Impact Criteria

The operational vibration impact criteria are based on the information contained in Section 6 of the *FTA Transit Noise and Vibration Impact Assessment Manual* (2018). The criteria for a general vibration assessment are based on land use and train frequency, as shown in Table 3.14-6. Some buildings, such as concert halls, recording studios and theaters, can have a higher sensitivity to vibration (or ground-borne noise) but do not fit into the three categories listed in Table 3.14-6; there are none of these higher sensitivity structures in the proposed Project footprint.

Table 3.14-6 includes additional criteria for ground-borne noise. Ground-borne noise is defined in terms of dBA, which emphasizes middle and high frequencies, which are more audible to human ears. The criteria for ground-borne noise are much lower than for airborne noise to account for the low-frequency character of ground-borne noise. However, because airborne noise typically masks ground-borne noise for above ground (at-grade or elevated) transit systems, ground-borne noise is only assessed for operations in tunnels, where airborne noise is not a factor, or at locations such as recording studios, which are well insulated from airborne noise.

Table 3.14-6. Ground-Borne Vibration and Noise Impact Criteria for General Assessment

Land Use Category	PPV (in/sec)			Approximate RMS Velocity (VdB re: 1 micro-inch/sec)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65[4]	65[4]	65[4]	N/A[5]	N/A[5]	N/A[5]

Table 3.14-6. Ground-Borne Vibration and Noise Impact Criteria for General Assessment

Land Use Category	PPV (in/sec)			Approximate RMS Velocity (VdB re: 1 micro-inch/sec)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 2: Residences and buildings where people normally sleep.	72	75	80	35	38	43
Category 3: Institutional land uses with primarily daytime use.	75	78	83	40	43	48

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

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

5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

Source: FTA, 2018

One factor not incorporated in the vibration criteria is existing vibration. In most cases, except near railroad tracks, the existing environment does not include a substantial number of perceptible ground-borne vibration or noise events. The criteria presented in Table 3.14-6 do not indicate how to account for existing vibration, a common situation for rail projects using existing rail ROWs. Representative scenarios for existing vibrations can be assessed using the following methods:

- **Infrequently used rail route:** Use the vibration criteria from Table 3.14-6 when the existing rail traffic consists of four trains or fewer per day.
- **Moderately used rail route:** If the existing rail traffic consists of 5 to 12 trains per day with vibration that substantially exceeds the impact criteria, there would be no effect as long as the project vibration levels are at least 5 VdB less than the existing vibration. Vibration from existing trains can be estimated using the General Assessment procedures in Section 6.4 of the *FTA Manual* (FTA, 2018).

  Heavily used rail route: If the existing traffic exceeds 12 trains per day and if the project would not substantially increase the number of vibration events (less than doubling the number of trains is usually considered not substantial), there would be no additional effect unless the project vibration, estimated using the procedures of Section 6.4 of the *FTA Manual*, would be higher than the existing vibration (FTA, 2018). In locations where the new trains would be

operating at higher speeds than the existing rail traffic, the trains would likely generate substantially higher levels of ground-borne vibration. When the project would cause vibration more than 5 VdB greater than the existing source, the existing source can be ignored and the vibration criteria in Table 3.14-6 can be applied to the Project.

CEQA Thresholds

To satisfy CEQA requirements, noise and vibration impacts were analyzed in accordance with Appendix G of the CEQA Guidelines. According to the CEQA Guidelines, CCR, Title 14, Section 15002(g), "a significant effect on the environment is defined as a substantial adverse change in the physical conditions which exist in the area affected by the proposed project." As stated in CEQA Guidelines Section 15064(b)(1), the significance of an activity may vary with the setting. The impact analysis identifies and analyzes construction (short-term) and operation (long-term) impacts, as well as direct and indirect impacts (see PRC Section 21065). The proposed Project would have significant noise and vibration impacts under CEQA if it would:

a. Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

b. Generate of excessive ground-borne vibration or ground-borne noise levels; or

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

For purposes of this analysis, an impact would be considered significant if construction or operation of the proposed Project would have any of the following consequences:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of severe impact standards for a severe impact established by FTA for transit projects and other changes related to the project. These standards cover both substantial permanent and substantial temporary/periodic increases in ambient noise levels in the vicinity of the project above levels existing without the project.
- Generation of excessive ground-borne vibration or ground-borne noise levels.
- For areas near airports, the FTA severe impact threshold would also apply to generation of excessive noise levels.

3.14.4 Affected Environment

3.14.4.1 Environmental Setting

Existing Noise Sensitive Land Use Conditions

The rail corridor crosses through areas containing noise-sensitive land uses including residential, schools, daycare centers, parks, and places of worship. Table 3.14-7 provides a summary of noise sensitive land uses within the Coast Subdivision.

Table 3.14-7. Coast Subdivision Noise-Sensitive Land Uses

Location	Land Use Summary
Newark Junction to Jarvis Avenue	The noise-sensitive land use between Newark Junction and Jarvis Avenue along the Coast Subdivision is mostly single-family and multifamily residences. In addition to these land uses, noise-sensitive land uses include the Church of Jesus Christ of Latter-day Saints, Watkins Hall, Newark Community Church, Newark Christian Center and School, and Newark Senior Center.
Jarvis Avenue to Ardenwood Boulevard	The land use between Jarvis Avenue and Ardenwood Boulevard along the Coast Subdivision is mostly commercial. The noise-sensitive land use includes Sankata Mochana Hanuman Temple, Green Grass Edu, Shree Swaminarayan Hindu Temple, Home of Christ Church, and Challenger School – Ardenwood.
Ardenwood Boulevard to Alvarado Boulevard	The land use between Ardenwood Boulevard and Alvarado Boulevard along the Coast Subdivision is residential. The noise-sensitive land use is mostly single-family and multifamily residential and includes Adventure Montessori Academy, Cavalry Bible Chapel, and Alvarado KinderCare – Preschool.
Alvarado Boulevard to Arden Road	The land use between Alvarado Boulevard and Arden Road is a mixture of industrial, commercial, and residential. The noise-sensitive land use includes Kaiser Permanente Medical Center, Sociedade Divino Espirito Santo – Union City, Alvarado Park, Union City Historical Museum, New Covenant Evangelistic Center, Alvarado Elementary School, Alvarado Middle School, Adventure Montessori Academy, Safari Kid – Preschool and Daycare, and single-family and multifamily residences.
Arden Road to Skywest Golf Course	The land use between Arden Road and Skywest Golf Course is a mixture of commercial and industrial. There are no noise-sensitive land uses in this area.
Skywest Golf Course to Farallon Drive	The land use between Skywest Golf Course and Farallon Drive is mostly residential. The noise-sensitive land use includes the San Leandro Marina Community Center, Kipp King Collegiate High School, Bay Elementary School, San Lorenzo Park – Lake Walkway, and single-family and multifamily residences.
Farallon Drive to Davis Street	The land use between Farallon Drive and Davis Street is a mixture of commercial, industrial, and residential. The noise-sensitive land use includes Our Future Tots Daycare, Faith Chapel Church of God – East Bay, and single-family and multifamily residences.

Table 3.14-7. Coast Subdivision Noise-Sensitive Land Uses

Location	Land Use Summary
Davis Street to 98th Avenue	The land use between Davis Street and 98th Avenue is a mixture of commercial, industrial, and residential. The noise-sensitive land use includes Victory Baptist Church, Tabernacle Missionary Baptist Church, Iglesia Pentecostal Manantial de Vida, Oakland Cambodian Temple, SUM Bible College and Theological Seminary, King Pan Buddha Light Palace, Aspire Lionel Wilson Preparatory Academy, Community Reformed Church, and single-family and multifamily residences.

Existing Noise Conditions

Table 3.14-8 summarizes the results of the existing noise measurement program and Figure 3.14-8 shows the 28 long-term (LT) locations and 1 short-term (ST) location for the Project. The results of the existing noise measurements were used to characterize the existing noise levels at all noise-sensitive locations within the RSA. The measured noise levels ranged from 53 to 77 dBA Ldn, depending on the proximity of the receptor to the existing tracks.

Existing Vibration Conditions

Significant sources of vibration currently exist in the RSA including freight rail and Amtrak passenger rail service.

Because a general vibration assessment (rather than a detailed vibration analysis) was performed, existing vibration levels were not measured as a part of this assessment. A detailed vibration assessment is typically only conducted for new transit projects where either extensive vibration mitigation would be required, or where there are highly sensitive receptors near the proposed alignment. Because the vibration levels aren't changing at most locations, due to the existing train traffic, a detailed assessment is not required.

3.14.5 Best Management Practices

As noted in Chapter 2, Project Alternatives, CCJPA would incorporate a range of BMPs to avoid and minimize adverse effects on the environment that could result from implementation of the proposed Project. BMPs are included in the proposed Project description, and the impact analyses were conducted assuming application of these practices.

No BMPs for noise and vibration are included in the proposed Project.

Table 3.14-8. Existing Noise Level Measurements in the RSA

Site No.	City	Measurement Location	Measurement Start	Measurement Duration (hours)	L_{eq} Noise Level (dBA)[1]	L_{dn} Noise Level (dBA)[1]	Notes
LT-3	Newark	36329 Colbert Place	2019-07-29 (16:00:00)	24	50	56	The dominant noise source was rail traffic. Noise levels were measured for 24 hours in the backyard of the residence.
LT-4	Fremont	5364 Matthew Terrace	2019-07-30 (15:14:00)	24	50	55	The dominant noise sources were traffic on Paseo Padre Parkway and rail traffic. Noise levels were measured for 24 hours in the backyard of the residence.
LT-5	Union City	4301 Sedge Street	2019-07-31 (15:00:00)	24	48	61	The dominant noise sources were rail traffic and neighborhood noises. Noise levels were measured for 24 hours in the backyard of the residence.
LT-6	Union City	31357 San Bruno Court	2019-07-30 (16:00:00)	24	51	65	The dominant noise sources were rail traffic and traffic on Dyer Street. Noise levels were measured for 24 hours in the backyard of the residence.

Table 3.14-8. Existing Noise Level Measurements in the RSA

Site No.	City	Measurement Location	Measurement Start	Measurement Duration (hours)	L_{eq} Noise Level (dBA)[1]	L_{dn} Noise Level (dBA)[1]	Notes
LT-7	Hayward	2751 Shellgate Circle	2019-07-31 (13:00:00)	24	50	56	The dominant noise sources were train traffic and aircraft. Noise levels were measured for 24 hours in the backyard of the residence.
LT-8	San Leandro	15649 Wicks Boulevard	2019-07-31 (11:00:00)	24	50	64	The dominant noise sources were train traffic and aircraft. Noise levels were measured for 24 hours in the backyard of the residence.
LT-9	San Leandro	13517 Menlo Street	2019-07-30 (11:00:00)	24	47	68	The dominant noise source was train traffic. Noise levels were measured for 24 hours in the backyard of the residence.
LT-10	Oakland	444 Douglas Avenue	2019-07-30 (11:00:00)	24	49	65	The dominant noise sources were rail traffic and traffic on Interstate 880. Noise levels were measured for 24 hours in the backyard of the residence.
ST-1	San Lorenzo	San Lorenzo Community Center Park	2019-07-30 (17:00:00)	1	55	53	The dominant noise source was aircraft. Noise levels were measured for an hour on the western side of the lake.

Table 3.14-8. Existing Noise Level Measurements in the RSA

Site No.	City	Measurement Location	Measurement Start	Measurement Duration (hours)	L_{eq} Noise Level (dBA)[1]	L_{dn} Noise Level (dBA)[1]	Notes
LT-3	Newark	36329 Colbert Place	2019-07-29 (16:00:00)	24	50	56	The dominant noise source was rail traffic. Noise levels were measured for 24 hours in the backyard of the residence.

Notes:
1. L_{dn} is used for Category 2 (residential) land use and L_{eq} is used for Category 3 (institutional) land use.
LT-# = longer-term noise sites
ST-# = short-term noise sites
No. = number
hrs. = hours
dBA = A-weighted decibels
L_{eq} = equivalent sound level
L_{dn} = day-night sound level
Meas. Dur. = measurement duration
Source: CSA, 2019

3.14.6 Environmental Impacts

This section describes the potential environmental impacts related to noise as a result of implementation of the proposed Project. Lettering shown within the title for each environmental factor below correlates with CEQA Statute and Guidelines, Appendix G table lettering and numbering.

3.14.6.1 (a) Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

No Project Alternative

No Impact. Under the No Project Alternative, the Capitol Corridor passenger rail service between Oakland and San Jose would not be relocated from the Niles Subdivision to the Coast Subdivision. Improvements proposed for the Niles and Coast Subdivisions associated with the proposed Project would not occur. Capitol Corridor passenger trains would continue to operate based on current routes with no changes. There would be no changes to rail connectivity or operational efficiency. Therefore, the No Project Alternative would not result in direct impacts or changes to existing noise levels within the RSA.

Proposed Project

Construction

Less than Significant Impact with Mitigation Incorporated. Construction of track improvements would include three basic activities: (1) site work, (2) rail work, and (3) structures work. Because most track improvements are located on an active rail line, some construction work is anticipated to occur during the nighttime. The local noise ordinances for the cities and County along the rail corridor generally limit construction noise to particular time periods during weekday, weekend, and holiday daytime hours, with nighttime construction work generally prohibited. However, some jurisdictions allow for a noise variance.

Table 3.14-9 summarizes typical estimated construction noise levels and noise impact screening distances for each of the planned construction activities (e.g., site work, rail work, and structures work). The noise estimates are based on scenarios for the construction activities, using the FTA methodology and criteria described in Section 3.14.3, Methods for Evaluating Environmental Impacts. For purposes of this analysis, the screening distance estimates did not assume any topography or ground effects.

Table 3.14-9. Noise Impact Assessment for Construction Activities

Construction Activity and Equipment	Noise Level at 50 feet (dBA)	Equipment Usage Factor (%)	8-Hour L_{eq} at 50 feet (dBA) Predicted Exposure	8-Hour L_{eq} at 50 feet (dBA) Daytime Criterion	Approx. Noise Impact Distance (feet)
Site Work	—	—	89	80	135
Grader	85	53	82	—	—
Water Truck	84	44	80	—	—
D6 Dozer	85	61	83	—	—
D8 Dozer	85	45	82	—	—
Compactor	82	45	79	—	—
Dump Truck	84	23	78	—	—
Rail Work	—	—	90	80	150
Locomotive	88	25	82	—	—
D6 Dozer	85	38	81	—	—
Grader	85	38	81	—	—
Water Truck	84	38	80	—	—
Tamper	83	20	76	—	—
Regulator	85	20	78	—	—
Swinger	85	19	78	—	—
Welder	74	38	70	—	—
Flat Bed Truck	84	31	79	—	—
Pickup Truck	75	25	69	—	—

Table 3.14-9. Noise Impact Assessment for Construction Activities

Construction Activity and Equipment	Noise Level at 50 feet (dBA)	Equipment Usage Factor (%)	8-Hour L_{eq} at 50 feet (dBA) Predicted Exposure	8-Hour L_{eq} at 50 feet (dBA) Daytime Criterion	Approx. Noise Impact Distance (feet)
Sports Utility Vehicle	75	31	70	—	—
35-Ton Rough Terrain Crane	83	38	79	—	—
Flat Bed Tractor	84	13	75	—	—
Wheel Loader	80	28	74	—	—
Structures Work	—	—	95	80	270
Impact Pile Driver	101	20	94	—	—
Generator	82	90	82	—	—
75-Ton Mobile Crane	83	38	79	—	—
Water Truck	84	20	77	—	—
Flat Bed Truck	84	25	78	—	—
Pickup Truck	75	53	72	—	—
Concrete Mixer	85	13	76	—	—
Concrete Pump	82	18	75	—	—
Wheel Loader	80	20	73	—	—
Welder	74	31	69	—	—

L_{eq} = equivalent sound level
dBA = A-weighted decibel

The results of the analysis indicate that noise impacts would be limited to residences located within 135 to 270 feet from the construction site, depending on the activity. The potential for noise impacts would be greatest during structures work at locations where pile driving is required for bridge construction. Construction activities would be considered to have a potentially significant impact if the activity generates noise levels in excess of the FTA thresholds.

There are multiple areas along the rail corridor where construction activities would generate noise levels in excess of FTA thresholds at adjacent residential receptors. This is a significant impact that would require mitigation.

Mitigation Measure NOI-1: Construction Noise Control Plan requires the preparation and implementation of a construction noise control plan to reduce the impacts of construction noise on nearby noise-sensitive receptors that could be exposed to noise in excess of FTA thresholds. Certain construction noise abatement measures, such as a temporary noise barrier may be effective in certain locations. With implementation of MM NOI-1 construction noise impacts associated with the proposed Project would be reduced to a less than significant level.

Operation

Less than Significant Impact with Mitigation Incorporated. As summarized in Table 3.14-10, implementation of the proposed Project would result in moderate noise impacts to 451 Category 2 noise receptors and severe noise impacts to 21 Category 2 noise receptors.

Category 2 noise receptors, consisting of single-family and multifamily residences, are located adjacent to the existing railroad ROW along the Coast Subdivision. Moderate noise impacts are projected to occur at these noise receptors due to the proximity to the existing rail corridor as well as the continuation of railroad horn use in the area. Although the Project would generate noise during operation, at the majority of these receptors, Project noise levels would be lower than or equal to existing noise levels in area but would still exceed the FTA moderate impact criteria.

Twenty-one (21) Category 2 noise receptor locations are projected to experience a severe noise impact during operation of the proposed Project. These include the following:

- **Coast Subdivision North Section:** Three residences (located on the southwest side of the existing railroad ROW between Farallon Drive and Lewelling Boulevard) would experience a Project noise level of 66 dBA. This is higher than the existing noise level of 64 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.
- **Coast Subdivision North Section:** One residence (located on the northeast side of the existing railroad ROW between Lewelling Boulevard and Grant Avenue) would experience a Project noise level of 66 dBA. This is higher than the existing noise level of 64 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.
- **Coast Subdivision Central Section:** One residence (located on the northeast side of the existing railroad ROW between Grant Avenue and Skywest Golf Course) would experience a Project noise level of 66 dBA. This is higher than the existing noise level of 64 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.
- **Coast Subdivision Central Section:** Two residences (located on the northeast side of the existing railroad ROW between Union City Boulevard and Smith Street) would experience a

Project noise level of 67 dBA. This is higher than the existing noise level of 65 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.

- **Coast Subdivision South Section:** Nine residences (located on the northeast side of the existing railroad ROW between Smith Street and Alameda Creek) would experience a Project noise level of 68 dBA. This is higher than the existing noise level of 65 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.
- **Coast Subdivision South Section:** Four residences (located on the southwest side of the existing railroad ROW between Jarvis Avenue and Cedar Boulevard Park) would experience a Project noise level of 67 dBA. This is higher than the existing noise level of 65 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.
- **Coast Subdivision South Section:** One residence (located on the northeast side of the existing railroad ROW between Cedar Boulevard Park and Clark Avenue) would experience a Project noise level of 67 dBA. This is higher than the existing noise level of 65 dBA and exceeds the FTA severe impact criteria of 66 dBA assigned to this location.

All of the severe impacts identified at these locations are due to either the sounding of horns at at-grade crossings on the Coast Subdivision or the introduction or relocation of crossovers for the Project on the Coast Subdivision. Although noise increases at these locations would be within a 3 dBA increase, the resulting noise level with Project implementation would meet or exceed the FTA severe noise impact criteria assigned with mitigation required. Implementation of **Mitigation Measures NOI-2: Creation of Noise Quiet Zone**, which requires the creation of quiet zones at identified grade crossings or implementation of building sound insulation, would reduce impacts to a less than significant level.

The majority of the rail corridor under the proposed Project passes through highly developed urban and suburban areas, including many areas with adjacent sensitive land uses, such as residences (Category 2), churches (Category 3), schools (Category 3), and other institutional uses (Category 3). The rail corridor also extends through many commercial and industrial areas, which are generally not noise sensitive unless they are associated with areas of frequent outdoor use. No Category 1 land uses were identified within the rail corridor.

Attachment A of Appendix G provides operational noise impact calculations for Category 2 and Category 3 land uses for the RSA, from north to south. The noise impact calculation tables in Appendix G provide the existing noise levels, the projected noise levels from the Project at FTA Category 2 (residential) and Category 3 (institutional) receptors, FTA noise impact criteria, and an inventory of the moderate and severe noise impacts for the Project. The locations of the noise impacts within the RSA are also provided in Attachment B of Appendix G.

To analyze the change in noise levels at each of these receptor locations, a dBA threshold was assigned based on FTA moderate and severe impact criteria. A receptor location was considered to experience a moderate or severe impact if noise levels exceeded FTA impact criteria regardless of existing noise levels. Therefore, areas identified as experiencing a moderate noise impact would be areas where the level of Project noise projected would be lower than existing noise level but the existing noise levels are higher than the FTA criteria for moderate impacts. Areas identified as experiencing severe noise impacts would be areas where the level of proposed Project noise would be higher than existing noise levels and exceed the FTA noise level threshold assigned.

Locations that meet or exceed severe impact criteria noise levels, as defined by FTA, would be considered to result in potentially significant impacts for purposes of CEQA. Table 3.14-10 provides a comparison summary of Category 2 and Category 3 sensitive noise receptors for the proposed Project.

Table 3.14-10. Sensitive Noise Receptor Impact Summary

Type of Noise Impact	Category 2 Land Uses	Category 3 Land Uses
Moderate	451	3
Severe	21	0

Operation of the proposed Project would result in moderate noise impacts to three Category 3 noise receptors. No severe noise impacts are projected for Category 3 noise receptors. Operational noise impacts to Category 3 noise receptors under the proposed Project are considered to be less than significant.

3.14.6.2 (b) Would the project result in the generation of excessive ground-borne vibration or ground-borne noise levels?

No Project Alternative

No Impact. Under the No Project Alternative, the Capitol Corridor passenger rail service between Oakland and San Jose would not be relocated from the Niles Subdivision to the Coast Subdivision. Improvements proposed for the Niles and Coast Subdivisions associated with the proposed Project would not occur. Capitol Corridor passenger trains would continue to operate based on current routes with no changes. There would be no changes to rail connectivity or operational efficiency. Therefore, the No Project Alternative would not result in direct impacts or changes to existing vibration levels within the RSA.

Proposed Project

Construction

Less than Significant Impact with Mitigation Incorporated. Construction of the proposed Project is expected to generate vibration levels from 25 feet away as high as 94 VdB due to compactors during site work, 87 VdB due to bulldozers during rail work, and 104 VdB due to impact pile drivers during structures work. Except for pile drivers, it is unlikely that such equipment would be used close enough to sensitive structures to have the potential for any damage. For pile driving, it is anticipated that the potential for damage will be limited to structures located at distances in the range of 30 to 75 feet from the pile driving operations, depending on the building category. None of the built environment buildings identified as historical resources are located within 30 to 75 feet of the project footprint.

In terms of vibration annoyance effects or interference with the use of sensitive equipment, the potential extent of vibration impact from pile driving is expected to be even greater than for

damage. Table 3.14-11 provides the approximate distances within which receptors could experience construction-related vibration annoyance effects based on FTA methodology.

Table 3.14-11. Screening Distances for Vibration Effects from Pile Driving

Land Use Category	Vibration Criterion Level (VdB)	Approximate Vibration Impact Distance (feet)
Category 1 (Sensitive Buildings)	65	630
Category 2 (Residential Buildings)	72	290
Category 3 (Institutional Buildings)	75	230

VdB = Vibration velocity

The results of the analysis indicate that vibration impacts would extend to distances of 230 to 630 feet from pile driving operations, 100 to 240 feet for compacting, and less than 130 feet for bulldozers, depending on the vibration sensitivity of the land use category.

Construction activities would be considered to have a significant impact if they would generate vibration in excess of FTA construction vibration criteria. It is expected that ground-borne vibration from construction activities would cause only intermittent localized disturbance along the rail corridor. Although processes such as earthmoving with bulldozers or the use of vibratory compaction rollers can create annoying vibration, there should be only isolated cases where it is necessary to use this type of equipment in close proximity to residential buildings. It is possible that construction activities involving pile drivers occurring at the edge of or slightly outside of the current rail ROW could result in vibration damage, and damage from construction vibration would be a potentially significant impact.

To mitigate for these potential impacts, **Mitigation Measure MM NOI-3: Construction Vibration Control Plan**, will be implemented. MM NOI-3 would require the preparation and implementation of a construction vibration control plan to reduce the impacts of construction vibration on nearby vibration-sensitive land uses that could be exposed to vibration levels in excess of FTA thresholds. In the event building damage occurs due to construction, repairs would be made, or compensation would be provided. With implementation of MM NOI-3, impacts resulting from construction vibration structural damage would be minimized to a less-than-significant level.

Operation

Less than Significant Impact. Existing conditions in the rail corridor include vibration generated by the current volume of passenger and freight trains passing through the RSA. As a result, there are no new vibration impacts that would be generated as a result of the proposed Project implementation for the majority of sensitive receptors along the rail subdivisions. The only areas within the RSA where there could be new vibration levels generated at sensitive receptors would be located within 200 feet of new or relocated turnouts or crossovers for the Project. At these locations, the vibration levels would increase by 5 to 10 VdB, depending on the proximity of the sensitive receptors to the new or relocated turnouts or crossovers. Attachment C of Appendix G provides the

locations of potential operational vibration impacts. Locations with vibration impacts, as defined as exceeding FTA vibration criteria, would be considered a significant impact.

Fifty-one (51) receptor locations are projected to experience a potential vibration impact during operation of the proposed Project. These include the following:

- **Coast Subdivision North Section:** Eighteen (18) single-family and multifamily residences and one church (Faith Chapel Church of God – East Bay), between Marina Boulevard and Fairway Drive, are predicted to have vibration impacts. These impacts are due to the new crossover associated with the proposed Project.
- **Coast Subdivision South Section:** Thirty-two (32) single-family residences along the Coast Subdivision South Section, between Ardenwood Boulevard and Paseo Padre Parkway, are predicted to have vibration impacts. These impacts are due to the new crossover associated with the proposed Project.

All of the operational vibration impacts identified for the proposed Project are due to the introduction or relocation of crossovers for the proposed Project. With the inclusion of low-impact rail frogs at the new train crossovers in Project design, operational impacts would be less than significant.

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

No Project Alternative

No Impact. Under the No Project Alternative, the Capitol Corridor passenger rail service between Oakland and San Jose would not be relocated from the Niles Subdivision to the Coast Subdivision. Improvements proposed for the Niles and Coast Subdivisions associated with the proposed Project would not occur. Capitol Corridor passenger trains would continue to operate based on current routes with no changes. There would be no changes to rail connectivity or operational efficiency. Therefore, the No Project Alternative would not result in exposure to people working in the RSA to excessive airport noise levels.

Proposed Project

Construction and Operations

Less than Significant Impact. Airports in the RSA include the Oakland International Airport and the Hayward Executive Airport. The proposed Project is also located within the Oakland International Airport Land Use Compatibility Plan (ALUCP) Airport Influence Area (AIA) and the Hayward Executive Airport ALUCP AIA (ESA Airports 2010a & 2010b).

Both the Coast and Niles Subdivisions are located within two miles of the Oakland International Airport and the Hayward Executive Airport. The subdivisions are also located within the Oakland International ALUCP AIA and the Hayward Executive ALUCP AIA. The ALUCPs for the airports

include policies intended to reduce the risk from harm to people and property located within the AIAs and focus on four impact areas: noise, safety, airspace protection, and overflight.

Given the industrial nature of the proposed Project, it would be considered a noise compatible land use and activities associated with the land use may be carried out with essentially no interference from aircraft noise (ESA Airports 2010a & 2010b). Properties within an AIA are routinely subject to overflights by aircraft. However, this would not result in excessive noise exposure for people working within the RSA during construction and operational activities. Overflights by aircraft would occur intermittently throughout the day and would therefore not result in increased noise hazards over an extended period of time. Based on these factors, impacts would be less than significant and no mitigation would be required.

3.14.7 Mitigation Measures

The following mitigation measures associated with noise and vibration would be implemented as part of the proposed Project.

MM NOI-1 Construction Noise Control Plan

CCJPA, in coordination with the Construction Contractor and local jurisdiction(s), will prepare and implement a Construction Noise Control Plan (NCP) to reduce the impact of temporary construction-related noise on nearby noise-sensitive receptors. The plan will demonstrate how the contractor plans to limit the noise levels to below the thresholds for significant impacts. The NCP will include but not be limited to the following best practices:

- Install temporary construction site sound barriers near noise sources.
- Use moveable sound barriers at the source of the construction activity.
- Avoid the use of impact pile drivers where possible near noise-sensitive areas or use quieter alternatives (e.g., drilled piles) where geological conditions permit.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Reroute construction-related truck traffic along roadways that will cause the least disturbance to residents.
- Use low-noise emission equipment.
- Implement noise-deadening measures for truck loading and operations.
- Line or cover storage bins, conveyors, and chutes with sound-deadening material.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Use high-grade engine exhaust silencers and engine-casing sound insulation.
- Minimize the use of generators to power equipment.
- Limit use of public address systems.
- Grade surface irregularities on construction sites.

- Monitor and maintain equipment to meet noise limits.
- Establish an active community liaison program to keep residents informed about construction and to provide a procedure for addressing complaints.

MM NOI-2 Creation of Noise Quiet Zones

Prior to the start of construction activities, CCJPA, in coordination with the appropriate local jurisdiction(s) and stakeholders, will implement a phased program considering the potential establishment of quiet zones along the corridor at all locations where train noise is predicted to exceed FTA severe impact thresholds. This phased program will include the development of engineering studies and coordination agreements to design, construct, and enforce potential quiet zones at the following grade crossings on the Coast Subdivision:

- Jarvis Avenue (City of Newark);
- Alvarado Boulevard (City of Union City);
- Dyer Street (City of Union City);
- Union City Boulevard (City of Union City);
- Grant Avenue (unincorporated community of San Lorenzo); and
- Lewelling Boulevard (unincorporated community of San Lorenzo).

CCJPA will consider options for establishing quiet zones including, but not limited to, the following FRA pre-approved supplemental safety measures:

- *Four-quadrant gate system.* This measure involves the installation of at least one gate for each direction of traffic to fully block vehicles from entering the crossing.
- *Gates with medians or channelization devices.* This measure keeps traffic in the proper travel lanes as it approaches the crossing, thus denying the driver the option of circumventing the gates by traveling in the opposite lane.
- *One-way street with gates.* This measure consists of one-way streets with gates installed so that all approaching travel lanes are completely blocked. This option may not be feasible or acceptable to local jurisdictions at all locations.
- *Road closure.* This measure consists of closing the road to through travel at the at-grade crossing. This option may not be feasible or acceptable to local jurisdictions at all locations.

In addition to these pre-approved supplemental safety measures, FRA also identifies a range of other measures that may be used to establish a quiet zone. These could be modified supplemental safety measures or non-engineering measures, which might involve law enforcement or public awareness programs. Such alternative safety measures must be approved by FRA based on the prerequisite that they provide an equivalent level of safety as the sounding of horns.

This phased program will also consider the use of wayside horns as part of a quiet zone. While not avoiding the sounding of a horn, wayside horns affect a smaller area than

train-mounted horn. Wayside horns can be used when the other measures above are not adequate to avoid the use of a horn.

If quiet zones are not feasible, CCJPA will consider the application of building sound insulation at the impacted residences at the following locations:

- **Coast Subdivision North Section:** 3 residences located on the southwest side of the existing railroad ROW between Farallon Drive and Lewelling Boulevard.
- **Coast Subdivision North Section:** 1 residence located on the northeast side of the existing railroad ROW between Lewelling Boulevard and Grant Avenue.
- **Coast Subdivision Central Section:** 1 residence located on the northeast side of the existing railroad ROW between Grant Avenue and Skywest Golf Course.
- **Coast Subdivision Central Section:** 2 residences located on the northeast side of the existing railroad ROW between Union City Boulevard and Smith Street.
- **Coast Subdivision South Section:** 9 residences located on the northeast side of the existing railroad ROW between Smith Street and Alameda Creek.
- **Coast Subdivision South Section:** 4 residences located on the southwest side of the existing railroad ROW between Jarvis Avenue and Cedar Boulevard Park.
- **Coast Subdivision South Section***:* 1 residence located on the northeast side of the existing railroad ROW between Cedar Boulevard Park and Clark Avenue.

Building sound insulation improvements may include but not be limited to the following:

- Application of an extra layer of glazing to the windows;
- Sealing holes in exterior surfaces that act as sound leaks; and
- Provision of forced ventilation and air-conditioning so that windows do not need to be opened.

During final design of the project, CCJPA will coordinate with individual residents identified as candidates for sound insulation. The coordination will include testing of existing outdoor to indoor noise reduction and specific measures required to meet the interior noise level criterion.

MM NOI-3 Construction Vibration Control Plan

CCJPA, in coordination with the Construction Contractor and local jurisdiction(s), and cooperating railroad operator(s), will prepare and implement a Construction Vibration Control Plan (CVCP) to reduce the impact of temporary construction related vibration on nearby sensitive receptors. The CVCP will include, but not be limited to the following:

- Avoid the use of impact pile drivers where possible near vibration-sensitive areas or use alternative construction methods (e.g., drilled piles) where geological conditions permit.
- Avoid vibratory compacting/rolling in close proximity to structures.

- Require vibration monitoring during vibration-intensive activities.

3.14.8 Cumulative Impact Analysis

Cumulative impacts can result from individually minor but collectively substantial impacts from past, present, and reasonably foreseeable future projects. A cumulatively considerable impact to land use would occur if the proposed Project when combined with past, present, and reasonably foreseeable projects, results in cumulatively considerable impact to the land use in the project area. The cumulative RSA for noise and vibration is defined by the proposed Project's RSA. The cumulative RSA would capture impacts generated from the proposed Project's construction and potential regional impacts on noise and vibration.

As provided in Table 3.1-1 in Section 3.1, Introduction, multiple past, present, and reasonably foreseeable projects were considered for the purpose of this cumulative impact analysis. These cumulative projects include infrastructure projects, transportation and transit projects, recreational and community facility projects, and other private development projects within the proposed Project's RSA. Based on a review of environmental documents available for these cumulative projects, none of the projects identifies a cumulative noise and vibration impact.

The proposed Project, in combination with planned projects under the cumulative condition, would result in temporary changes in noise levels during construction if construction of the proposed Project occurs at the same time as construction of other planned projects. This could result in a cumulative effect on adjacent sensitive receptors if they become part of, or are near, a temporary construction easement, such as a staging area. However, each project is required to mitigate construction noise impacts on an individual basis. With implementation of the identified noise mitigation measures, cumulative construction noise impacts are anticipated to be less than significant.

Operation of the proposed Project could result in an increase in rail activity that would result in an increase in operational noise levels at sensitive receptors. These effects could result in a cumulative impact if combined with additional operational impacts from other projects. However, all development projects, including the identified cumulative projects, would be required to comply with applicable regulations and planning standards and would be subject to the local jurisdiction planning process and environmental review as applicable. Therefore, the cumulative projects would also be subject to compliance with relevant noise plans, policies, or regulations and would otherwise require the approval of the County of Alameda and the respective local jurisdictions. Cumulative noise impacts during operational activities are anticipated to be less than significant.

Based on the discussion above, the proposed Project would not contribute to cumulative impacts to noise and vibration. When considered with all cumulative projects reviewed, the proposed Project would have less than cumulatively considerable impacts.

3.14.9 CEQA Significance Findings Summary Table

Table 3.14-12 summarizes the noise impacts of the proposed Project.

Table 3.14-12. Noise Impacts Summary

Impact	Level of Significance Before Mitigation	Incremental Project Contribution to Cumulative Impacts	Mitigation	Level of Significance with Mitigation Incorporated	Incremental Project Cumulative Impact after Mitigation
(a) Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	S/M	CC	MM NOI-1 MM NOI-2	LTS	NCC
(b) Would the project result in the generation of excessive ground-borne vibration or ground-borne noise levels?	LTS	NCC	N/A	LTS	NCC
c) For a project located within the vicinity of a private airstrip or an airport land us 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?	LTS	NCC	N/A	LTS	NCC

Notes: LTS = Less than Significant Impact, NI = No Impact, N/A = Not Applicable, SI = Significant Impact, S/M = Significant Impact but Mitigable to a Less than Significant Level, CC = Cumulatively Considerable, NCC = Not Cumulatively Considerable.

3.14.10 References

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