Chapter 4
NEPA Alternatives Analysis of Operations

4.1 Introduction

Pursuant to NEPA regulations (Code of Federal Regulations [CFR], Title 40, Section 1508.27), the evaluation of effects in this chapter is based on context and intensity. *Context* means the affected environment in which a proposed project would be located. *Intensity* refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved; location and extent of the effect; duration of the effect (short- or long-term); and other considerations. Beneficial effects are also identified and described.

This Final SEIS/SEIR has been revised to reflect changes and corrections to the text of the Draft SEIS/SEIR in response to public comments and/or design changes. Changes in the text are indicated by underline text for additions and ~~strikeout~~ for deletions. Comments received on the Draft SEIS/SEIR are provided in Volume II, Chapter 2, *Response to Comments*, of this Final SEIS/SEIR. See Table 2-B in Volume I, Chapter 2, *Alternatives*, for a summary of design changes since the release of the Draft SEIS/SEIR, which are analyzed in this Chapter 4.

There are two alternatives evaluated in this chapter in accordance with NEPA: the No Build Alternative and the BART Extension Alternative.

Chapter 4 discusses the operational impacts of the NEPA Alternatives, except for the operational transportation analysis, which is included in Chapter 3, *NEPA and CEQA Transportation Operation Analysis*. For construction impacts (and mitigation measures) of the NEPA Alternatives, see Chapter 5, *NEPA Alternatives Analysis of Construction*. For an analysis of impacts and mitigation measures of the CEQA Alternatives, see Chapter 6, *CEQA Alternatives Analysis of Construction and Operation*. Cumulative and growth-inducing impacts related to the BART Extension Alternative are discussed in Chapter 7, *Other NEPA and CEQA Considerations*.

VTA's transit-oriented joint development (TOJD) is not part of the NEPA BART Extension Alternative. No federal dollars would be used to design or construct the TOJD, and no federal approvals are required. VTA's TOJD impacts and mitigation measures are addressed in each of the Chapter 6 sections under the *BART Extension with TOJD Alternative* subsection.

Based on the analysis presented in Chapter 4 and per 40 CFR 1502.9, the changes and correction in response to public comments and design changes since the Draft SEIS/SEIR *are not considered*:

(i) … substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

These changes do not result in new adverse operational impacts and neither do they substantially change the intensity of impacts previously identified in the Draft SEIS/SEIR.

4.2 Air Quality

4.2.1 Introduction

This section describes the affected environment and environmental consequences related to air quality from operations of the NEPA Alternatives. Information in this section is based on *VTA's BART Silicon Valley – Phase II Extension Project Air Quality Study* (Terry A. Hayes Inc. 2017~~6~~), which is included with this SEIS/SEIR as a technical report and provides calculation details and air quality data.

4.2.2 Environmental and Regulatory Setting

4.2.2.1 Environmental Setting

Existing Air Quality Conditions

Climate and Meteorology

Regional Context

The BART Extension Alternative alignment passes through the Cities of San Jose and Santa Clara. The west portal is less than 1 mile west of Mineta San Jose International Airport. The corridor is in an air basin that includes nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. Air quality in the region is affected by natural factors, such as proximity to the bay and ocean, topography, meteorology, and existing air pollution sources. At the northern end of the peninsula, in San Francisco, pollutant emissions are high, especially with motor vehicle congestion. Localized pollutants, such as carbon monoxide (CO), can build up in "urban canyons." However, the winds are generally strong enough to carry the pollutants away before they can accumulate.

The Bay Area is characterized by a Mediterranean-type climate, with warm, dry summers and cool, wet winters. The terrain of the area influences both the climate and air pollution potential. The Cities of San Jose and Santa Clara lie in the Santa Clara Valley climatological subregion of the air basin. The northwest/southeast-oriented Santa Clara Valley is bounded by the Santa Cruz Mountains to the west, the Diablo Range to the east, the San Francisco Bay to the north, and the convergence of the Gabilan Range and the Diablo Range to the south. Winter temperatures are mild, except for very cool but generally frostless mornings. At the northern end of the Santa Clara Valley, Mineta San Jose International Airport reports mean maximum temperatures ranging from the high 70s to the low 80s during the summer and the high 50s to the low 60s during the winter; mean minimum temperatures range from the high 50s during the summer to the low 40s during the winter. Farther inland, where the moderating effect of the bay is not as strong, temperature extremes are greater.

Local Climate

The annual average temperature along the BART Extension alignment is approximately 60°F (Western Regional Climate Center 2015). The corridor area experiences an average winter temperature of approximately 50°F and an average summer temperature of approximately 68°F. Total precipitation in the corridor averages approximately 14.6 inches annually. Precipitation occurs mostly during the winter and relatively infrequently during the summer.

The wind patterns in the Santa Clara Valley are influenced greatly by the terrain, resulting in a prevailing flow roughly parallel to the valley's northwest-southeast axis, with a north-northwesterly ocean breeze that flows up the valley in the afternoon and early evening and a light south-southeasterly flow during the late evening and early morning. In the summer, a convergence zone is sometimes observed in the southern end of the valley between Gilroy and Morgan Hill when air flowing from the Monterey Bay through the Pajaro Gap is channeled northward into the south end of the Santa Clara Valley and meets with the prevailing north-northwesterly winds. Speeds are greatest in the spring and summer; nighttime and early morning hours have light winds and are frequently calm in all seasons. Summer afternoons and evenings can be windy.

Air Quality Monitoring

The Bay Area Air Quality Management District (BAAQMD) monitors air quality conditions at more than 30 locations throughout the Bay Area. The nearest air monitoring station to the BART Extension is in San Jose at 158 East Jackson Street, approximately 0.9 mile northwest of Santa Clara Street and 0.5 mile east of State Route (SR) 87. The East Jackson Street monitoring station is representative of air quality conditions throughout the alignment. Historical data from this station were used to characterize existing conditions in the vicinity of the BART Extension and establish a baseline for estimating future conditions with and without the extension. Pollutants monitored at the 158 East Jackson Street Monitoring Station include ozone, CO, and particulate matter (PM), which consists of PM that is 10 microns in diameter or less (PM10) and PM that is 2.5 microns in diameter or less (PM2.5).

Monitored data is compared to National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) to determine if existing conditions exceed health standards. Table 4.2-1 summarizes the NAAQS, and the CAAQS are provided for reference. Table 4.2-2 summarizes ambient air quality conditions from 2010 to 2014 and number of exceedances as compared to NAAQS and CAAQS.

Sensitive Receptors

Some land uses are considered more sensitive to changes in air quality than others, depending on the population groups and the activities involved. The California Air Resources Board (ARB) has identified the following groups who are most likely to be affected by air pollution: children under 14, the elderly (over 65 years of age), athletes, and people with cardiovascular and chronic respiratory diseases. Typically, sensitive receptors include residences, schools, playgrounds, child-care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The 6-mile extension passes through San Jose and ends in Santa Clara. The alignment is surrounded by a mix of residential, industrial, commercial, institutional, and recreational land uses. Refer to Section 4.4, *Community Services and Public Facilities*, for locations of schools, parks, and recreational facilities, and religious or civic institutions that may be sensitive to air quality pollutants. Refer to Section 4.11, *Land Use*, for locations of residential uses along the alignment.

Table 4.2-1: Federal and State Air Quality Standards and Attainment Status, San Francisco Bay Area

Pollutant	Averaging Period	Federal (NAAQS) Standards	Federal (NAAQS) Attainment Status	California (CAAQS) Standards	California (CAAQS) Attainment Status
Ozone	1 hour	No federal standard	No federal standard	0.09 ppm (180 µg/m³)	Nonattainment
	8 hours	0.070 ppm (137 µg/m³)	Nonattainment	0.070 ppm (137 µg/m³)	Nonattainment
Respirable Particulate Matter (PM10)	24 hours	150 µg/m³	Unclassified	50 µg/m³	Nonattainment
	Annual arithmetic mean	No federal standard	No federal standard	20 µg/m³	Nonattainment
Fine Particulate Matter (PM2.5)	24 hours	35 µg/m³	Nonattainment	No state standard	No state standard
	Annual arithmetic mean	12.0 µg/m³	Unclassified	12 µg/m³	Nonattainment
Carbon Monoxide	8 hours	9 ppm (10 mg/m³)	Attainment/Maintenance	9.0 ppm (10 mg/m³)	Attainment
	1 hour	35 ppm (40 mg/m³)	Attainment/Maintenance	20 ppm (23 mg/m³)	Attainment
Nitrogen Dioxide	Annual arithmetic mean	53 ppb (100 µg/m³)	Attainment	0.030 ppm (57 µg/m³)	Attainment
	1 hour	100 ppb (188 µg/m³) /a/	Unclassified	0.18 ppm (339 µg/m³)	Attainment
Sulfur Dioxide	24 hours	0.14 ppm (365 µg/m³)	Attainment	0.04 ppm (105 µg/m³)	Attainment
	1 hour	75 ppb (196 µg/m³)	Attainment	0.25 ppm (655 µg/m³)	Attainment
Lead	30-day average	--	Attainment	1.5 µg/m³	Attainment
	Calendar quarter	1.5 µg/m³	Attainment	No state standard	No state standard
	Rolling 3-month average	0.15 µg/m³	--	No state standard	No state standard
Visibility-Reducing Particles	8 hours	No federal standard		Extinction coefficient of 0.23 per kilometer	Unclassified
Sulfates	24 hours	No federal standard		25 µg/m³	Attainment
Hydrogen Sulfide	1 hour	No federal standard		0.03 ppm (42 µg/m³)	Unclassified

Note: ppb = parts per billion; ppm = parts of million
Source: California Air Resources Board 2015b.

Table 4.2-2: 2010–2014 Ambient Air Quality Data in BART Extension Vicinity[a]

Pollutant	Pollutant Concentration and Standards	Number of Days Above State Standard				
		2010	2011	2012	2013	2014
Ozone	Maximum 1-hour Concentration (ppb)	126	98	101	93	89
	Days > 90 ppb (state 1-hour standard)	5	1	1	1	0
	Maximum 8-hour Concentration (ppm)	86	67	62	79	66
	Days > 70 ppb (state 8-hour standard)	3	0	0	1	0
	Days > 75 ppb (federal 8-hour standard)	3	0	0	1	0
Carbon Monoxide	Maximum 1-hour concentration (ppm)	2.8	2.5	2.6	3.1	2.4
	Days > 20 ppm (state1-hour standard)	0	0	0	0	0
	Days > 35 ppm (federal 1-hour standard)	0	0	0	0	0
	Maximum 8-hour concentration (ppm)	2.2	2.2	1.9	n/a	n/a
	Days > 9.0 ppm (state 8-hour standard)	0	0	0		
	Days > 9.0 ppm (federal 8-hour standard)	0	0	0		
Respirable Particulate Matter (PM10)	Maximum 24-hr Concentration (µg/m³)	44.2	41.3	56.5	55.8	56.4
	Estimated Days > 50 µg/m³ (state 24-hour standard)	0	0	1	5	1
	Estimated Days > 150 µg/m³ (federal 24-hour standard)	0	0	0	0	0
Fine Particulate Matter (PM2.5)	Maximum 24-hr Concentration (µg/m³)	41.5	50.5	38.4	57.7	60.4
	Estimated Days > 35 µg/m³ (federal standard)	3	3	2	4	2

Note: ppb = parts per billion; ppm = parts of million; µg/m³ = microgram per cubic meter
[a.] PM2.5 and PM10 background data were obtained from the East Jackson Street monitoring station.
Source: California Air Resources Board 2015a.

4.2.2.2 Regulatory Setting

Background on Air Pollutants

The federal government has established NAAQS for six criteria pollutants: ozone, CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM10, and PM2.5. Effective October 1, 1993, ARB required a new sulfur limit of 0.05 percent (500 ppm) termed “low sulfur” diesel fuel, which is applicable to both highway and off-road vehicles. The new low sulfur diesel fuel led to negligible SO_2 emissions as compared to emissions of other criteria pollutants such as nitrogen oxides (NO_X) and CO. The proposed project is not considered a significance source of SO_2 emissions. In addition, the local air district does not consider SO_2 to be a pollutant of concern in the air basin. The primary pollutants of concern for the BART Extension Alternative are ozone, CO, PM, and NO_2. which is assessed as NO_X. The principal characteristics surrounding these pollutants are discussed below. Toxic air contaminants

(TACs)/mobile-source air toxics (MSATs) are also discussed, although there are no federal standards for these pollutants.

Ozone

Ground-level ozone is not emitted directly into the air but is created by chemical reactions between NO_X and volatile organic compounds (VOCs)/reactive organic compounds (ROGs) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NO_X and VOCs. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground-level ozone can also have harmful effects on sensitive vegetation and ecosystems.

Carbon Monoxide

CO, a colorless, odorless gas, is emitted from combustion processes. In urban areas, the majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (e.g., the heart and brain) and tissues.

Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of the particles is directly linked to their potential for causing health problems. The U.S. Environmental Protection Agency (EPA) is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories: inhalable coarse particles, which include PM10, and fine particles, which include PM2.5. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air.

Numerous scientific studies have linked particle pollution exposure to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased incidences of respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing. People with heart or lung diseases, children, and older adults are most likely to be affected by particle pollution. However, even healthy individuals may experience temporary symptoms from exposure to elevated levels of particle pollution.

Toxic Air Contaminants/Mobile Source Air Toxics

Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the ARB) has consistently found that there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly with regard to the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA). TACs are a category of air pollutants that have been shown to have an impact on human health but are not classified as criteria pollutants.

Air toxics are generated by a number of sources, including stationary sources (e.g., dry cleaners, gas stations, auto body shops, combustion sources), mobile sources (e.g., diesel trucks, ships, trains), and area sources (e.g., farms, landfills, construction sites). Ten TACs have been identified, with use of ambient air quality data, as posing the greatest health risks in California. Adverse health effects of TACs can be carcinogenic (cancer causing), short-term (acute) noncarcinogenic, and long-term (chronic) noncarcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

EPA has identified a group of 93 compounds that are emitted from mobile sources and listed them in its Integrated Risk Information System. From this list of 93 compounds, EPA has identified seven as priority MSATs: acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter.

Federal

The federal regulations discussed below are applicable to the study area. Chapter 6, Section 6.3, *Air Quality*, provides further details regarding state and local regulations related to air quality.

Clean Air Act

The Clean Air Act (CAA) governs air quality in the United States. EPA is responsible for enforcing the CAA and establishing the NAAQS, which are required under the 1977 CAA and subsequent amendments. EPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. In addition, EPA has jurisdiction over emission sources that are outside state waters (e.g., beyond the outer continental shelf). It also establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet stricter emission standards, which are established by ARB.

The CAA requires EPA to designate areas as *attainment*, *nonattainment*, or *maintenance* (previously nonattainment and currently attainment) areas with regard to each criteria pollutant, based on whether the NAAQS have been achieved. Table 4.2-2 summarizes the NAAQS; CAAQS are provided for reference. The attainment status of the BART Extension area with respect to the NAAQS and CAAQS is also presented.

Transportation Conformity

CAA Section 176(c)(1) (U.S. Code, Title 42, Section 7506) states that "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated…" A transportation conformity analysis is required to ensure that federally supported highway and transit project activities are consistent with the purpose of the State Implementation Plan (SIP). Conformity with the CAA takes place on two levels—first, at the regional level and second, at the project level. The proposed project must conform at both levels to be approved.

Mobile-Source Air Toxics

The CAA made controlling air toxic emissions a national priority; therefore, Congress mandated that EPA regulate 188 air toxics. These substances are also known as hazardous air pollutants (HAPs). In its latest rule on the control of HAPs from mobile sources (72 *Federal Register* 8430), EPA identified a group of 93 compounds that are emitted from mobile sources and listed them in its Integrated Risk Information System. From this list of 93 compounds, EPA identified seven as priority MSATs: acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. The high regulation priority of these seven MSATs was based on EPA's 1999 National Air Toxics Assessment.

In March 2001, EPA issued regulations that required the producers of urban air toxics to decrease emissions of these pollutants by target dates in 2007 and 2020. As a result, on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde will be reduced by 67 to 76 percent between 1990 and 2020. On-highway diesel particulate matter emissions will be reduced by 90 percent. These reductions are expected as a result of the national mobile-source control programs listed below.

- Reformulated gasoline program
- New threshold for the toxic content of gasoline
- National low-emission vehicle standards
- Tier 2 motor vehicle emissions standards and gasoline sulfur-control requirements
- Heavy-duty engine and vehicle standards and on-highway diesel-fuel sulfur-control requirements

The predicated improvements are net emission reductions that will be experienced even after the number of vehicle miles traveled (VMT) is taken into account.

4.2.3 Methodology

4.2.3.1 Overview

Based on EPA's transportation conformity rule (40 Code of Federal Regulations [CFR] Parts 51 and 93) and federal air quality regulations, the BART Extension would have an adverse effect on air quality if it were to result in the conditions listed below.

- Design and scope of the BART Extension would be inconsistent with the Metropolitan Transportation Commission's (MTC's) *Transportation 2035 Plan* (Regional Transportation Plan [RTP]) or 2015 *Transportation Improvement Program* (Federal Transportation Improvement Program [FTIP}).
- BART Extension Alternative would worsen existing or contribute to new localized CO or PM hot spots.
- BART Extension Alternative would generate substantial levels of MSAT emissions.

A project's air quality impacts are considered significant under the CAA if project emissions cause or contribute to ambient air concentrations that exceed a NAAQS.

Regional Conformity

Regional conformity for a given project is analyzed by determining if the project was included in a conforming RTP or FTIP with substantially the same design concept and scope that was used for the regional conformity analysis. Accordingly, the regional conformity analysis was conducted by comparing the BART Extension Alternative's design, concept, and scope to its description in *Plan Bay Area* and associated air quality analyses.

Project-Level Conformity (localized CO or PM hot-spots)

Project-level conformity is analyzed by determining if the project would cause localized exceedances of CO, PM2.5, and/or PM10 standards or interfere with "timely implementation" of the transportation control measures called out in the SIP. The sections that follow summarize the methodology used to evaluate project-level conformity requirements for CO, PM10, and PM2.5.

Carbon Monoxide

The BART Extension would be located in a maintenance area with regard to the federal CO standard (see Table 4.2-2). Consequently, an evaluation of transportation conformity related to CO would be required. The CO transportation conformity analysis would be based on the CO screening criteria established by the BAAQMD (BAAQMD 2010). The criteria provide a conservative indication of whether a project will generate new air quality violations, worsen existing violations, or delay attainment of the NAAQS and CAAQS with regard to CO. If the screening criteria are met, a quantitative analysis of project-related CO emissions would not be necessary because the transportation conformity requirements would be satisfied.

The BART Extension was evaluated against the BAAQMD CO screening criteria listed below.

- Consistency with an applicable congestion management program established by the county congestion management agency for designated roads or highways, a regional transportation plan, and local congestion management agency plans.
- Increased traffic volumes at affected intersections with more than 44,000 vehicles per hour.

Particulate Matter

The BART Extension would be located in a nonattainment area with regard to the federal PM2.5 standard. Consequently, a project-level conformity determination for PM2.5 would be required (see Table 4.2-2).

In December 2010, EPA finalized conformity guidance for determining which transportation projects must be analyzed for local air quality impacts in PM2.5 and PM10 nonattainment and maintenance areas. The guidance requires a quantitative hot-spot analysis to be performed for a project of air quality concern (POAQC) or any other project identified by the PM10 or PM2.5 SIP as a localized air quality concern. POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the PM2.5 or PM10 SIP as a localized air quality concern.

For projects that have not been identified as a POAQC, PM2.5 and PM10 hot-spot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that CAA and 40 CFR 93.116 requirements have been met without a hot-spot analysis because the projects have not been found to be an air quality concern under 40 CFR 93.123(b)(1).

Mobile-Source Air Toxics

The Federal Highway Administration's (FHWA's) *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* was used to evaluate potential MSAT emissions associated with the BART Extension Alternative (Federal Highway Administration 2012). The guidance uses a tiered approach to address MSAT impacts from roadway projects. The analysis levels outlined in FHWA's interim guidance, and listed below, were used to evaluate the BART Extension Alternative's MSAT impacts.

Level 1 – Exempt projects with no potential for meaningful MSAT effects. These projects require no analysis. The types of projects included in this category are:

- Projects that qualify for a categorical exclusion under 23 CFR 771.117(c).
- Projects that are exempt under the CAA conformity rule under 40 CFR 93.126.
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

Level 2 – Projects with low potential for MSAT effects. These projects require a qualitative analysis. The types of projects included in this category are those that improve highway, transit, or freight operations without adding substantial new capacity or creating a facility that is likely to meaningfully increase MSAT emissions. Examples of these types of projects are minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design-year traffic is not projected to meet the 140,000 to 150,000 average daily traffic (ADT) criterion.

Level 3 – Projects with higher potential MSAT. These projects require quantitative analysis to differentiate alternatives. To fall into this category, a project must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes where the ADT is projected to be in the range of 140,000 to 150,000 or more by the design year; and
- Be located in proximity to populated areas.

The FHWA guidance for the assessment of MSATs in NEPA documents does not specifically address the analysis of construction-related emissions because of their relatively short duration. FHWA is considering whether more guidance is needed regarding construction activities in future versions of its guidance.

4.2.3.2 Local Air District Thresholds

Although the BART Extension Alternative would be subject to transportation conformity, the BAAQMD CEQA thresholds are used to evaluate the intensity of operational emissions. BAAQMD's applicable mass emission threshold are summarized below.

- ROG and NOx: 54 pounds per day, 10 tons per year
- PM10: 82 pounds per day, 15 tons per year
- PM2.5: 54 pounds per day, 10 tons per year

4.2.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether such impacts would be adverse under NEPA, using the criteria identified in Section 4.2.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.2.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area (see Chapter 2, Section 2.2.1, *NEPA No*

Build Alternative, for a list of these projects). Given the mix of projects, some of the projects may reduce air quality and greenhouse gas emissions by providing transit, bicycle and pedestrian improvements and also reducing congestion. Other projects may result in short-term exceedances in air quality standards during construction. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse air quality and greenhouse gas effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.2.4.2 BART Extension Alternative

Regional Conformity

The BART Extension is included in MTC's 2015 FTIP, which was adopted by MTC on September 24, 2014. FTA and FHWA approved the 2015 FTIP on December 15, 2014. The 2015 FTIP Identification Number is BRT030001 (Metropolitan Transportation Commission 2015b). The BART Extension is described as "BART: Extend BART from Berryessa Station to San Jose and Santa Clara." The BART Extension is also included in the RTP under Identification Number 240375 and described as "Extend BART from Berryessa to San Jose/Santa Clara (Phase 2)." The regional planning documents assume construction beginning in 2018, with completion in 2024. Passenger service is anticipated to begin in late 2025/2026. It is anticipated that the assumed open-to-traffic-year change will occur through the FTIP and RTP amendment process before completion of the NEPA process. The FTIP and RTP amendments will ensure that, prior to preparation of the final environmental document for the BART Extension, the design, concept, and scope will be consistent with the project description in the FTIP and RTP amendment. Therefore, the BART Extension's regional conformity determination requirement is satisfied.

BART Extension Alternative Conformity

Conformity requires demonstration that a project will not result in new local CO or PM2.5 exceedances or worsen existing violations.

Carbon Monoxide Hot-Spot Analysis

CO hot-spot analysis is required under the EPA Transportation Conformity regulations for non-exempt projects in nonattainment or maintenance areas for CO. BAAQMD air quality monitors have not recorded an exceedance of the federal CO standards since at least 1994. CO concentrations throughout California have steadily declined over time as vehicle engines have become more efficient and less polluting. BAAQMD has recognized this trend and published a screening methodology for determining the possibility for a CO hot spot (BAAQMD 2010).

VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis of the BART Extension Only (Hexagon 2017~~6~~) assessed 17 signalized intersections in the vicinity of the Alum Rock/ 28th Street Station, 29 signalized intersections in the vicinity of the Diridon Station (South and North Options), and 16 signalized intersections in the vicinity of the Santa Clara Station. The identified intersections support fewer than 5,000 vehicles during the weekday AM and PM peak hours. The BART Extension Alternative would not increase traffic volumes at any intersection in the traffic study area to more than 24,000 vehicles per hour. No potential exists for a new localized CO hot spot or worsening of an existing CO hot spot.

PM2.5 Hot-Spot Analysis

The alignment is within a nonattainment area for the federal PM2.5 standard. Therefore, pursuant to 40 CFR Part 93, a project-level PM2.5 analysis is required for conformity purposes.

A quantitative hot-spot analysis is required only for a project that has been identified as a POAQC, as defined in 40 CFR 93.123(b)(1). As described below, the BART Extension Alternative does not meet the criteria that would classify it as a POAQC under EPA's final rule. Accordingly, the BART Extension Alternative is not considered to be a POAQC, and the project-level PM conformity determination requirements are satisfied. Confirmation of this finding was obtained following interagency consultation with MTC's Air Quality Conformity Task Force. Under the BART Extension Alternative, there would be *no adverse effect* related to worsening existing or contributing to new localized PM hot spots.

Projects involving new or expanded highway facilities and a significant number of, or a significant increase in the number of, diesel vehicles (*significant number* is defined as more than 125,000 AADT, with 8 percent or more of such AADT being diesel truck traffic or, in practice, truck AADT of 10,000 or more regardless of total AADT; *significant increase* is defined in practice as a 10 percent increase in the volume of heavy-duty truck traffic).

A list of projects that are considered to be POAQCs is provided below, along with an analysis of why the BART Extension Alternative is not considered to be a POAQC.

1. Projects affecting intersections that are at level of service (LOS) D, E, or F, with a significant number of diesel vehicles, or will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to BART Extension Alternative.
2. New bus and rail terminals and transfer points with a significant number of diesel vehicles congregating at a single location.
3. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.
4. Projects in or affecting locations, areas, or categories of sites identified in the PM2.5 or PM10 Implementation Plan or Implementation Plan submission, as appropriate, as sites of possible violation.

The BART Extension Alternative is a heavy-rail transit project that would not directly increase diesel truck traffic on the roadway network. The level of service related to increased traffic volumes from a significant number of diesel vehicles related to the BART Extension Alternative is not relevant. In addition, although the BART Extensions Alternative would involve new bus and rail transfer points, the new bus and rail transfer points would be located at the Alum Rock/28th Street Station and Santa Clara Station, and in central San Jose. At the Alum Rock/28th Street Station, the new bus transfer location would be provided along North 28th Street. At the Santa Clara Station, a new bus transfer location would be provided along Brokaw Road. The bus transfer locations would operate similar to existing bus stops on a local roadway; they are not considered significant terminals or transfer points with a significant number of diesel vehicles (VTA will have phased out diesel buses by 2025).

The No Build Alternative bus fleet includes services to shuttle passengers between the Berryessa/North San Jose Station and downtown destinations. This shuttle service would be eliminated in the BART Extension Alternative resulting in a decrease in bus activity in response to the light rail transit (LRT). Based on a bus demand study completed by VTA, the Santa Clara Station would experience a decrease of 96 buses in late 2025/2026 and 160 buses in 2035. The Alum Rock/28th Street Station would experience no change in daily late 2025/2026 or 2035 bus volumes. Central San Jose would experience no change in 2026 bus volumes and a decrease of 32 buses in 2035.

VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than 1 minute per vehicle. Although sensitive receptors would be located within 1,000 feet of the transfer points, these land uses would not be exposed to adverse diesel particulate matter emissions given the bus type (hybrids) and limited idling time.

The Diridon Station Options include an existing bus transit facility. The existing facility will be reconstructed for better bus circulation in the same location for both Diridon Station Options. Similar to the Santa Clara Station Option, the Diridon Station Options would experience a decrease of 96 buses in late 2025/2026 and 192 buses in 2035. In addition, VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses.

In addition, the BART Extension Alternative sites have not been identified as possible violation sites in the PM2.5 or PM10 Implementation Plan or Implementation Plan submission. Due to the above reasons, the MTC's Air Quality Conformity Task Force determined on June 23, 2016, that the BART Extension Alternative is not considered to be a POAQC.

Mobile-Source Air Toxics

This SEIS/SEIR includes a basic qualitative analysis of the likely MSAT emission impacts of the BART Extension Alternative. However, available technical tools do not make it possible to predict the specific health impacts of the emission changes associated with the BART Extension Alternative.

The BART Extension Alternative would be electrically powered and would not generate MSAT emissions. FHWA has published guidance related to roadway emissions. Thus, the MSAT analysis focuses on how the BART Extension Alternative would affect exposure to roadway MSAT.

New bus transfer points would be located at the Alum Rock/28th Street Station and Santa Clara Station. At the Alum Rock/28th Street Station, a bus transfer location would be provided along North 28th Street. At the Santa Clara Station, a bus transfer location would be provided along Brokaw Road. In addition, the Diridon Station (both Options) include an existing bus transit facility. The existing facility would be reconstructed for better bus circulation. It is not anticipated that this facility would accommodate any increased bus frequency. VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than 1 minute per vehicle. Given the above qualitative analysis, diesel-hybrid bus activity would not represent a significant source of new exposure.

The Newhall Maintenance Facility, including vehicle storage at the facility, would not include significant sources of combustion-related TACs, such as heavy-duty diesel trucks or active power generators. The maintenance facility would require the use of chemicals related to repair and cleaning activities, resulting in evaporative emissions. However, the chemicals would be stored in accordance with BAAQMD permitting requirements and state safety guidelines; the majority of related activities would occur within maintenance facilities. This would reduce the potential for exposure to substantial MSAT concentrations. Given the above qualitative analysis, the maintenance facility would not represent a significant source of new exposure and, therefore, would result in *no adverse effect* related to operational MSAT emissions.

Operational Emissions

The operational analysis for the BART Extension Alternative considers emissions benefits associated with vehicle mode shift. It is anticipated that the BART Extension Alternative would increase ridership, thereby decreasing regional passenger VMT through mode shift from private automobiles to transit. Accounting for emissions reductions associated with mode shift is consistent with recommendations from APTA (2009). Table 4.2-3 shows regional VMT associated with the No Build and BART Extension Alternatives. The VMT and associated emissions analysis are presented for 2025 Opening Year and 2035 Forecast Year.

Table 4.2-3: Regional Vehicle Miles Traveled – BART Extension Alternative

Analysis Year	Vehicle Miles Traveled (miles per day)		% VMT Change from No Build Alternative	% VMT Change from Existing
	No Build Alternative	BART Extension Alternative		
2025 Opening Year	54,981,379	54,693,572	(0.52%)	5%
2035 Forecast Year	59,777,409	59,492,258	(0.48%)	15%
Source: *VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis of the BART Extension Only* (Hexagon 2017~~6~~).				

Estimated criteria pollutant emissions from all vehicles in the region are shown in Table 4.2-4. The differences in emissions between the alternatives represent criteria pollutant emissions generated as a result of implementation of the BART Extension Alternative. Considering the small decrease in regional VMT, differences in operational emissions generated by the BART Extension Alternative are expected to be minor and related primarily to changes in VMT and vehicle speeds as a result of use of public transportation.

Table 4.2-4: Estimated Maximum Daily Operational Emissions – Bart Extension Alternative

Criteria Pollutant or Ozone Precursor	Pounds per Day				
	ROGs	NO_X	CO	PM10	PM2.5
2025 Opening Year					
No Build Alternative	1,453	7,207	75,108	5,962	2,499
BART Extension Alternative	1,446	7,181	74,715	5,932	2,486
Net Change from No Build	**(-7)**	**(-26)**	**(-393)**	**(-30)**	**(-13)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	**No**	**No**	**--**	**No**	**No**
2035 Forecast Year					
No Build Alternative	927	4,852	52,408	6,360	2,607
BART Extension Alternative	924	4,839	52,158	6,331	2,595
Net Change from No Build	**(-3)**	**(-13)**	**(-250)**	**(-29)**	**(-12)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	**No**	**No**	**--**	**No**	**No**
Sources: ARB, EMFAC2014, CalEEMod version 2013.					

The analysis shows that the BART Extension Alternative would reduce regional criteria pollutant emissions and associated concentrations. Therefore, implementation of the BART Extension Alternative would result in a regional air quality benefit by encouraging a modal shift from single-occupancy vehicles toward transit, and would not generate emissions that exceed the NAAQS. Consequently, operation of the BART Extension Alternative would result in *no adverse effect*.

4.2.5 NEPA Conclusion

The design, concept, and opening year of the BART Extension Alternative are consistent with MTC's RTP and FTIP. The BART Extension Alternative would not result in a CO or PM2.5 hot spot. Accordingly, the BART Extension Alternative's regional and project-level conformity requirements are satisfied. Neither the VTA buses nor the new maintenance facility would represent a significant source of new MSATs. Long-term operation of the BART Extension Alternative would reduce criteria pollutant emissions, relative to the No Build Alternative, and therefore result in a beneficial air quality effect. For these reasons, operation of the BART Extension Alternative would result in *no adverse effect*.

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4.3 Biological Resources and Wetlands

4.3.1 Introduction

This section describes the affected environment and environmental consequences related to biological resources and wetlands from operations of the NEPA Alternatives.

Additional information on biological resources is provided in *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists* technical report.

Biologists compiled a variety of natural resource information for the corridor by consulting the California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2016), the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants* (California Native Plant Society 2015), and the U.S. Fish and Wildlife Service (USFWS) list of threatened and endangered species (U.S. Fish and Wildlife Service 2015). A reconnaissance survey was conducted on November 4, 2015, to confirm existing biological resources and wetlands in the area. In addition, the *Silicon Valley Rapid Transit Corridor Environmental Impact Statement and 4(f) Evaluation* (Santa Clara Valley Transportation Authority and Federal Transit Administration 2010) and associated biological technical studies prepared for the FEIS were used as background information for the vicinity. The CNDDB, CNPS, and USFWS lists are included in *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists*.

4.3.2 Environmental and Regulatory Setting

4.3.2.1 Environmental Setting

This section discusses the existing biological resources and wetlands in the area. For purposes of this analysis, a 2-mile buffer of the area of disturbance, including construction staging areas, was assessed for the potential presence of special-status species that could be affected by the BART Extension Alternative. See Figures 4.3-1 and 4.3-2 for special-status plant and animal species with CNDDB-documented occurrences within 2 miles of the BART Extension.

Land Cover Types

The BART Extension would be located within the central California Coast Range. Vegetation and non-developed land cover types identified in the area consist of ruderal/disturbed, willow scrub/riparian woodland, and riverine (Guadalupe River and creeks). Four creeks run through the BART Extension area: Coyote Creek, Lower Silver Creek, Los Gatos Creek, and the Guadalupe River. Land cover types in the area are highly fragmented, which diminishes their ecological value in most cases. Isolated habitat islands may provide refuge for wildlife, but the habitat value in these areas is degraded and most likely will continue to degrade regardless of the BART Extension because of the isolation from urban development. Willow scrub/riparian woodland is the only sensitive natural communities (i.e., communities that are of limited distribution statewide or within a county or region and considered "special-status" by the California Department of Fish and Wildlife [CDFW]) in the area. See Figure 4.3-3 for the mapped land cover types within the area, which are based on those identified and mapped in the *Santa Clara Valley Habitat Plan* (SCVHP) (Santa Clara County 2012).

A brief description of the vegetation and wildlife resources within each land cover type is provided below. Plant taxonomy and nomenclature follow the *Jepson Manual: Vascular Plants of California* (Baldwin and Wilken 2012).

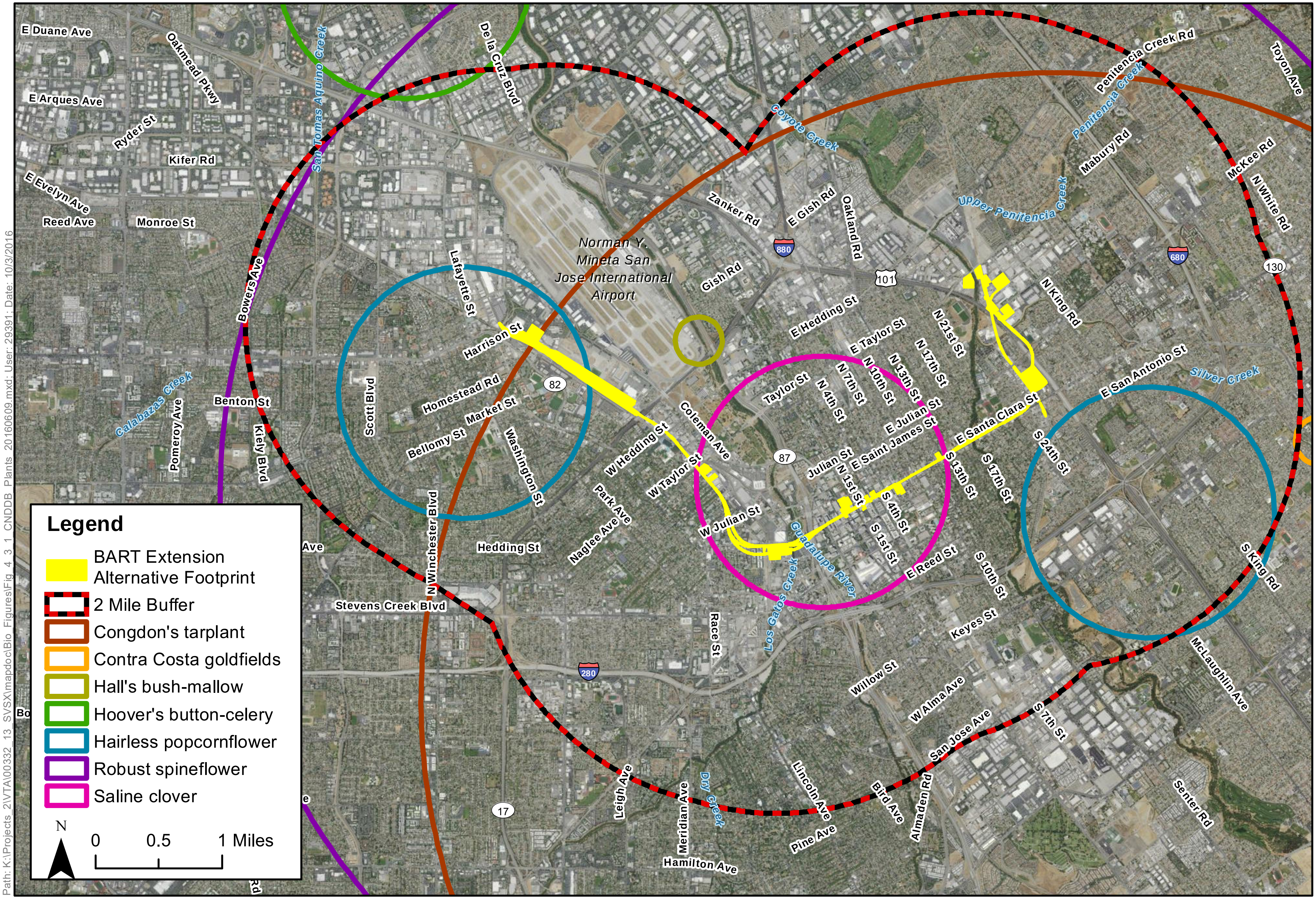
Ruderal/Disturbed

This land cover type includes species groupings found in urban ornamental landscape and agriculture settings. A distinguishing characteristic of ruderal/disturbed communities within urban areas is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements, such as cover for nesting and foraging, as well as food sources, such as nuts, berries, or insects. Ruderal/disturbed habitat is typically dominated by nonnative grass species, including Italian ryegrass, orchardgrass (*Dactylus glomerata*), and wild oat, as well as bull thistle (*Cirsium vulgare*). Examples of animal species tolerant of human activities that often utilize ruderal/disturbed habitats include killdeer (*Charadrius vociferous*), mourning doves (*Zenaida macroura*), and California ground squirrel (*Otospermophilus beecheyi)*.

The majority of the corridor lies within ruderal/disturbed vegetation, and most of the area that would be disturbed by the BART Extension consists of ruderal/disturbed urban landscape. Some remnant agricultural areas, consisting solely of disked pasture, persist adjacent to the BART Extension.

Willow Scrub/Riparian Woodland

Willow scrub occurs along Lower Silver Creek, which was disturbed during flood protection improvements in August 2009 and subsequently revegetated for the Santa Clara Valley Water District's Lower Silver Creek Project. Willow (*Salix* spp.) shrubs dominate this land cover type and are supported by the water of Lower Silver Creek. Understory species are primarily nonnative grasses but are eventually expected to change as willow scrub matures and a defined overstory develops.



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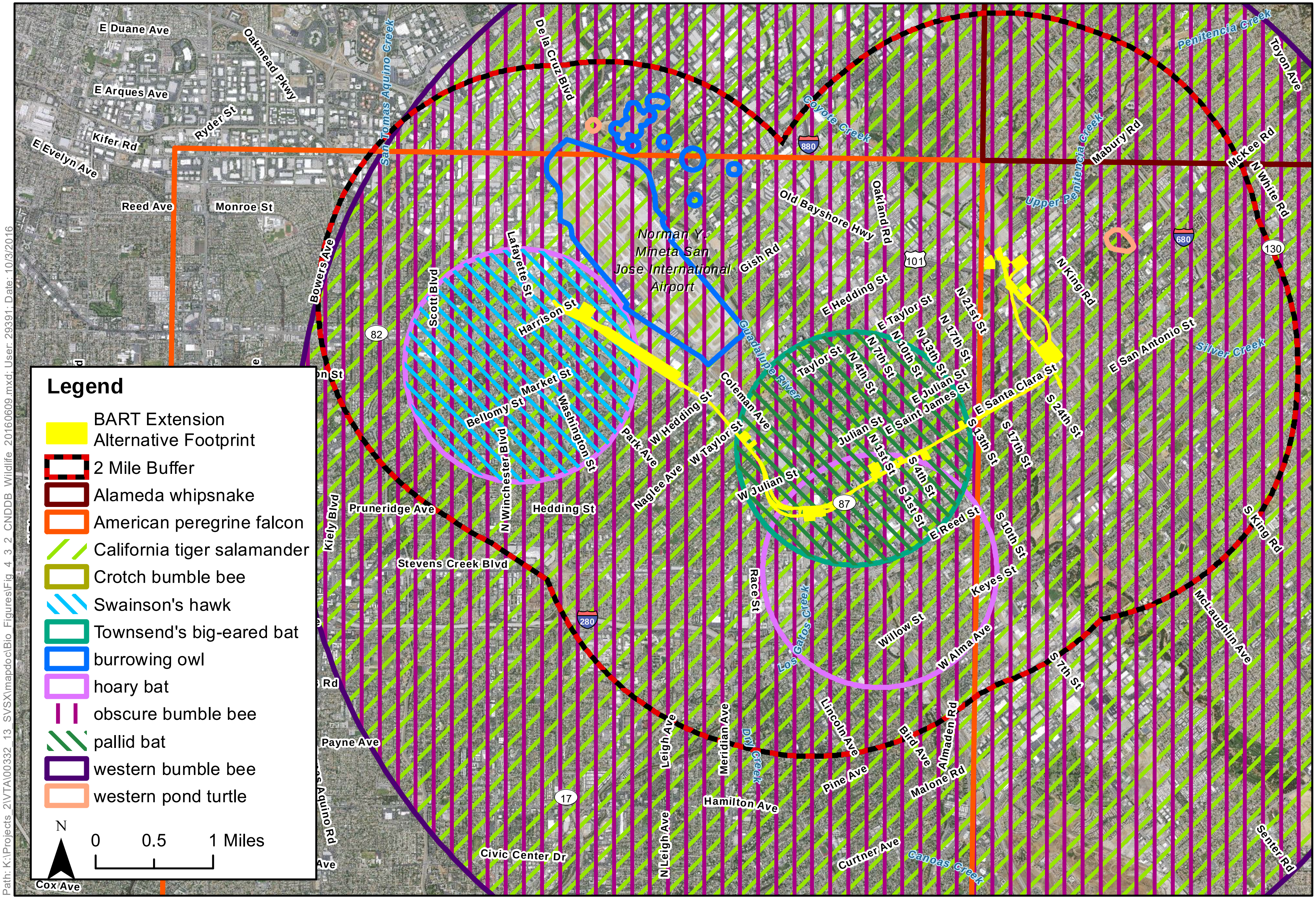
Source: Plants, CNDDB June 2106; Imagery, NAIP 2014

Figure 4.3-1
CNDDB Plants within 2 Miles
VTA's BART Silicon Valley–Phase II Extension Project



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Source: Plants, CNDDB June 2016; Imagery, NAIP 2014

Figure 4.3-2
CNDDB Wildlife within 2 Miles
VTA's BART Silicon Valley–Phase II Extension Project

Riparian woodland occurs along portions of Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek and is recognized as a sensitive natural community by CDFW (2010). Dominant plant species in the overstory of riparian woodland along the creeks include willows, Fremont cottonwood (*Populus fremontii*), and box elder (*Acer negundo*), as well as a few scattered walnuts (*Juglans* sp.). Common species in the understory of riparian woodland include California blackberry (*Rubus ursinus*), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), western goldentop (*Euthamia occidentalis*), and several nonnative herbaceous species such as bristly oxtongue (*Helminthotheca echioides*), perennial pepperweed (*Lepidium latifolium*), and poison hemlock (*Conium maculatum*). The understory of this land cover type typically includes nonnative grasses, including barley (*Hordeum vulgare*), Italian ryegrass (*Lolium multiflorum*), and ripgut brome (*Bromus diandrus*).

Because the vegetation is structurally diverse and portions are well developed, riparian woodland communities provide habitat for many wildlife species. The multilayered riparian woodland land cover type provides escape cover, forage, and nesting opportunities for wildlife. Common wildlife species observed in riparian woodland habitats are acorn woodpecker (*Melanerpes formicivorus*), downy woodpecker (*Picoides pubescens*), black phoebe (*Sayornis nigricans*), northern mockingbird (*Turdus migratorius*), red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*) and American kestrel (*Falco sparverius*), among others. Riparian woodland habitat is frequently used by terrestrial mammals as movement corridors if they connect larger patches of habitat.

Riverine

Riverine land cover consists of perennial, intermittent, and ephemeral watercourses characterized by a defined bed and bank. Four watercourses occur within the study area: Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek (refer to Section 4.17.2.1, *Environmental Setting*, and Figure 4.17-1 for locations and descriptions of these watercourses). All of these watercourses are mainly perennial, but may be dry in certain areas during the summer months. These features are associated with adjacent willow scrub/riparian woodland land cover type. Common fish species known to occur in the Guadalupe River and Coyote Creek include California roach (*Lavinia symmetricus*), hitch (*L. exilicauda*), Sacramento sucker (*Catostomus occidentalis*), and threespine stickleback (*Gasterosteus aculeatus*). In addition to fish, western pond turtle (*Actinemys marmorata*) and Pacific tree frogs (*Pseudacris regilla*) may occur in or near the watercourses.

Waters of the United States

Waters of the United States include the three creeks and one river that cross the BART Extension—Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek (refer to Section 4.17, *Water Resources, Water Quality, and Floodplains*). The streams up to the limit of the Ordinary High Water Marks on opposing banks, and any associated in-channel or floodplain wetlands,~~and their respective floodplains~~ are jurisdictional features regulated by the U.S. Army Corps of Engineers (USACE). Lower Silver Creek, Coyote Creek, the Guadalupe River, and Los Gatos Creek are inventoried by the USFWS as palustrine forested, temporarily flooded wetlands; the vegetated portions of the streams are described in the *Willow Scrub/Riparian Woodland* section above and the open water portions of the streams are described in the *Riverine* section. These streams were not studied intensively for the BART Extension because facilities would be constructed in underground tunnels 20 to 40 feet below the creek and river bottoms and all construction staging areas and access would be outside of waterways; therefore, VTA would avoid potential adverse effects on waters of the United States.

Special-Status Species

Special-status species are plants and animals that are legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For the purposes of this document, special-status species consist of the following.

- Species listed or proposed for listing as threatened or endangered under the ESA (Title 50, Code of Federal Regulations [CFR], Section 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the Federal Register [FR] for species proposed for listing).
- Species that are candidates for possible future listing as threatened or endangered under the ESA.
- Species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 California Code of Regulations Section 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Plants listed as rare under the California Native Plant Protection Act (CNPPA) (California Fish and Game Code Sections 1900 et seq.).
- Plants with a California Rare Plant Rank of 1A, 1B, 2A, and 2B (California Department of Fish and Wildlife 2016).
- Animals listed as California Species of Special Concern on CDFW's Special Animals List (California Department of Fish and Wildlife 2016).
- Animals that are fully protected in California (California Fish and Game Code Section 3511 [birds], Section 4700 [mammals], Section 5050 [amphibians and reptiles], and Section 5515 [fish]).
- Bats identified as medium or high priority on the Western Bat Working Group regional priority species matrix (Western Bat Working Group).

An official species list of rare, threatened, endangered, and candidate species with potential to occur in the area, which includes the San Jose West and San Jose East U.S. Geological Survey (USGS) quadrangles, was generated from USFWS online data on September 24, 2015. A CDFW species list for the BART Extension was generated from a search of the CNDDB (California Department of Fish and Wildlife 2016). See *VTA's BART Silicon Valley—Phase II Extension Project Special-Status Species Lists* for species lists and determining potential for special-status species to occur in the BART Extension area.

Following the database searches, an extensive review of literature and environmental documentation prepared for other projects in the vicinity was conducted. This section reports findings only for those species for which suitable habitat was determined to occur in the immediate vicinity of the BART Extension. Special-status species known to occur or with potential to occur based on the presence of suitable habitat in the area include several fish, amphibian, bird, and mammal species, as described below. No special-status plant species have been observed in the area, and none is expected to occur due to historic and ongoing disturbance and consequent lack of suitable habitat.

Fish

Central California Coast Steelhead

Central California coast steelhead (*Oncorhynchus mykiss*) is a federally listed threatened fish species. The Central California Coast steelhead distinct population segment has been listed as threatened under the ESA (62 FR 159, August 18, 1997). Critical habitat for steelhead is designated and includes the Guadalupe River and Coyote Creek (50 FR 226, September 2, 2005).

Despite degraded habitat conditions, Coyote Creek supports a small, viable steelhead fishery (Busby et al. 1996; Leidy et al. 2005), and the Guadalupe River has the potential to support steelhead as well. The extent to which steelhead spawn and rear in Coyote Creek is not known. One adult steelhead was observed in Alamitos Creek, a tributary to the Guadalupe River upstream of the BART Extension area, in early 2003 (California Department of Fish and Wildlife 2016). This means that adults are moving through the Guadalupe River system at some level and could spawn, though the extent of spawning is unknown. Flows and habitat conditions (e.g., water temperature) are believed to be insufficient in all other streams in the BART Extension area to support self-sustaining steelhead populations. Steelhead may stray into Lower Silver Creek and Los Gatos Creek because of their connections to Coyote Creek and the Guadalupe River, respectively, although steelhead are mainly seen in Coyote Creek (Smith 2013).

Fall-Run Chinook Salmon

The National Marine Fisheries Service (NMFS) considers the Chinook salmon (*Oncorhynchus tshawytscha*) in the South Bay Area to be part of the Central Valley fall- run Chinook salmon evolutionarily significant unit (ESU). NMFS has determined that the Central Valley fall-run - Chinook salmon ESU does not warrant listing, but it is considered a candidate species (64 FR 50394, September 16, 1999). In addition, streams in the vicinity are considered essential fish habitat for Chinook salmon, a commercial species. The Magnuson-Stevens Fishery Conservation and Management Act defines *essential fish habitat* as waters and substrate necessary for fish to spawn, breed, feed, and grow to maturity.

As is the case for steelhead, Chinook salmon may stray into Lower Silver Creek and are known to spawn and rear in portions of Coyote Creek. Fall-run Chinook salmon have occurred in small numbers in the Guadalupe River in the last decade (Smith 2013). The current Chinook salmon population may be mostly strays from hatchery populations from the Sacramento-San Joaquin River system (Garza and Pearse 2008). Currently, Chinook salmon migrate up the Guadalupe River to spawn. The majority of Chinook salmon in Guadalupe River spawn throughout the downstream reaches of the river (Smith 2013). Chinook salmon may stray into Los Gatos Creek because of its connection to the Guadalupe River.

Wildlife

California Red-Legged Frog

The California red-legged frog (*Rana draytonii*) is listed as threatened under the ESA and is a state Species of Special Concern. The area is not located within an area designated as critical habitat for California red-legged frog. There are no known occurrences of the species in the BART Extension area (California Department of Fish and Wildlife 2016). However, the riparian and aquatic habitat in Guadalupe River, Coyote Creek, and Lower Silver Creek may provide suitable habitat, and some of the smaller streams may function as dispersal corridors for this species when they contain water. H.T. Harvey and Associates (1997) concluded that although the California red-legged frog is not believed to inhabit urbanized areas of San Jose, known occurrences in Alum Rock Park indicate that frogs may potentially be transported downstream during high flows and reach the BART Extension area. Four individuals were observed in July 2000 in Upper Penitencia Creek in Alum Rock Park, approximately 4.5 miles east of the BART Extension (California Department of Fish and Wildlife 2016). Also, four adult California red-legged frogs were captured and relocated in Upper Penitencia Creek in Alum Rock Park during construction of VTA’s Fish Passage Project from August 2012 to October 2012 (Ann Calnan pers. comm.). The area between these known occurrences and the BART Extension area is highly urbanized. Frogs would not be able to move overland into the BART Extension area. Any movement of frogs would have to occur in stream system, most of which are urban streams with little to no vegetation. Therefore, California red-legged frogs are not expected to occur within the BART Extension area.

Western Pond Turtle

The western pond turtle (*Actinemys marmorata*) is a candidate for future listing under the ESA and is a state Species of Special Concern. Habitat for the western pond turtle is present in the Guadalupe River, Coyote Creek, Los Gatos Creek, and Lower Silver Creek, and some of the smaller streams may function as dispersal corridors for this species when the streams contain water. Western pond turtles have been observed in Coyote Creek and the Guadalupe River (California Department of Fish and Wildlife 2016).

Bay Checkerspot Butterfly

Although there is no habitat for Bay checkerspot butterfly in the immediate vicinity, there is a potential for indirect effects on the butterfly from nitrogen deposition in locations situated away from the study area. The Bay checkerspot butterfly (*Euphydryas editha bayensis*) is listed as threatened under the ESA. The Bay checkerspot butterfly associates with specific host plants that typically grow within serpentine soils, including native grassland species such as dwarf plantain (*Plantago erecta*) as larvae and California goldfields (*Lasthenia californica*) as adults. The species currently occurs only in Santa Clara and San Mateo Counties on serpentine rock outcrops. The life cycle of the Bay checkerspot butterfly corresponds directly to its host plant, where the butterfly emerges from pupae between late February and early May as the nectar plants begin to bloom (U.S. Environmental Protection Agency 2010).

There is one known Bay checkerspot butterfly occurrence at the Silver Creek Hills, between Silver Creek and U.S. Highway 101 (U.S. 101) in 1999, but the site was partially developed in 2000. The occurrence is approximately 6.5 miles southeast of the BART Extension (California Department of Fish and Wildlife 2016).

Tricolored Blackbird

The tricolored blackbird (*Agelaius tricolor*) is a California Species of Special Concern. Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open, accessible water; a protected nesting substrate, including flooded, thorny, or spiny vegetation; and suitable foraging space providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999). Almost 93 percent of the 252 breeding colonies reported by Neff (1937) were in freshwater marshes dominated by cattails and bulrushes (*Schoenoplectus* spp.). The remaining colonies in Neff's study were in willows, blackberries (*Rubus* spp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* spp.). In contrast, only 53 percent of the colonies reported during the 1970s were in cattails and bulrushes (DeHaven et al. 1975).

There are no known occurrences of tricolored blackbirds in the area (California Department of Fish and Wildlife ~~Game~~ 2016~~5~~; Figure 4.3-2), but preconstruction surveys for nesting tricolored blackbirds are required by the SCVHP (2012) due to the presence of riparian habitat. See Figure 4.3-3 for the areas where preconstruction surveys would be required.

Burrowing Owl

The burrowing owl is a California Species of Special Concern. It is not a federally listed species, and therefore no federal consultation is required. Historically, resident and wintering burrowing owls were common throughout most of California except in mountainous areas and coastal counties north of Marin (Gervais et al. 2008). Urbanization and agricultural conversion have eliminated large tracts of burrowing owl habitat and fragmented the remainder (Haug et al. 1993; Schulz 1997; Dechant 2002); however, burrowing owls exhibit a high level of tolerance to human disturbance and will nest or roost in urban and metropolitan areas (Haug et al. 1993).

At one point it was estimated that 167 nesting pairs (about 1.8 percent of the total California population) occurred in the San Francisco Bay Area, a decline of 50 percent from population estimates in the mid-1980s (DeSante et al. 1997). In 2014, surveys documented 115 breeding adults and 87 fledged young in Santa Clara Valley, occurring in the North San José/Baylands, Morgan Hill, and Gilroy (Santa Clara Valley Habitat Agency 2016). Potential breeding and foraging habitats in the area are located in the ruderal and non-native grasslands. The documented occurrences within 2 miles of the Newhall Maintenance Facility are all at the Mineta San Jose International Airport. The portion of the Newhall Maintenance Facility within the City of San Jose would be located within the burrowing owl fee zone of the SCVHP. The fee zone was established to protect burrowing owl habitat and fund conservation actions (Santa Clara County 2012). See Figure 4.3-3 for the areas where the fee zone and preconstruction surveys will occur.

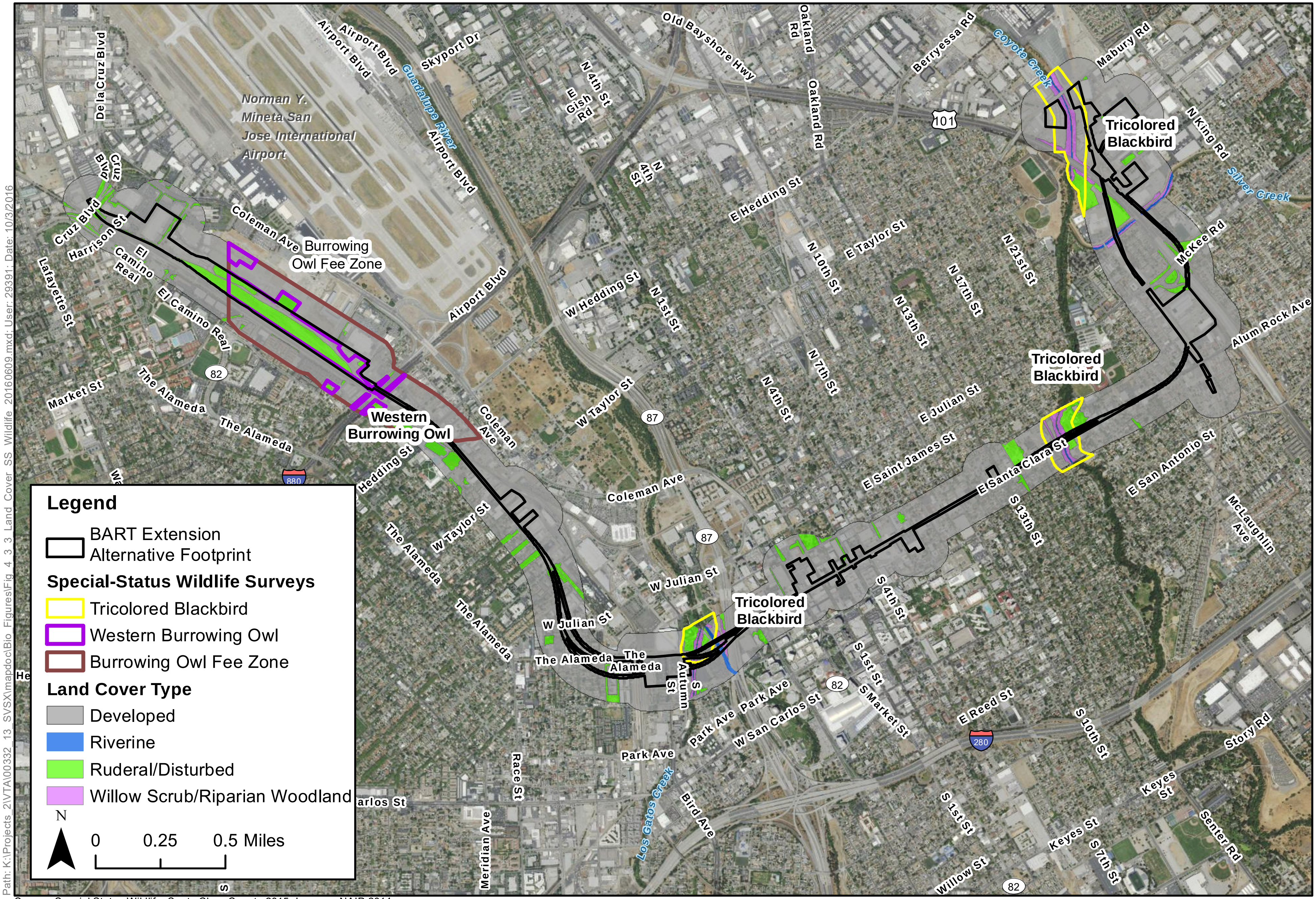
Special-Status Bats

Special-status bat species, such as Townsend's big-eared bat (*Corynorhinus townsendii*), may occur in the area. The underside of bridges and buildings located throughout the area, and riparian areas of the Guadalupe River and Coyote Creek, offer potential roosting and nursery habitat and foraging habitat for bats. Many bat species that can occur in the area may be state species of special concern.

Other Protected or Managed Biological Resources

Nesting Birds

Several species of birds, including many raptors, are not currently listed under the ESA or CESA, and are typically not considered to be special-status species by CDFW or USFWS. However, the occupied nests and eggs of these birds are protected by federal and state laws, including the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Sections 3503 (active bird nests) and 3503.5 (active raptor nests). Birds have the potential to nest and forage in all natural and some semi-natural habitats in the area. The highest concentration of nesting habitat for birds is in the riparian woodland of the Guadalupe River, Los Gatos Creek, and Coyote Creek.



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Source: Special Status Wildlife, Santa Clara County 2015; Imagery, NAIP 2014

Figure 4.3-3
Land Cover Types and Special-Status Wildlife Surveys
VTA's BART Silicon Valley–Phase II Extension Project

Cliff swallows (*Petrochelidon pyrrhonota*), tree swallows (*Tachycineta bicolor*), and barn swallows (*Hirundo rustica*) may nest in the area. Cliff swallows and barn swallows are colonial nesters and build mud nests on the undersides of artificial structures such as bridges. Tree swallows nest in tree and snag cavities in riparian and other woodland habitats. Swallows nest from February to August, and begin migrating southward in September and October. Potential nesting habitat for swallows occurs on the undersides of bridges in the area and in riparian habitat along the Guadalupe River, Los Gatos Creek, and Coyote Creek.

Other migratory bird species with a high potential to occur in an urbanized setting like the BART Extension area include mourning dove, killdeer, and black phoebe.

Roosting Bats

Bats, including Yuma myotis (*Myotis yumanensis*), long-legged myotis (*Myotis volans*), Pacific long-eared myotis (*Myotis evotis*), and special-status bats, could roost in the area under existing bridges, in abandoned buildings, or in trees within riparian woodland. Bat roosts are considered sensitive resources by CDFW. In addition, "take" of nongame mammals (i.e., all mammals occurring naturally in California which are not game mammals, fully protected mammals, or fur-bearing mammals), including bats, is prohibited by California Fish and Game Code Section 4150.

4.3.2.2 Regulatory Setting

The following federal regulations are relevant to the BART Extension. State and local regulations are discussed in Chapter 6, Section 6.4, *Biological Resources and Wetlands*.

Federal

Federal Endangered Species Act

The ESA of 1973 protects fish and wildlife species that have been identified by USFWS or NMFS as threatened or endangered, and their habitats. Endangered refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range; threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future. USFWS and NMFS administer the ESA. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes while other listed species are under USFWS jurisdiction. The following sections summarize provisions of the ESA (Sections 9 and 7) that are relevant to the BART Extension.

ESA Prohibitions (Section 9)

ESA Section 9 prohibits the take of any fish or wildlife species listed under the ESA as endangered. Take of a threatened species is also prohibited under Section 9 unless otherwise authorized by federal regulations. *Take*, as defined by the ESA, means “to harass, harm, pursue, hunt, shoot, wound, trap, kill, capture, or collect, or to attempt to engage in any such conduct.” Harm is defined as “any act that kills or injures the species, including significant habitat modification." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

ESA Authorization Process for Federal Actions (Section 7)

ESA Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies. It applies to actions that are conducted, permitted, or funded by a federal agency. Under Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NMFS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a Biological Assessment (BA) evaluating the nature and severity of the expected effect. If the BA concludes that the project "may affect, but is not likely to adversely affect" the species or designated critical habitat, then USFWS or NMFS must determine whether to concur with that conclusion. If so, the agency may issue a Letter of Concurrence and specify conditions underlying their concurrence, thereby concluding informal consultation. If, however, USFWS or NMFS do not concur and determine instead that the project "is likely to adversely affect" the species under review, then formal consultation is necessary and USFWS or NMFS issues a Biological Opinion (BO), with a determination that the proposed action would result in one of two conditions.

- The action may jeopardize the continued existence of one or more listed species (jeopardy finding) or result in the destruction or adverse modification of critical habitat (adverse modification finding).
- The action will not jeopardize the continued existence of any listed species (no jeopardy finding) or result in adverse modification of critical habitat (no adverse modification finding).

The BO issued by USFWS or NMFS may stipulate discretionary "reasonable and prudent" conservation measures. If the project would not jeopardize a listed species, USFWS or NMFS issues an incidental take statement to authorize the proposed activity. Incidental take permits are required when non-federal activities could result in take of a threatened or endangered species.

Migratory Bird Treaty Act

The MBTA (U.S. Code, Title 16, Section 703, 50 CFR 21, 50 CFR 10) enacts the provisions of treaties between the U.S., Canada, Mexico, Japan, and the former Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. Most actions that result in taking or in permanent or temporary possession of a protected species constitute violation of the MBTA. Examples of permitted actions that do not violate the MBTA include the possession of a hunting license to pursue specific game birds, legitimate research activities, display in zoological gardens, bird-banding, and other similar activities (Faanes et al. 1992). USFWS is responsible for overseeing compliance with the MBTA, and the U.S. Department of Agriculture's Wildlife Services Officer makes recommendations on related animal protection issues.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires all federal agencies to consult with NMFS on all actions or proposed actions (permitted, funded, or undertaken by the federal agency) that may adversely affect fish habitats. Under the provisions of the act, Congress mandated the identification of habitats essential to managed species (e.g., commercial species) and measures to conserve and enhance these habitats. The act requires cooperation among NMFS, Regional Fishery Management Councils, fishing participants, and federal and state agencies to protect, conserve, and enhance *essential fish habitat*, defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity.

Federal Clean Water Act

The federal Clean Water Act (CWA) is the primary law protecting the quality of the nation's surface waters, including lakes, rivers, and wetlands. As such, it empowers the U.S. Environmental Protection Agency to set national water quality standards and effluent limitations and establishes permit review mechanisms to enforce them, operating on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit.

Sections 303(d) (Identification of Areas with Insufficient Controls, Maximum Daily Load, Certain Effluent Limitation Revision), 401 (Certification), and 402 (National Pollutant Discharge Elimination System) of the CWA apply to the BART Extension. Sections 303(d), 401 and 402 are discussed in Section 4.17.2.2, *Water Quality*.

4.3.3 Methodology

An impact finding of *adverse effect* would involve influential regional effects and high-intensity loss of sensitive natural communities, wetlands and waters of the United States, special-status species and habitat, or wildlife movement habitat.

4.3.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*, and Section 4.3.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.3.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects would likely result in biological effects typically associated with transit, highway, bicycle and pedestrian facilities, and roadway projects. Mitigation for potential adverse effects could include avoidance or replacement of a land cover type in accordance with a mitigation and monitoring plan approved by the regulatory agencies. Projects planned under the No Build Alternative would undergo separate environmental review to determine biological resources and wetlands effects, which would include an analysis of impacts and mitigation measures to mitigate potential project impacts.

4.3.4.2 BART Extension Alternative

Sensitive Natural Communities

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa Extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the tunnel would pass beneath Lower Silver Creek near the U.S. 101 crossing. Riparian woodland occurs at Lower Silver Creek; however, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath the creekbed, respectively. Tunneling is discussed in Chapter 5, Section 5.3.1.1, *Tunnel Boring*; Section 5.3.2.1, *Tunnel Construction*; and Section 5.5.9.2, *Surface Settlement*. The tunnels would be lined with precast concrete segmental linings as the pressurized closed-faced tunnel boring machine moves forward. The closed-face tunnel boring machine keeps out groundwater, stabilizes the tunnel face, and minimizes settlement. Maximum settlement is projected to be 1 inch. Therefore, Lower Silver Creek and other creeks and rivers along the alignment would not be adversely affected. For the Twin-Bore Option, cross passages are required every 460 to 750 feet between the tunnels and may require surface ground treatment. Excavation of cross passages is not required for the Single-Bore Option. Surface ground treatment for cross passages would be a minimum of 200 feet from any river or creek. Because the BART Extension Alternative for both tunnel options would be located beneath the creek and surface activities would be at least 200 feet from any river or creek, there would be *no adverse effect* on sensitive natural communities at this location. No mitigation is required.

Alum Rock/28th Street Station

No sensitive natural communities occur at the Alum Rock/28th Street Station location; therefore, there would be *no effect* on these resources. No mitigation would be required.

Tunnel Alignment near Coyote Creek

Riparian woodland occurs in Coyote Creek; however, the Twin-Bore and Single-Bore Options would pass approximately 20 feet and 55 feet beneath the creekbed, respectively. The Twin-Bore Option would veer slightly to the north of the Single-Bore Option alignment near Coyote Creek. There would be no aboveground operations activities at this location for either tunnel option. Therefore, BART Extension Alternative operations would have *no adverse effect* on sensitive natural communities at this location. No mitigation would be required.

Downtown San Jose Station

No sensitive natural communities occur at the locations of the Downtown San Jose Station East Option or the Downtown San Jose Station West Option; therefore, there would be *no effect* on these resources. No mitigation would be required.

Diridon Station

Riparian woodland occurs along the alignment in Guadalupe River and Los Gatos Creek near the Diridon Station South and North Options. For the Diridon Station South Option, the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively, and 20 feet and 50 feet beneath the Los Gatos Creek bed, respectively. For the Diridon Station North Option, Twin-Bore and Single-Bore Options would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively, and 25 feet and 50 feet beneath the Los Gatos Creek bed, respectively. There would be no aboveground operational activities at these locations. All operational activities would occur in previously developed areas and would avoid riparian habitat. Therefore, BART Extension Alternative operations would have *no adverse effect* on sensitive natural communities at this location**.** No mitigation would be required.

Continuation of Tunnel Alignment

No sensitive natural communities occur along the continuation of the tunnel alignment from the Diridon Station to just north of Interstate 880 (I-880).Therefore, although the aboveground Stockton Avenue ventilation facility would be located in this portion of the alignment, there would be *no effect* on biological resources. No mitigation would be required.

Newhall Maintenance Facility

No sensitive natural communities occur at the site of the proposed Newhall Maintenance Facility; therefore, there would be *no effect* on these resources. No mitigation would be required.

Santa Clara Station

No sensitive natural communities occur at the site of the proposed Santa Clara Station; therefore, there would be *no effect* on these resources. No mitigation would be required.

Wetlands and Waters of the United States

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath Lower Silver Creek bed, respectively, near the U.S. 101 crossing. No operations would occur aboveground at Lower Silver Creek. Therefore, BART Extension Alternative operations would have *no adverse effect* on federally protected wetlands or waters of the United States at Lower Silver Creek. No mitigation would be required.

Alum Rock/28th Street Station

No federally protected wetlands or waters of the United States are present at the Alum Rock/28th Street Station. Therefore, there would be *no effect* on wetlands or waters of the United States at this location. No mitigation would be required.

Tunnel Alignment near Coyote Creek

The Twin-Bore and Single-Bore Options alignment would pass approximately 20 feet and 55 feet beneath the Coyote Creek bed, respectively, and there would be no aboveground operations activities near the creek. Therefore, there would be *no effect* on wetlands or waters of the United States at this location. No mitigation would be required.

Downtown San Jose Station

No federally protected wetlands or waters of the United States are present at the locations of the Downtown San Jose Station East and West Options. All aboveground BART Extension Alternative operations would be in previously developed areas. Therefore, there would be *no effect* on wetlands or waters of the United States under either option. No mitigation would be required.

Diridon Station

For the Diridon Station South Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively. For the Diridon Station North Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively. There would be no aboveground operational activities near the river.

As the alignment approaches the Diridon Station South Option, it would continue approximately 20 feet (Twin-Bore Option) and 50 feet (Single-Bore Option) under Los Gatos Creek bed. Systems facilities for the Diridon Station South Option would be on the north side of the creek in a previously developed area. As the alignment approaches the Diridon Station North Option, it would continue approximately 25 feet (Twin-Bore Option) and 50 feet (Single-Bore Option) under the Los Gatos Creek bed. Systems facilities for the Diridon Station North Option would be on the north side of Autumn Street in a previously developed area. Therefore, there would be *no effect* on wetlands and waters of the United States at this location. No mitigation would be required.

Continuation of Tunnel Alignment

No federally protected wetlands or waters of the United States occur along the tunnel alignment from Diridon Station to just north of I-880. Therefore, although the aboveground Stockton Avenue ventilation facility would be located in this portion of the alignment, there would be *no effect* on wetlands and waters of the United States along this alignment. No mitigation would be required.

Newhall Maintenance Facility

No federally protected wetlands or waters of the United States occur at the site of the proposed Newhall Maintenance Facility. Therefore, there would be *no effect* on wetlands and waters of the United States at this location. No mitigation would be required.

Santa Clara Station

No federally protected wetlands or waters of the United States occur at the Santa Clara Station. Therefore, there would be *no effect* on wetlands and waters of the United States. No mitigation would be required.

Special-Status Species

Connection to Phase I Berryessa Extension

The connection to the Phase I Berryessa extension would be at grade near Las Plumas Avenue, north of Lower Silver Creek, and then enter the East Tunnel Portal. South of the portal, the Twin-Bore and Single-Bore Options would pass approximately 25 feet and 30 feet beneath Lower Silver Creek bed, respectively, near the U.S. 101 crossing. The surrounding area is highly urbanized. No special-status species are expected to occur on the BART Extension Alternative because of a lack of habitat. Therefore, BART Extension Alternative operations in this location would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Alum Rock/28th Street Station

Alum Rock/28th Street Station would be located in an area that is already urbanized. No special-status species are expected to occur on the BART Extension Alternative because of a lack of habitat. Therefore, BART Extension Alternative operations at the Alum Rock/ 28th Street Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Tunnel Alignment near Coyote Creek

The Twin-Bore and Single-Bore Options alignment would pass approximately 20 feet and 55 feet beneath Coyote Creek bed, respectively, near Santa Clara Street. In addition, there would be a ventilation facility on an existing site consisting of a parking lot and building west of Coyote Creek. Although Coyote Creek and associated riparian woodland are known to or could potentially support special-status fish, bat, and aquatic reptile (i.e., western pond turtle) species, BART Extension Alternative operations would not disturb any aquatic or woodland habitat potentially supporting special-status species because operations would be 20 feet below the ground surface or away from the creek. Therefore, BART Extension Alternative operations in this location would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Downtown San Jose Station

Both of the locations of the Downtown San Jose Station Options (East and West) are in a downtown commercial area that is urbanized. No special-status species are expected to be present in this area. Therefore, BART Extension Alternative operations at the Downtown San Jose Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Diridon Station (South and North Options)

For the Diridon Station South Option, tunnels for the Twin-Bore and Single-Bore Options would pass approximately 40 feet and 50 feet beneath the Guadalupe River bed, respectively, and 20 feet and 50 feet beneath the Los Gatos Creek bed, respectively, east of the Diridon Station, For the Diridon Station South Option, the tunnels for the Twin-Bore and Single-Bore Options alignments would pass approximately 45 feet and 50 feet beneath the Guadalupe River bed, respectively, and 25 feet and 50 feet beneath the Los Gatos Creek bed, respectively, east of the Diridon Station North Option, then continue along the south side of Santa Clara Street underground for both the Twin-Bore and Single-Bore Options. Special-status species with the potential to occur in and around Guadalupe River and Los Gatos Creek consist of special-status bats, western pond turtles, and Central California coast steelhead and Chinook salmon. Underground operations would not disturb habitat for these species. The rest of the Diridon Station South and North Options would be in an area that is currently used as parking for the existing Caltrain station. The Diridon Station North Option would also utilize a previously disturbed, triangular parcel for construction staging and/or underground station system facilities (Single-Bore Option) adjacent to the western section of the Caltrain tracks. Therefore, BART Extension Alternative operations at the Diridon Station with both the South and North Options would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Continuation of Tunnel Alignment

The continuation of the tunnel alignment from Diridon Station to just north of I-880 would be located in an urbanized area with extensive human disturbance. No special-status species are expected to be present in this area; therefore, BART Extension Alternative operations along the continuation of the tunnel alignment, including operation of the ventilation facility along Stockton Avenue, would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Newhall Maintenance Facility

The Newhall Maintenance Facility would be located in an urbanized area with extensive human disturbance. Burrowing owl habitat is identified in the SCVHP as possibly being present in the portion of the Newhall Maintenance Facility within the City of San Jose. This area is a burrowing owl fee zone. Mitigation requiring surveys for owls would be implemented during construction, as described in Mitigation Measure BIO-CNST-F (see Chapter 5, Section 5.5.4, *Biological Resources and Wetlands* for construction mitigation). After construction, no special-status species are expected to be present in this area. Impacts for the Twin-Bore and Single-Bore Options would be the same. Therefore, BART Extension Alternative operations would have *no adverse effect* on special-status species or habitat, and no mitigation would be required.

Santa Clara Station

The Santa Clara Station would be located in an urbanized area with extensive human disturbance, including passenger and freight train movements. No special-status species are expected to be present in this area because of a lack of habitat; therefore, BART Extension Alternative operations at the Santa Clara Station would have *no adverse effect* on special-status species or habitat. No mitigation would be required.

Santa Clara Valley Habitat Plan

The BART Extension Alternative falls within the SCVHP permit area. Within the permit area, the alignment falls within wildlife survey areas for burrowing owl at the Newhall Maintenance Facility and tricolored blackbird along Guadalupe River and Los Gatos Creek, and is also located in the burrowing owl fee zone (SCHVA 2015). Construction activities could result in a significant impact on these species if found in the area (see Chapter 5, Section 5.4.4, *Biological Resources and Wetlands*). VTA would perform preconstruction surveys, and if necessary implement avoidance measures for tricolored blackbird (Mitigation Measure BIO-CNST-E) and burrowing owls (Mitigation Measure BIO-CNST-F). With the implementation of these mitigation measures and compliance with the SCVHP burrowing owl fee zone, this impact would have *no adverse effect*.

The SCVHP addresses nitrogen deposition in the region of the BART Extension Alternative. Operations of the BART Extension Alternative could affect nitrogen output, which could indirectly reduce habitat quality for Bay checkerspot butterflies, a species listed as threatened under the ESA and covered under the SCVHP, by impacting success of their host plants. Serpentine soils have low productivity and naturally low nitrogen levels. This allows the bay checkerspot butterfly native host plants to thrive in serpentine soils. As a result of increased air pollution, nitrogen has been depositing into the serpentine soils, allowing for other nonnative invasive species to persist and compete with the bay checkerspot butterfly host plants. Serpentine soils are also important to a variety of native grasses. Nitrogen deposition poses threats to many resources in the region (Santa Clara County 2012). As discussed in Chapter 6, Sections 6.3, *Air Quality*, and 6.7, *Energy*, the BART Extension Alternative will actually decrease nitrogen output because fewer vehicle miles traveled as a result of fewer vehicles on the road. Therefore, there would be *no adverse effect*. No mitigation is required.

Wildlife Movement and Nesting Birds

Operation of the BART Extension Alternative is not expected to interfere with wildlife movement or impede use of wildlife nursery sites, including active bird nests protected under the MBTA and California Fish and Game Code. Although opportunities for wildlife movement in the study area are severely limited by the existing urban development, some wildlife movement could be expected along the Guadalupe River and Lower Silver, Coyote, and Los Gatos Creeks. However, the Twin-Bore and Single-Bore Options at these locations would be, at a minimum, approximately 20 feet below the creek beds and, thus, would not prevent wildlife movement.

Terrestrial wildlife species, including birds, may be temporarily disturbed during maintenance activities at the Newhall Maintenance Facility; however, because all the facilities would be in highly urbanized areas that lack vegetation suitable for nesting, birds would not likely use these areas for nesting or would have already adapted to the high levels of disturbance characteristic of urbanized areas. Therefore, there would be *no adverse effect*.

NEPA Conclusion

There would be *no adverse effect* on any biological resources from operation of the BART Extension Alternative (for both Single-Bore and Twin-Bore Options).

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4.4 Community Facilities and Public Services

4.4.1 Introduction

This section describes the affected environment and environmental consequences related to community facilities and public services from operations of the NEPA Alternatives. The following sources of information were used to prepare the analysis in this section.

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010-2035 General Plan* (City of Santa Clara 2010).
- *City of Santa Clara 2010-2035 General Plan EIR* (City of Santa Clara 2010a).
- *Fire Department Organizational Review – City of San Jose, CA* (Citygate Associates, Inc. 2016).
- *Triennial On-Site Security Review of VTA* (California Public Utilities Commission 2014).
- Personal communications with San Jose Police Department, San Jose Fire Department, San Jose Unified School District, San Jose Parks, Recreation and Neighborhood Services, Santa Clara Police Department, Santa Clara Fire Department, Santa Clara Unified School District, Santa Clara Department of Parks and Recreation, and BART Police Department.

4.4.2 Environmental and Regulatory Setting

4.4.2.1 Environmental Setting

This section discusses the existing conditions related to public services and community facilities in the vicinity of the BART Extension Alternative. For the purposes of this analysis, *public services* include fire protection, emergency services, and law enforcement, whereas *community facilities* include schools, parks, libraries, civic and cultural centers, religious institutions, entertainment hubs, and museums. Figures 4.4-1 through 4.4-3 show the locations of these public services and community facilities within San Jose and Santa Clara along the alignment.

Police, Fire, and Emergency Services

Police Services

Police protection for the BART Extension Alternative is provided by the BART Police Department for the station platforms and trackway and VTA in coordination with the Santa Clara County Sheriff's Office for other facilities, as discussed in Section 4.13, *Security and System Safety*. Police protection and traffic enforcement for areas outside the BART Extension Alternative facilities would be provided by the San Jose Police Department (SJPD) and Santa Clara Police Department (SCPD). In addition, local police departments have mutual-aid agreements with other agencies such as the San Mateo County Sheriff's Office and California Highway Patrol.

Police protection services for each city in the study area are discussed below. Police facilities servicing the BART Extension Alternative are mapped in Figure 4.4-1.

City of San Jose

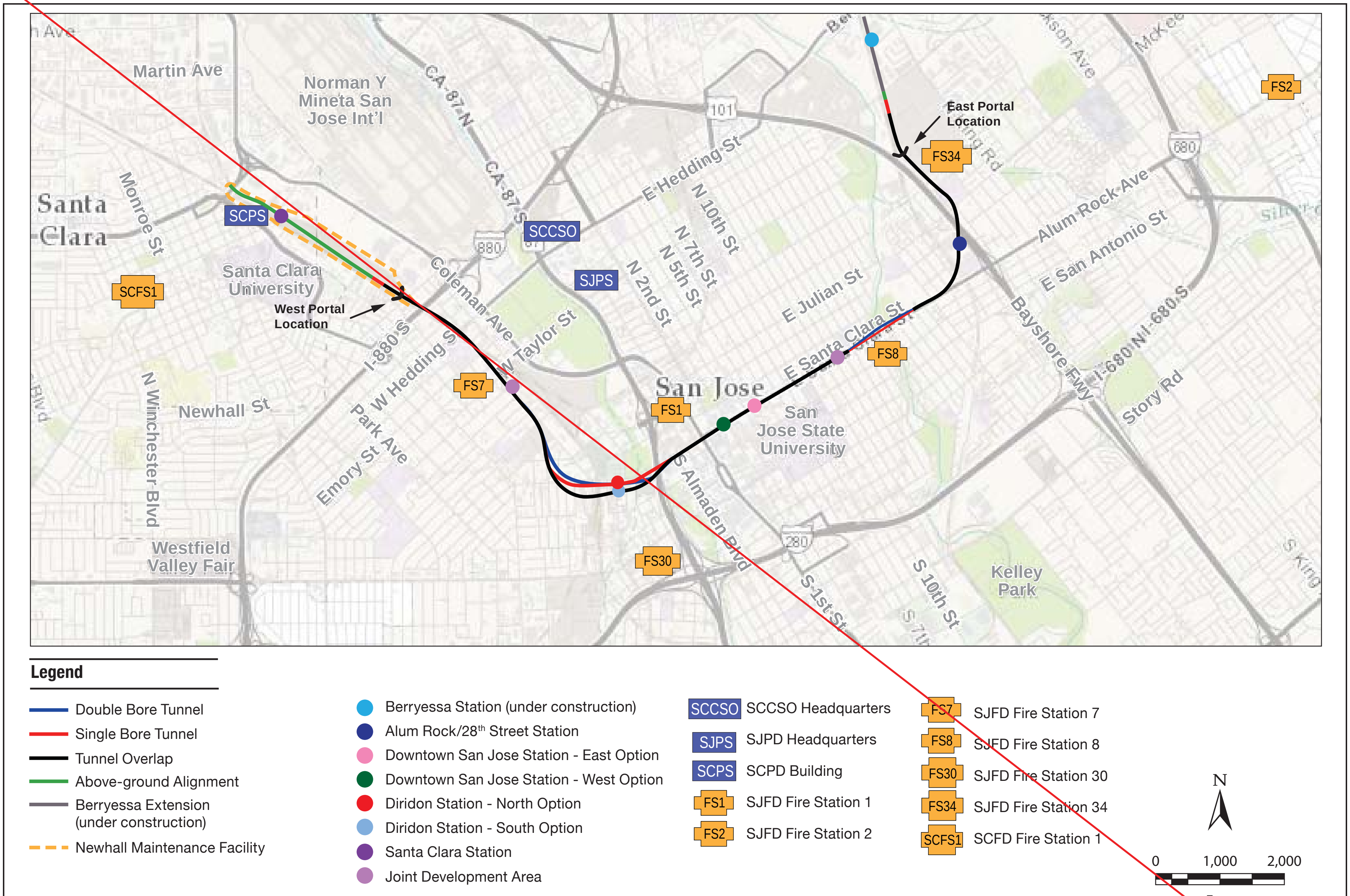
SJPD provides police services to the City of San Jose, and currently employs 932 sworn officers and 423.67 civilian staff members. SJPD's response target, defined as the period from when a call is received until an officer is on the scene, is under 6 minutes for Priority 1 calls and under 11 minutes for Priority 2 calls. (Priority 1 calls indicate an event of immediate potential for imminent danger to life or property; Priority 2 calls indicate that an event has occurred but the suspect is no longer at the scene and/or no imminent threat exists to life or property). For the first quarter of the 2015 fiscal year, SJPD maintained an average 7.58-minute response time for Priority 1 calls and 20.89-minute response time for Priority 2 calls. SJPD responded to 53 percent of Priority 1 calls in under 6 minutes, and 45 percent of Priority 2 calls in under 11 minutes.

SJPD operates out of the 201 West Mission Street headquarters, located outside of the BART Extension Alternative study area. This location serves the entire City of San Jose. As of fall 2015, there were no new proposed police stations. SJPD does not consider current equipment, staffing, facilities, and response times as adequate to provide police service in its jurisdiction (Morales pers. comm.).

City of Santa Clara

SCPD provides police services to the City of Santa Clara. SCPD currently employs 205 full-time and 68 volunteer employees. The Santa Clara BART station would be served by the SCPD Police Building at 601 El Camino Real. The *City of Santa Clara 2010-2035 General Plan* establishes a 3 minutes-or-less response time for high priority calls. In fiscal year 2014, SCPD had an average response time of 3:59 minutes to high-priority calls (McDowell pers. comm.).

SCPD currently needs additional police officers and support staff to maintain its level of service, and is conducting a detailed assessment to better evaluate existing resources and plan for future staffing needs.



Source: Station and Track, VTA 2015; Basemap, ESRI 2015

Graphics … 00332.13 (10-17-2016)

Figure 4.4-1
Police and Fire Services
VTA's BART Silicon Valley–Phase II Extension Project

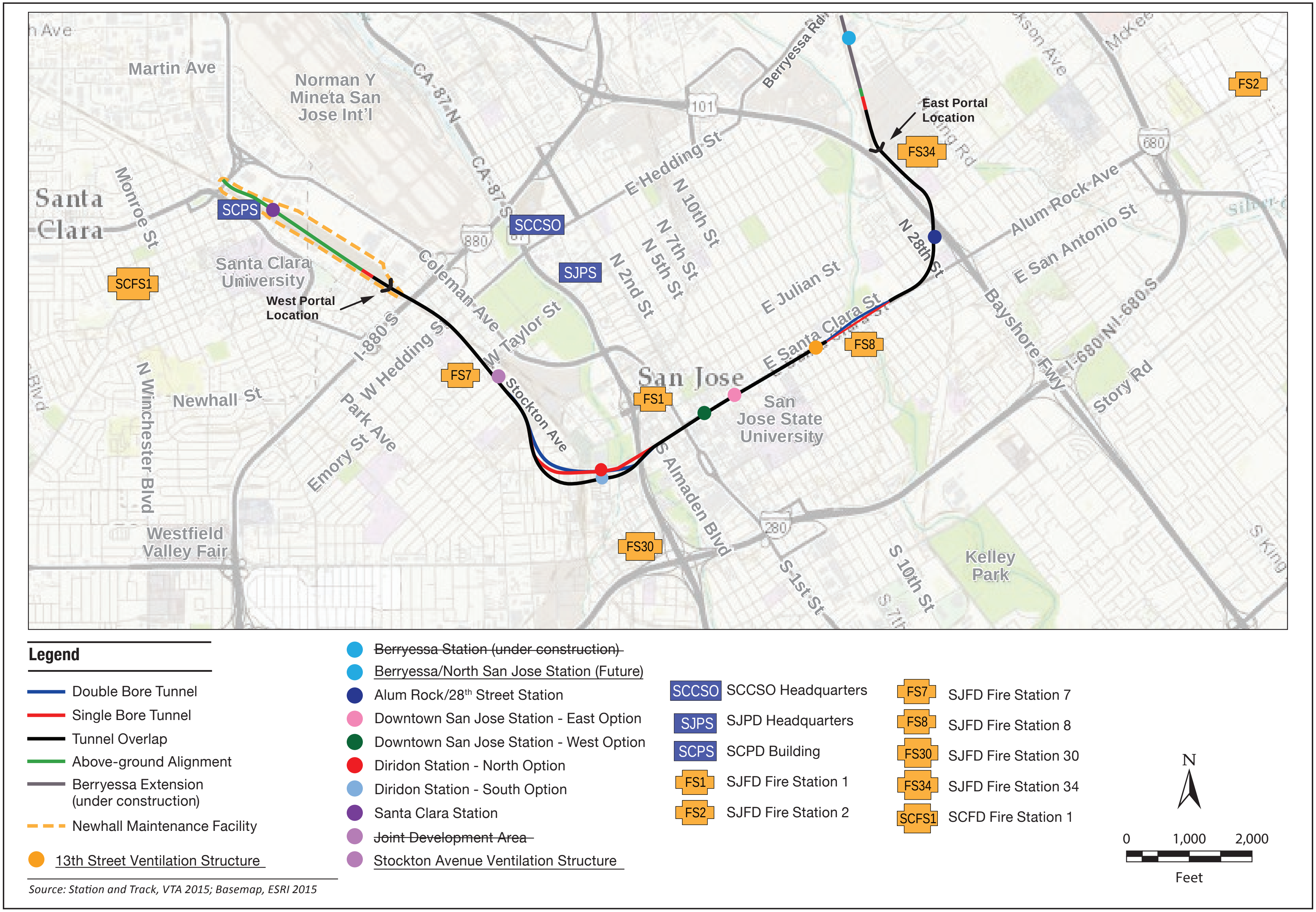


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Figure 4.4-1
Police and Fire Services (Revised)
VTA's BART Silicon Valley–Phase II Extension Project

Santa Clara County Sherriff's Office

The Santa Clara County Sheriff's Office (SCCSO) provides law enforcement for Cupertino, Los Altos Hills, Saratoga, and unincorporated Santa Clara County, and maintains contracts with VTA and Santa Clara County Parks Department for police services. SCCSO currently employs 1,299 sworn officers and 426 civilian staff members, operating from a headquarters in San Jose and multiple substations across Santa Clara County.

Currently, under the direction of VTA's Director of System Safety and Security, VTA's law enforcement and investigative services are provided under contract with the SCCSO Transit Patrol Division. Transit Patrol deputies are on duty 24 hours per day and respond to calls for service through VTA's Operations Control Center and passengers using the 9-1-1 system. In addition, three special enforcement units are employed to ensure a safe environment for VTA operators and passengers (California Public Utilities Commission 2014).

San Mateo County Sherriff's Office

The San Mateo County Sheriff's Office (SMCSO) Transit Police Bureau provides law enforcement and investigative services to the municipal bus system in San Mateo County and the entire Caltrain commuter railroad line operating from San Francisco to Gilroy. The Transit Police Bureau currently employs 15 officers responsible for patrolling transit stations, railroad rights-of-way, district parking lots, and related properties throughout San Francisco, San Mateo, and Santa Clara counties; as well as the investigation of crimes, collisions, accidents, and deaths involving Caltrain passenger trains. The Transit Police operate from a headquarters in San Carlos, but maintain substations at the 4th and King Caltrain Station in San Francisco and the Diridon Caltrain Station in San Jose. SMCSO provides primary enforcement for the parking areas related to the Diridon Caltrain Station.

Fire Protection and Emergency Services

Fire protection services and emergency medical rescue in the study area are provided by the Cities of San Jose and Santa Clara. These cities maintain mutual-aid agreements with the municipal and county fire departments through the Santa Clara County Local Mutual Aid Plan, as well as with the California Department of Forestry and Fire Protection.

Fire protection services for San Jose and Santa Clara are discussed below. Fire facilities servicing the BART Extension Alternative are mapped in Figure 4.4-1.

City of San Jose

The San Jose Fire Department (SJFD) provides fire protection and emergency services throughout San Jose. As of October 2015, SJFD had 660 sworn personnel and 33 active fire stations (Pereira pers. comm.). Each station is capable of providing fire protection, fire rescue, and emergency medical services.

Six SJFD stations serve the study area:

- Fire Station 1, located at 225 North Market Street, is staffed 24 hours a day. This station has a four-person fire engine, a four-person fire truck, and a battalion chief.
- Fire Station 2, located at 2949 Alum Rock Avenue, is staffed 24 hours a day. This station has a four-person fire engine, a four-person fire truck, and a battalion chief.
- Fire Station 7, located at 800 Emory Street, is staffed 24 hours a day. This station has a four-person fire engine.
- Fire Station 8, located at 802 Santa Clara Street, is staffed 24 hours a day. This station has a four-person fire engine.
- Fire Station 30, located at 454 Auzerais Avenue, is staffed 24 hours a day. This station has a four-person fire truck, a two-person squad, and a paramedic supervisor.
- Fire Station 34, located at 1634 Las Plumas Avenue, is staffed 24 hours a day. This station has a four-person engine and a four-person urban search and rescue team.

SJFD's current performance goal is to arrive within 8 minutes for 80 percent of 9-1-1 calls for serious (Priority 1) incidents. For medical emergencies and emerging fires, national best practices recommend that the first fire unit arrive within 7 minutes of a 9-1-1 call 90 percent of the time. Neither of these standards are met department-wide, though five individual station areas meet the 8-minute goal (Citygate 2016).

In addition, the *Envision San Jose 2040 General Plan* identifies a 4-minute response time for first engine response, and 6 minutes for the second engine and first truck/urban search and rescue responses. No SJFD station meets this response time goal (Citygate 2016). The SJFD's primary obstacles to meeting response goals include too few stations, traffic congestion, high workload rates, and movements of station companies for mandatory multi-unit training.

The San Jose Fire Department, Bureau of Fire Prevention is responsible for providing technical reviews, construction inspections, and California Fire Code enforcement to maintain public safety within the City of San Jose. The Bureau is currently staffed with the following positions:

- Senior Engineers (4) – supervise Associate Engineers and provide direction on complex issues.
- Associate Engineers (15) – perform plan reviews and construction inspections.
- Fire Inspectors (11) – perform code enforcement and annual inspections, including construction inspections.

City of Santa Clara

The Santa Clara Fire Department (SCFD) provides fire protection and emergency services to Santa Clara. SCFD currently employs 134 full-time personnel and 44 volunteer reserve staff members. SCFD aims for a city-wide response time of less than 5:30 minutes for 90 percent of all high-level emergency calls. In 2014, SCFD achieved this response standard 85 percent of the time (Madden pers. comm.).

Fire Station 1, located at 777 Benton Street, would service the Santa Clara Station with supplemental assistance from Fire Station 4, located at 2323 Pruneridge Avenue, and Fire Station 2, located at 1900 Walsh Avenue, depending on the nature of the emergency. Fire Station 1 is staffed 24 hours a day and provides fire protection, advanced life support, fire and life safety inspection, and emergency medical services to District 1, which ranges from Newhall Street to the south, Los Padres Boulevard to the west, De La Cruz Avenue to the east, and Reed Street to the north. Fire Station 1 is equipped with a three-person advanced life support fire engine company, a two-person fire department ambulance, and a battalion chief.

SCFD is currently conducting a staffing analysis and comprehensive standards of cover report.

Community Facilities

Community facilities are defined as schools, parks, libraries, civic and cultural centers, religious institutions, entertainment hubs, and museums. For the purposes of this analysis, facilities within approximately 0.25 mile (walking distance) of a BART station are evaluated, because community facilities within this proximity are most likely to be affected by the BART Extension Alternative. There are no hospitals within this study area.

Schools

San Jose

San Jose has 22 public school districts that operate 222 public schools serving the city. The San Jose Unified School District (SJUSD) operates schools that serve the San Jose portions of the BART Extension Alternative. Many private and charter schools also operate within the city.

Empire Gardens Elementary School, Burnett Middle School, and San Jose High School would be the designated schools for students generated by the BART Extension Alternative within San Jose. According to SJUSD, Empire Gardens Elementary School is at 74 percent capacity with 399 students, Burnett Middle School is at 87 percent capacity with 813 students, and San Jose High School is at 76 percent capacity with 1,065 students (Case pers. comm.). SJUSD is currently considering an expansion of the Burnett Middle School campus to accommodate an Alternative Cooperative Education Charter School. Based on a recent demographic study, SJUSD ~~is~~will experienc~~ing~~e an enrollment decline in the study area over the next 5 years (Case pers. comm.). According to the *Envision San Jose 2040 General Plan EIR*, San Jose is expecting an additional 11,079 students by 2040.

Two high schools, three elementary schools, one middle school, and one community middle/high school are within 0.25 mile of the BART station locations in San Jose. These institutions are listed in Table 4.4-1 and shown on Figure 4.4-2. Anne Darling Elementary School, San Jose Community Middle and High Schools, and San Jose High School (all operated by SJUSD) would be within walking distance of the Alum Rock/28th Street Station. Both Cristo Rey San Jose Jesuit High School ~~is a~~ (private high school) and Sunrise Middle School (charter school) are also within walking distance of this station.

Table 4.4-1: Schools within the Study Area

Schools	Location	Nearby Station (within 0.25 mile)	Figure 4.4-2 Map Icon
Anne Darling Elementary School	333 North 33rd Street, San Jose	Alum Rock/28th Street	S1
San Jose Community Middle and High Schools	1155 E. Julian Street, San Jose	Alum Rock/28th Street	S2
San Jose High School	275 North 24th Street, San Jose	Alum Rock/28th Street	S3
Cristo Rey San Jose Jesuit High School	1390 Five Wounds Lane, San Jose	Alum Rock/28th Street	S4
Saint Patrick Elementary School	51 North 9th Street, San Jose	Downtown San Jose (East Option)	S5
San Jose State University	One Washington Square, San Jose	Downtown San Jose (East Option)	S6
Horace Mann Elementary School	55 North 7th Street, San Jose	Downtown San Jose (East Option)	S7
Bellarmine College Preparatory	850 Elm Street, San Jose	N/A	S8
Santa Clara University	500 El Camino Real, Santa Clara	Santa Clara	S9
Sunrise Middle School	1149 E. Julian Street, San Jose	Alum Rock/28th Street	S10
Source: Google Maps 2015; San Jose State University 2014; Santa Clara University 2016; Case pers. comm.			

Horace Mann Elementary School, operated by SJUSD, would be within walking distance of the San Jose Downtown Station East Option. In addition, Saint Patrick Elementary School, a private elementary school, and San Jose State University, a public university with almost 32,000 students, also would be within 0.25 mile of this station (San Jose State University 2014).

Bellarmine College Preparatory is not within 0.25 mile of a BART station, but a corner of the Bellarmine College Preparatory school grounds is directly above the tunnel alignment for both the Twin-Bore and Single-Bore Options.

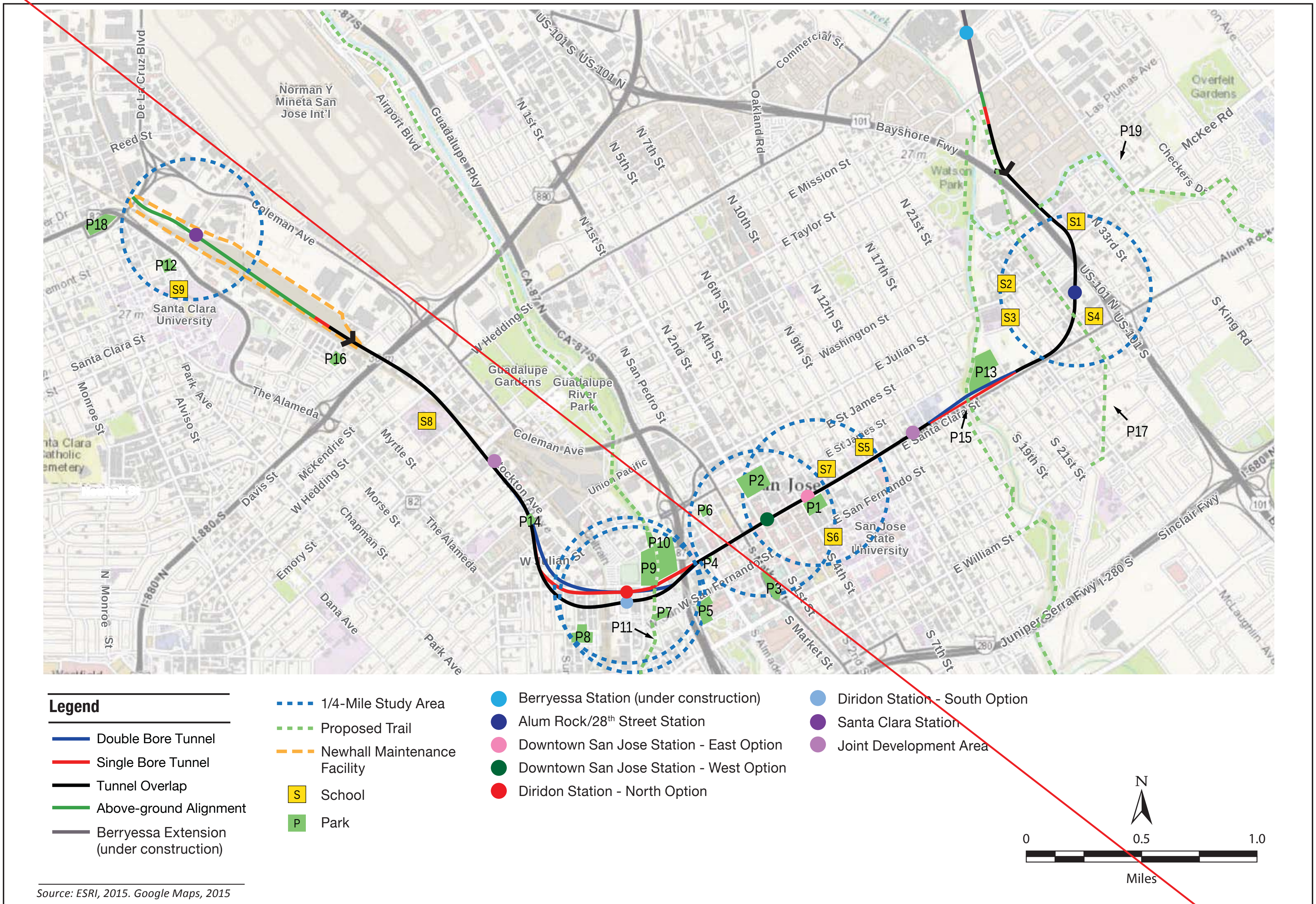

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Figure 4.4-2
Schools and Park Facilities
VTA's BART Silicon Valley–Phase II Extension Project

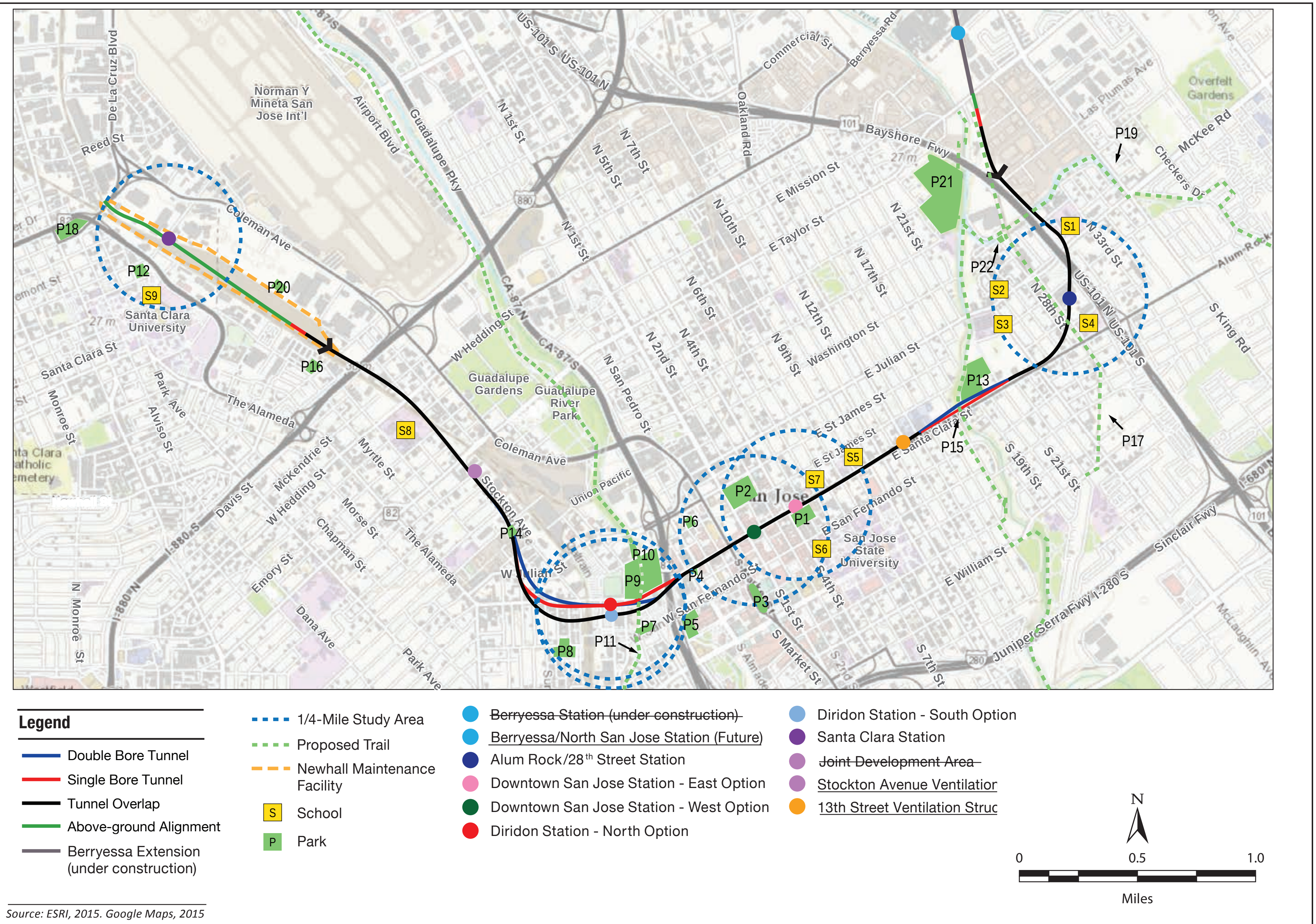

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Figure 4.4-2
Schools and Park Facilities (Revised)
VTA's BART Silicon Valley–Phase II Extension Project

Santa Clara

The Santa Clara Unified School District (SCUSD) provides public education services to students in Santa Clara, Sunnyvale, and San Jose, and is responsible for 16 elementary schools, three middle schools, two high schools, one kindergarten through 8th grade (K–8), two continuation high schools, and one adult education school.

Scott Lane Elementary School, Buscher Middle School, and Santa Clara High School would be the designated schools for students generated by the BART Extension Alternative within Santa Clara. Scott Lane Elementary is at 104 percent capacity with 466 students, Buscher Middle School is at 103 percent capacity with 1,047 students, and Santa Clara High School is at 124 percent capacity with 2,017 students (Healy pers. comm.).

Approximately 2,000 additional students will need to be accommodated by SCUSD by 2035 (City of Santa Clara 2010). SCUSD currently has four closed school sites in Santa Clara that could be used by students generated by new development. New school facilities are also anticipated in north San Jose that would add more capacity, and Campbell school districts could accommodate a relatively modest gain in students from Santa Clara. Alternatively, school catchment areas[1] could be modified or modular classrooms could be used to accommodate new students.

The only school within walking distance of the BART Station in Santa Clara is Santa Clara University, a private university with over 9,000 students (Santa Clara University 2016). A number of Santa Clara University academic buildings, recreational facilities, and student housing would also be within 0.25 mile of the Newhall Maintenance Facility.

Parks and Recreational Facilities

~~There are a variety of existing and proposed parks and recreational facilities within the vicinity of the BART Extension Alternative.~~ As noted in Table 4.4-2 and shown on Figure 4.4-2, there are 22~~19~~ parks, trails, and proposed trails near the BART Extensions Alternative~~are within 0.25 mile of the San Jose and Santa Clara BART stations~~. Table 4.4-2 and Figure 4.4-2 also identify recreational facilities ~~located directly over the proposed alignment or~~ within 0.25 mile of the Newhall Maintenance Facility.

City of Jose

The City of San Jose Department of Parks, Recreation and Neighborhood Services (SJPRNS) operates ~~3,484~~ 3,502 acres of regional and neighborhood/community serving parkland in San Jose (SJPRNS 2016) ~~(LéVeque pers. comm.)~~. SJPRNS manages ~~197~~ 190 neighborhood ~~services~~ parks, 9 regional parks, and over 57 miles of trails. As stated in the *Envision San Jose 2040 General Plan*, San Jose has a neighborhood parkland level of service (LOS) goal of 3.5 acres per 1,000 residents. Citywide, the LOS is estimated at 1.68 acres per 1,000 residents, less than half of the LOS goal (LéVeque pers. comm.).

[1] School catchment areas are the predefined geographic zones associated with a school. Students living within a catchment area are eligible to attend the corresponding school.

Table 4.4-2: Parks and Recreational Facilities within the Study Area

Parks and Recreational Facility	Location	Nearby Station (within 0.25 mile)[a]	Figure 4.4-2 Map Icon
City Hall Plaza	San Jose	Downtown San Jose	P1
St. James Park	San Jose	Downtown San Jose	P2
Plaza de Cesar Chavez	San Jose	Downtown San Jose (West Option)	P3
Almaden Entrance Triangle Park	San Jose	Downtown San Jose (West Option)	P4
McEnery Park	San Jose	Diridon (South and North Options)	P5
Peralta Adobe – Fallon House Historic Site	San Jose	Downtown San Jose (West Option)	P6
San Fernando Station Plaza	San Jose	Diridon (South and North Options)	P7
Cahill Park	San Jose	Diridon (South and North Options)	P8
Arena Green	San Jose	Diridon (South and North Options)	P9
Guadalupe River Park & Trail	San Jose	Diridon (South and North Options)	P10
Los Gatos Creek Trail (Proposed)[b]	San Jose	Diridon (South and North Options)	P11
The Forge Garden	Santa Clara	Santa Clara	P12
Roosevelt Park[c]	San Jose	N/A	P13
Theodore Lenzen Park[c]	San Jose	N/A	P14
Coyote Creek Trail (Proposed)[d]	San Jose	N/A	P15
Newhall Park	San Jose	N/A	P16
Five Wounds Trail (Proposed)[e]	San Jose	Alum Rock/28th Street	P17
Larry J. Marsalli Park	Santa Clara	N/A	P18
Lower Silver Creek Trail	San Jose	N/A	P19
Coleman Soccer Fields	San Jose	N/A	P20
Watson Park	San Jose	N/A	P21
Hacienda Park	San Jose	N/A	P22

Sources: City of San Jose 2015; Google Maps 2015.

[a] Unless specifically mentioned, parks and recreational facilities within 0.25 mile of the Downtown San Jose Station are within 0.25 mile of both the Downtown San Jose Station East Option and the Downtown San Jose Station West Option locations.

[b] The proposed Reach 5 of the Los Gatos Creek Trail would extend north from the existing Los Gatos Creek Trail to intersect with the Guadalupe Creek Trail at Santa Clara Street. A planning document for this segment – *Los Gatos Creek Trail Reach 5 Master Plan* – was released in 2008. Final design of this segment is currently ongoing, and no construction commencement date has been identified.

[c] Roosevelt Park and Theodore Lenzen Park are not with 0.25 mile of a BART Station. However, both parks are directly above the tunnel alignment.

[d] Coyote Creek Trail (Proposed) would extend north and south along Coyote Creek through the City of San Jose. Only a segment of this proposed trail is depicted in Figure 4.4-2. A planning document for this segment – *Coyote Creek Trail, Story Road to Lower Silver Creek Master Plan* – was released in 2008. Final design of this segment is currently ongoing, and no construction commencement date has been identified.

Parks and Recreational Facility	Location	Nearby Station (within 0.25 mile)[a]	Figure 4.4-2 Map Icon
[e] Five Wounds Trail (Proposed) would follow a former railway alignment through eastern downtown San Jose. In 2010, the community developed a conceptual plan for this trail. No further studies have been completed.			

City of Santa Clara

The City of Santa Clara owns and maintains 38 parks, playgrounds, and open space areas, for a total of approximately 299 acres. This acreage includes parks that primarily serve Santa Clara residents and businesses, but excludes regional service facilities such as the Municipal Santa Clara Golf & Tennis Club and the Pruneridge Golf Course. All of these facilities are managed by the City of Santa Clara Department of Parks and Recreation. Santa Clara currently has 2.53 acres of local-serving parkland per 1,000 multi-family apartment residents, and 3 acres of parkland per 1,000 single-family subdivision residents (Teixeira pers. comm.). Opportunities for additional open space within Santa Clara are limited by existing urban development (City of Santa Clara 2010a).

There are no Santa Clara-owned parks or recreational facilities in the vicinity of the BART Extension Alternative. Forge Garden is a Santa Clara University facility located within 0.25 mile of the Santa Clara Station. This garden is used for academic courses and is open during weekdays for public engagement. Santa Clara University also operates a number of sports complexes within 0.25 mile of the Newhall Maintenance Facility.

Civic, Religious, ~~Entertainment,~~ and Cultural Facilities

As shown in Table 4.4-3 and on Figure 4.4-3, there are ~~30~~36 civic, cultural, and religious facilities within 0.25 mile of the BART station locations. Of these, 31~~25~~ facilities are in San Jose and 5 are in Santa Clara.

Table 4.4-3: Civic, Cultural, and Religious Facilities within the Study Area

Facility	Location	Nearby Station (within 0.25 mile)[a]	Figure 4.4-3 Map Icon
Civic Facilities			
San Jose City Hall	200 Santa Clara Street, San Jose	Downtown San Jose	C3
Dr. Martin Luther King Jr. Library	150 East San Fernando Street, San Jose	Downtown San Jose	C4
United States Post Office	105 North 1st Street, San Jose	Downtown San Jose	C5
Notre Dame Courthouse	99 Notre Dame Avenue, San Jose	Downtown San Jose (East Option)	C9
6th District Court of Appeal	333 Santa Clara Street #1060, San Jose	Downtown San Jose (East Option)	C10
Santa Clara University Library	500 El Camino Real, Santa Clara	Santa Clara	C16
Cultural Facilities			
~~Sociedade Filarmonica Uniao~~ SF União Popular	1220 Santa Clara Street, San Jose	Alum Rock/28th Street	C1
Portuguese Band of San Jose	100 North 27th Street, San Jose	Alum Rock/28th Street	C2
Hammer Theater	101 Paseo De San Antonio Walk, San Jose	Downtown San Jose	C6
San Jose Museum of Art	110 South Market Street, San Jose	Downtown San Jose (West Option)	C7
Tech Museum of Innovation	201 South Market Street, San Jose	Downtown San Jose (West Option)	C8
SAP Center at San Jose	525 Santa Clara Street, San Jose	Diridon (South and North Options)	C11
Santa Clara Women's Club Adobe	3260 The Alameda, Santa Clara	Santa Clara	C12
de Saisset Museum	500 El Camino Real, Santa Clara	Santa Clara	C13
Lois B. Mayer Theater	500 El Camino Real, Santa Clara	Santa Clara	C14
Mission Santa Clara de Asis	500 El Camino Real, Santa Clara	Santa Clara	C15
S.F. Nova Aliança	37 North 27th Street	Alum Rock/28th Street	C17
Sociedade Aliança Jorgense	198 North 27th Street	Alum Rock/28th Street	C18
Irmandade do Espírito Santo (I.E.S) & Portuguese Athletic Club	1401 Santa Clara Street	Alum Rock/28th Street	C19
Centro Leonino	1304 East Julian Street	Alum Rock/28th Street	C20
Casa do Benfica	1198 Santa Clara Street	Alum Rock/28th Street	C21
Portuguese Community Center	1115 Santa Clara Street	Alum Rock/28th Street	C22
Religious Facilities			
Pilgrim Church of the Living God	1452 Whitton Ave, San Jose	Alum Rock/28th Street	R1
Seventh-Day Adventist Church	281 North 33rd Street, San Jose	Alum Rock/28th Street	R2
Five Wounds ~~National~~ Portuguese National Church	1375 Santa Clara Street, San Jose	Alum Rock/28th Street	R3
Church of Jesus Christ	66 South 7th Street, San Jose	Downtown San Jose (East Option)	R4
First Christian Church	80 South 5th Street, San Jose	Downtown San Jose	R5
Apostolic Assembly of Faith	77 North 5th Street, San Jose	Downtown San Jose	R6
First United Methodist Church	24 North 5th Street, San Jose	Downtown San Jose	R7
Central Apostolic Church of San Jose	77 North 5th Street, San Jose	Downtown San Jose	R8
First Presbyterian Church	49 North 4th Street, San Jose	Downtown San Jose	R9
First Unitarian Church	160 North 3rd Street, San Jose	Downtown San Jose	R10
Nuestra Senora De Guadalupe	81 North 2nd Street, San Jose	Downtown San Jose	R11
Trinity Episcopal Cathedral	81 North 2nd Street, San Jose	Downtown San Jose	R12
St. Josephs Cathedral Basilica	80 South Market Street, San Jose	Downtown San Jose	R13
Templo la Hermosa - Assemblies of God	56 South Montgomery Street, San Jose	Diridon (South and North Options)	R14

Source: Google Maps 2015

[a] Unless specifically mentioned, civic, cultural, and religious facilities with 0.25 mile of the Downtown San Jose Station are within 0.25 mile of both the Downtown San Jose Station East Option and the Downtown San Jose Station West Option locations.

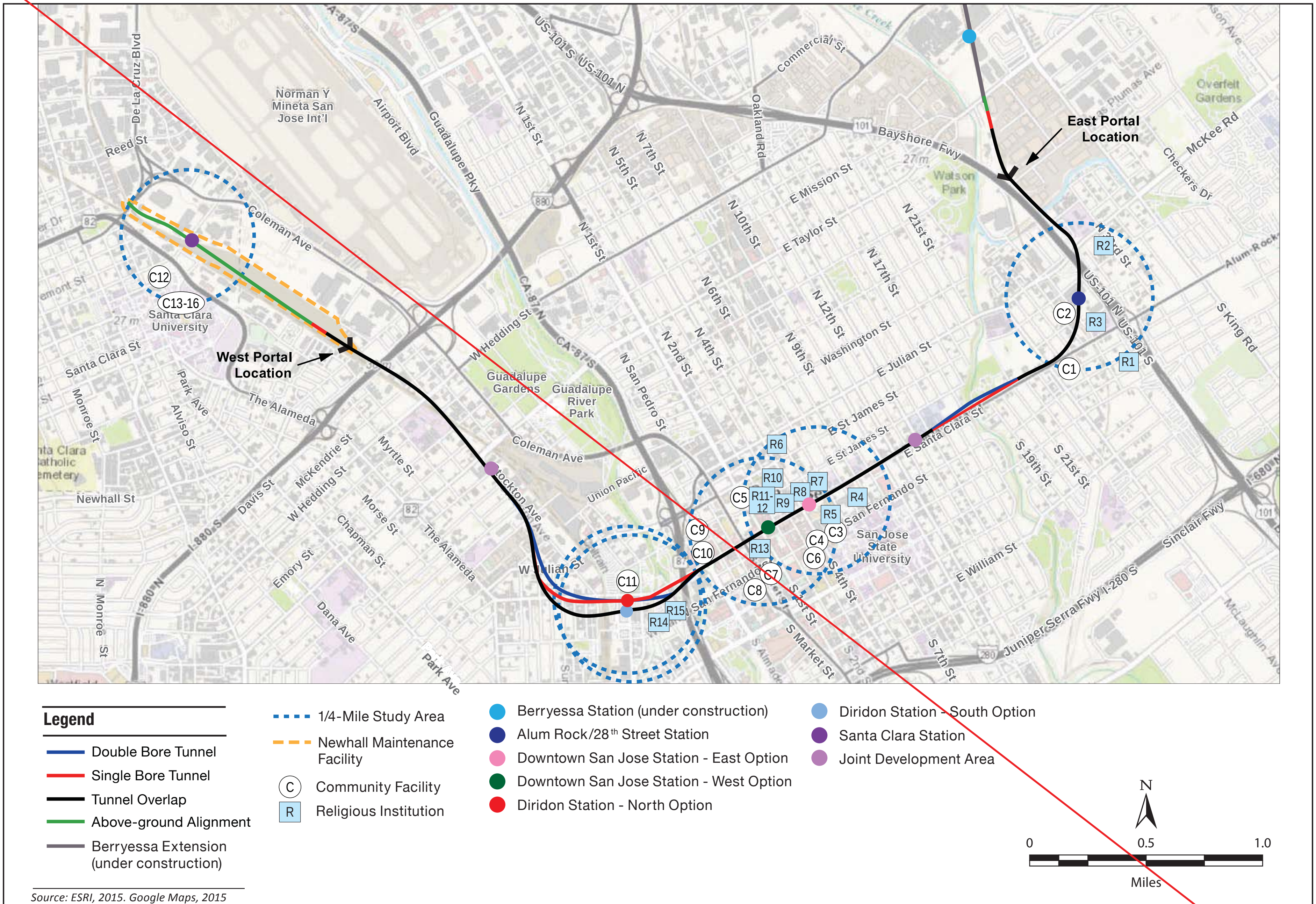

Figure 4.4-3
Civic, Religious, Entertainment, and Cultural Facilities
VTA's BART Silicon Valley–Phase II Extension Project

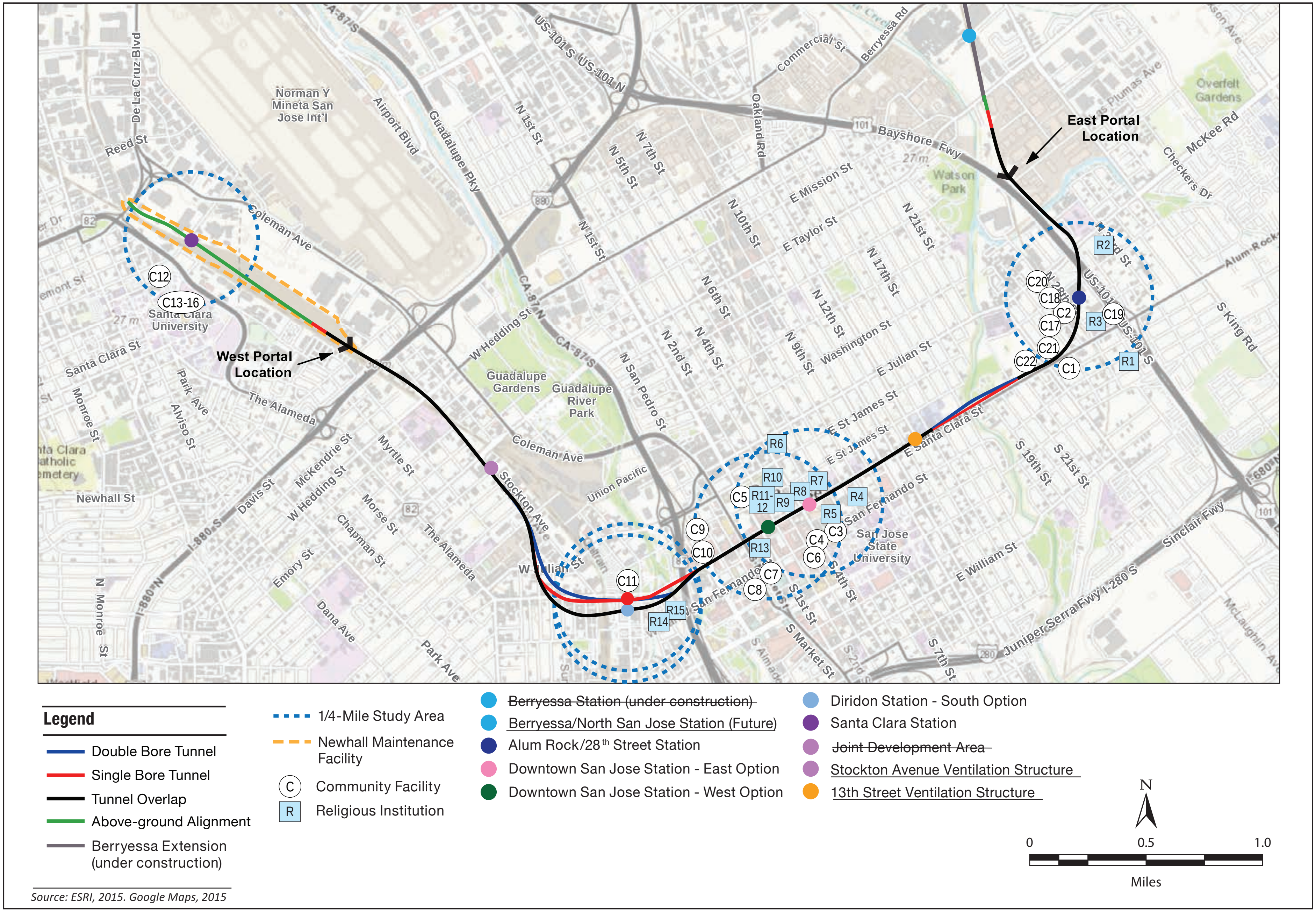

Figure 4.4-3

Civic, Religious, and Cultural Facilities (Revised)

VTA's BART Silicon Valley–Phase II Extension Project

4.4.2.2 Regulatory Setting

There are no federal regulations that specifically pertain to public services and community facilities. Design guidelines and mutual-aid agreements with the cities of San Jose and Santa Clara provide guidance for the alternatives and for addressing potential adverse effects on public services and community facilities. There are several state and local land use regulations applicable to public services and community facilities, which are summarized in Chapter 6, Section 6.5, *Public Services and Recreation*.

4.4.3 Methodology

An *adverse effect* on public services and community facilities would occur if the BART Extension ~~that~~ would contribute to a violation of regulatory standards or exceed the capacity of existing facilities.

4.4.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*.

As noted in Section 4.4.2.1, *Environmental Setting*, several public services serve the BART Extension Alternative, and many community facilities are within walking distance (0.25 mile) of a BART station location. These services and facilities can expect to see increased pedestrian traffic and activity as a result of improved transit access.

Changes in existing service ratios for public services are analyzed in this section for each alternative, along with a discussion of the potential need for new public service facilities. Affects from changes in access, changes in use, and alteration to community facilities are also evaluated in this section. Displacement of community facilities is discussed in Section 4.14, *Socioeconomics*.

4.4.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects).

The No Build Alternative projects would likely result in changes to community facility access typically associated with transit, highway, bicycle, and pedestrian facilities, and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would result in effects on access to community facilities. When necessary, mitigation for adverse effects could include measures to ensure continued access to these facilities.

The No Build Alternative projects would likely result in effects on community facilities and police and fire service ratios. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would result in alteration or displacement of community facilities and changes in police and fire service ratios. Environmental review would include an analysis of mitigation measures to mitigate potential impacts.

4.4.4.2 BART Extension Alternative

Police Service

As discussed in Section 4.13, *Security and System Safety*, BART police facilities would be expanded to provide police services at the proposed BART stations and along the corridor. A new BART police station at the Berryessa/North San Jose Station is under construction as part of the Phase I Project. BART police would operate from this station to provide security enforcement for both the Phase I and Phase II segments. VTA anticipates that the BART Police Department would have primary responsibility within the Operating Corridor, which consists of onboard trains, tunnels, and rights-of-way, and areas within the station platforms. The exact boundaries of this Operating Corridor are subject to final agreement between BART and VTA.

VTA would expand its current agreement with SCCSO to provide law enforcement for the BART Extension Alternative facilities not patrolled by the BART Police Department. This includes aboveground facilities outside of the Operating Corridor such as the bus transit centers, kiss-and-ride facilities, parking lots, and pedestrian areas. SCCSO currently provides law enforcement services to VTA stations, including the bus stops at Diridon Transit Station and Santa Clara Caltrain Station. SCCSO would need to increase staffing to provide adequate enforcement to the BART Extension Alternative. Additional facilities could be provided through reconfiguring one of VTA’s existing facilities.

VTA and BART would expand existing mutual-aid agreements with the SMCSO and local police service providers in the cities of San Jose and Santa Clara and ensure appropriate coordination. SJPD and SCPD would provide supporting police enforcement to the BART Extension Alternative through these expanded mutual-aid agreements. SMCSO would also provide supporting police enforcement where the BART Extension Alternative Operating Corridor is within the Caltrain right-of-way. Though SMSCO, SJPD, and SCPD may receive service calls related to the BART Extension Alternative, this increased call volume would not degrade the existing level of police services.

The BART Extension Alternative constitutes a transportation project that would not directly introduce new population or lower the current ratio of officers to residents in the area. In addition, the BART Extension Alternative does not propose new at-grade crossings, and would not interfere with emergency responders traveling along existing roadways. Given the above, operation of the BART Extension Alternative would have *no adverse effect* on police services, and no mitigation would be required.

Fire Service

VTA and BART would expand existing mutual-aid agreements with SJFD and SCFD to provide fire and emergency services to the BART Extension Alternative. In the event of a large incident, additional aid could come from Mountain View Fire Department, Sunnyvale Public Safety, Santa Clara County Fire Department, Rural Metro Ambulance Services, Santa Clara County Emergency Medical Services, or other jurisdictions in Santa Clara County.

SJFD and SCFD would be the primary responders to incidents within the BART system. However, as discussed in Section 4.13, *Security and System Safety*, BART's System Safety Department is responsible for monitoring and implementing operational safety procedures throughout the BART system. The System Safety Department also implements BART's Emergency Plan, which establishes public safety mobilization procedures. Furthermore, the BART Extension Alternative would be designed to comply with pertinent BART Facilities Standards Design Criteria, which ensure that new BART projects provide a high level of security and safety. These management practices and design criteria would significantly reduce the need for emergency services along the BART Extension Alternative.

Although the BART Extension Alternative would incrementally increase demand on SJFD and SCFD, it would not substantially degrade the level of service provided by SJFD and SCFD. In addition, the BART Extension Alternative does not propose new at-grade crossings, and would not interfere with emergency responders traveling along existing roadways. Operation of the BART Extension Alternative would have *no adverse effect* on fire services, and no mitigation would be required.

School Facilities

School demand is based on population factors. The BART Extension Alternative constitutes a transportation project that would not directly introduce new population to the area. As a result, implementation of the BART Extension Alternative would not increase the demand for schools beyond what is currently provided in the study area.

The Downtown San Jose and Santa Clara BART Stations would improve regional access to San Jose State University and Santa Clara University, which may lead to increased demand of these educational institutions. However, capacity at these universities is dictated by the admissions process, and increased accessibility does not correlate to higher acceptance rates or a larger body of matriculated students. Operation of the BART Extension is unlikely to directly require new or expanded university facilities.

Both Anne Darling Elementary and Bellarmine High Schools are adjacent to the tunnel alignment. Because the tunnel would be at least 35 feet below the surface and not directly beneath school facilities, BART extension operations would not cause disruption to school activities. Therefore, the BART Extension Alternative would have *no adverse effect* on school facilities, and no mitigation would be required.

Park Facilities

Park demand is based on population factors. The BART Extension Alternative constitutes a transportation project that would not directly introduce new population to the area. As a result, implementation of the BART Extension Alternative would not increase the demand for parks beyond what is currently provided in the area.

Several park facilities would be located above the tunnel alignment, including Roosevelt Park, Theodore Lenzen Park, Guadalupe River Park & Trail, Los Gatos Creek Trail (Proposed), Five Wounds Trail (Proposed) and Coyote Creek Trail (Proposed). The BART Extension Alternative would not entail surface improvements that would interfere with these park facilities. Passing trains would not adversely affect park facilities above the alignment.

Operation of the BART Extension Alternative may lead to increased usage of the Guadalupe River Trail near the Diridon Station South and North Options. This trail network may be used by BART riders to access employers, homes, and other regional destinations. However, the BART Extension Alternative is considered in VTA's *Valley Transportation Plan 2030* and San Jose's *Diridon Station Area Plan Environmental Impact Report*. Together, these planning documents propose multimodal circulation improvements to accommodate transit users near the Diridon Station South and North Options.

Given the above, operation of the BART Extension Alternative would have *no adverse effect* on park and trail facilities, and no mitigation would be required.

Civic, Cultural, and Religious Facilities

As listed in Table 4.4-3, there are 36~~33~~ civic, cultural, and religious facilities within 0.25 mile of a BART station. Many of these facilities, such as religious and civic institutions, serve local residents. Because the BART Extension Alternative would not directly increase population in the area, these facilities are not expected to experience increased usage. Other facilities, such as museums and theaters, can be expected to draw larger audiences as a result of improved accessibility and transit connectivity.

Civic, cultural, and religious facilities would experience improved access as a result of the BART Extension Alternative. Alteration to civic, cultural, and religious facilities resulting from displacement and relocation is discussed in Section 4.14, *Socioeconomics*. Operation of the BART Extension Alternative would have *no adverse effect* on civic, cultural, and religious facilities, and no mitigation would be required.

4.4.5 NEPA Conclusion

BART Police would provide primary law enforcement within the BART Extension Alternative Operating Corridor, including onboard trains, tunnels and right-of-ways, and within the station platform areas. Police protection for BART facilities outside of the Operating Corridor would be coordinated by VTA and the SCCSO. VTA would also expand existing mutual aid agreements with regional police providers, including SJPD, SCPD, and

SMCSO. These agencies would provide supplemental law enforcement along the BART Extension Alternative; however, the BART Extension would not significantly degrade their existing level of service. The BART Extension Alternative would have *no adverse effect* on police services under NEPA, and no mitigation would be required.

SJFD and SCFD would be the primary responders to incidents along the BART Extension Alternative. However, operational safety procedures implemented by BART's System Safety Department would significantly reduce the need for emergency services within the BART system. Though SJFD and SCFD would respond to incidents along the BART Extension Alternative, the BART Extension Alternative would not significantly degrade their existing level of service. The BART Extension Alternative would have *no adverse effect* on fire services under NEPA, and no mitigation would be required.

The BART Extension Alternative would not directly increase population in the study area. Therefore, there would be no direct demand for school or park facilities. Existing trails near the proposed Diridon Station South and North Options may experience increased usage as a result of the BART Extension Alternative; however, planned transportation improvements would reduce the potential for degradation of trail facilities. Operation of the BART Extension Alternative would have *no adverse effect* on parks and *no effect* on schools under NEPA, and no mitigation would be required.

Civic, cultural, and religious facilities that serve local residents would not see a direct increase in demand as a result of the BART Extension Alternative, although facilities that serve regional audiences would benefit from increased transit connectivity. There would be *no adverse effect* on civic, cultural, or religions facilities with the BART Extension Alternative, and no mitigation would be required. There would be *no adverse effect* on schools and park and recreational facilities under NEPA, and no mitigation would be required.

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4.5 Cultural Resources

4.5.1 Introduction

This section describes the environmental consequences related to cultural resources from operations of the NEPA Alternatives. The analysis in this section is based on the following key sources of information.

- Background records/literature review conducted at the Northwest Information Center, Sonoma State University, Rohnert Park; the repository of cultural data for Santa Clara County.
- Consultation with the California State Historic Preservation Officer (SHPO), Native American Heritage Commission (NAHC), local Native American groups, and individuals.
- *VTA's Draft Technical Memorandum Historical Resources Evaluation Report for SVRTC EIS/EIR Alternatives (JRP Historical Consulting 2003).*
- *VTA's Silicon Valley Rapid Transit Corridor EIS/SEIR Technical Memorandum, Archaeological Survey and Sensitivity Report for SVRTC EIS/SEIR* (Far Western Anthropological Research Group 2010).
- *VTA's BART Silicon Valley—Phase II Extension Project, Archaeological Resources Technical Report* (Far Western Anthropological Research Group 2017a~~6~~).
- *VTA's BART Silicon Valley—Phase II Extension Project, Supplemental Archaeological Resources Technical Report* (Far Western Anthropological Research Group 2017b).
- *VTA's BART Silicon Valley—Phase II Extension Project: Supplemental Built Environment Survey Report* (JRP Historical Consulting 2016).
- *Addendum to the 2016 Supplemental Built Environment Survey Report* (JRP Historical Consulting 2017)
- *VTA's BART Silicon Valley—Phase II Extension Project: ~~Preliminary~~ Finding of Effects* (JRP Historical Consulting, ~~ICF,~~ Far Western Anthropological Research Group, ICF ~~2016~~2017).

4.5.2 Environmental and Regulatory Setting

4.5.2.1 Environmental Setting

~~Two~~ The Areas of Potential Effect~~s~~ (APE~~s~~), which includes one for archaeological resources and one for historic architectural resources, ha~~ve~~s been identified and ~~are~~is included in this Final SEIS/SEIR as Appendices D.1 and D.2. The APE~~s~~ for archaeological and historic architectural resources was~~ere~~ defined by the Federal Transit Administration (FTA) and

VTA, in consultation with the SHPO. On April 6, 2016, the SHPO concurred with the delineation of the APE. Since then, options for the Twin-Bore and Single-Bore tunnel as well as station design options, construction staging areas, parking lots, ventilation structures, and other design features had been incorporated into the project design, which resulted in changes to the APE. The SHPO concurred on the delineation of the revised APEs on October 28, 2016 (Polanco 2016). Since the SHPO concurred on the APE in October 2016, the project was further modified. Minor refinements included the slight shifting of some tunnel alignments for the Single- and Twin-Bore Option, redesign of stations, and reduction of tunnel depth at some locations for the Single-Bore Option. Only some of the design modifications required changes to the APE. The SHPO concurred on the delineation of the revised APE on December 8, 2017. Additional details on the APE~~s~~ are provided below.

Archaeology

Area of Potential Effect

The archaeological APE was identified in accordance with National Historic Preservation Act (NHPA) Section 106 (36 Code of Federal Regulations [CFR] part 800.4(a)(1)) and encompasses all areas where BART Extension construction and staging would occur. It encompasses both a horizontal and vertical extent, measuring approximately 6 miles in length, a maximum of 1,897 feet in width (including the combined width of the Twin-Bore and Single-Bore Options), and reaches depths up to 120 feet below surface.

Besides the 5-mile-long underground tunnel corridor route, the eastern extent of the APE includes surface construction staging areas (CSAs) and the East Tunnel Portal east of U.S. 101 and south of Mabury Road in the City of San Jose; CSAs in part of the existing Union Pacific Railroad right-of-way, including the bridge over U.S. 101; and the Alum Rock/28th Street Station, just west of U.S. 101 and north of Alum Rock Avenue. The tunnel then passes under Coyote Creek, includes the 13th Street Mid-Tunnel Ventilation Structure, and passes through downtown San Jose where the San Jose Station East and West Options and associated CSAs are proposed. Another CSA is under the elevated roadway of State Route (SR) 87, followed by the Diridon Station South and North Options, and the Stockton Avenue Mid-Tunnel Ventilation Structure. The West Tunnel Portal, Newhall Maintenance Facility, Santa Clara Station, and additional CSAs extend along the west end of the APE. The APE map can be found in Appendix D.2 of this document, and a detailed text description is presented in the *Archaeological Resources Technical Report* (ARTR).

The majority of the alignment (about 5 of the 6 miles) would consist of subway tunnels excavated by a tunnel boring machine, and in those areas, no surface deposits would be disturbed. Tunnel depths vary across the corridor, ranging between 30 and 80 feet for the Twin-Bore Option, and between 40 and 120 for the Single-Bore Option. This depth places most of the tunnel length well below where cultural deposits would be anticipated. The station boxes, crossovers, station entrances, and supporting infrastructure would be excavated from the surface and would variably extend to approximately 70 to 150 feet deep.

Excavations at the campus areas of the four stations would range from approximately 12 to 15 feet for elevator shafts, utilities, and site preparation. Pile driving for tall structures within the station campuses typically ranges from 30 to 90 feet deep depending on site conditions. Excavations at the two mid-tunnel ventilation facilities would extend from the surface to approximately 75 to 90 feet deep. Excavations at the end-of-the-line maintenance facility would range from 5 to 10 feet deep for utility relocation and site preparation. Excavation for building pads within the maintenance facility would range from approximately 15 to 20 feet deep, with pile driving for tall structures at depths of 30 to 90 feet deep. Cut-and-cover excavation at the East and West Tunnel Portals would range from approximately 75 to 90 feet deep.

In the staging areas outside of permanent footprints, minimal ground disturbance and compaction is anticipated (1–2 feet) to account for stockpiling of soils or building materials, machinery, and other construction equipment. However, some portions of staging areas may be subject to greater disturbance, such as possible excavation to 3–5 feet, for detention areas to dry out materials such as concrete washout pits.

Background Records Search and Archival Research

Bibliographic references, previous survey reports, historic maps, and archaeological site records pertinent to the archaeological APE were compiled through a records search of the California Historical Resources Information System in order to identify prior archaeological studies and known cultural resources within a 0.5-mile area surrounding, or adjacent to, the archaeological APE. The area within this 0.5-mile search radius is referred to as the *study area* or *records search area* in this section.

Records searches were conducted in 2001, 2002, 2008, 2013, and 2015 at the Northwest Information Center of the California Historical Resources Information System (~~Ruby et al. 2010;~~Far Western 2017~~6~~).

The records search involved a review of the following.

- Site records for previously recorded sites.
- All previous studies conducted within 0.5 mile of the archaeological APE.
- The National Register of Historic Places (NRHP).
- The California Historic Resources Inventory (HRI).
- The Office of Historic Preservation (OHP) Historic Properties Directory (HPD).

Archival and geoarchaeological research, pedestrian inventory, bore hole monitoring, and records searches identified one formally recorded archaeological site within the APE (site CA-SCL-363H/P-43-000369), the potential for archaeological deposits associated with 84 historic-era sites, and areas of high sensitivity for buried cultural deposits.

Summary of Native American Consultation

VTA, on behalf of the FTA, contacted the NAHC on March 4, 2015, to request a search of the Sacred Lands File (SLF) and to provide a list of interested Native American representatives. The NAHC responded on March 26, 2015, stating that a search of the SLF did not contain any records of Native American sacred sites in or adjacent to the archaeological APE.

The NAHC also provided a list of 11 Native American contacts who might have information pertinent to the BART Extension or have concerns regarding the proposed actions. Because the BART Extension was initiated before July 2015, California State Assembly Bill 52 (Chapter 532, Statutes of 2014) does not apply for CEQA. For Section 106, the following is a list of the Native American Identified Contacts whom FTA contacted in regards to the BART Extension.

- Jakki Kehl, Ohlone/Costanoan
- Katherine Erolinda Perez, Ohlone/Costanoan, Northern Valley Yokuts, Bay Miwok
- Linda Yamane, Ohlone/Costanoan
- Valentin Lopez, Chairperson, Amah Mutsun Tribal Band
- Edward Ketchum, Amah Mutsun Tribal Band
- Irene Zwierlein, Chairperson, Amah Mutsun Tribal Band
- Michelle Zimmer, Amah Mutsun Tribal Band of Mission San Juan Bautista
- Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan
- Rosemary Cambra, Chairperson, Muwekma Ohlone Indian Tribe of the SF Bay Area
- Andrew Galvan, The Ohlone Indian Tribe
- Ramona Garibay, Representative, Trina Marine Ruano Family

The 2016 ARTR and 2017 Supplemental ARTR contain~~s~~ the Native American correspondence sent and received as well as phone call transcripts between VTA and Native American contacts for the BART Extension to date. Comments received during the consultation process included the following: requests to be kept informed as the process progresses, requests for copies of the cultural studies when they are available, and requests that cultural resource training be required for construction crews because the project is located in culturally sensitive areas. Valentin Lopez, Chairperson of the Amah Mutsun Tribal Band, deferred review and comment on this project to the Muwekma Ohlone Indian Tribe and representative Rosemary Cambra. No resources, including traditional cultural properties, were identified during the consultation process described above. Native American consultation for the Phase II Project is ongoing and will be updated as responses are received.

Resources

Known Resource CA-SCL-363H (CA-SCL-363H/P-43-000369)

This site contains archaeological features associated with the Spanish Period Amesquita Adobe as well as Late American commercial and residential features, some of which are possibly associated with one of the City's post-1877 Chinatowns. It encompasses a part of the city's original Pueblo San Jose de Guadalupe, which was established in 1777. Most of the site is considered eligible for listing to the NRHP under Criteria A and D, although the portion underlying SR 87 is not.

The Amesquita Adobe was built in the 1790s and is named for Manuel Amesquita, one of the original founders of the Pueblo San Jose de Guadalupe. The building remained in the Amesquita family until 1848 and was dismantled in 1925. The building may have been the oldest fired-brick, two-story residence in California and was used as the region's first jail (Gilreath 2003). The dismantled adobe building was apparently reconstructed in Cupertino sometime around 1925 within an unspecified historic park. The adobe's foundations were exposed during archaeological excavations conducted in 1979 by Archaeological Resource Management (Cartier 1979) and remains protected by two feet of sand on its sides and top (City of San Jose 2013). The adobe foundations lie outside the APE just south of the tunnel alignment.

Extensive additional excavations at the site conducted for various redevelopment projects since 1979 have revealed historic trash and privy deposits and foundations associated with a Chinese laundry, the Orange Mill/Distillery Complex, a flour mill, an undertaker, a wine depot, residences, and delivery stables (e.g., Basin Research Associates 2003; Caltrans 2003; Cartier et al. 1984). All these deposits and features were encountered at maximum depth of 6 feet.

The site extends across the city block now bounded by Santa Clara Street on the north, Almaden Boulevard on the east, West San Fernando Street on the south, and Guadalupe River on the west. SR 87 courses north-south across its western portion, and that portion of the site underlying its right-of-way was greatly disturbed during the highway construction and during prior river channelization conducted by the U.S. Army Corps of Engineers (Basin Research Associates 2003). Consequently, the Federal Highway Administration determined that this disturbed portion of the site did not contribute to the site's eligibility. This correspondence is provided in the *Finding of Effects*. The SHPO concurred with this finding but noted that historic archaeological deposits might still exist to the west of the right-of-way (Mellon 2003a,2003b,2003c). This contradicts the most recent boundary revision proposed for this site (Gilreath 2003), which confines the site to the east of SR 87. For the BART Extension, therefore, the site boundaries are considered to extend west of SR 87 to the Guadalupe River as per SHPO.

Unknown Resources

The 2016 ARTR and 2017 Supplemental ARTR identified numerous locations within the APE where archaeological resources or human burials may be expected. According to the updated buried site sensitivity assessment in the 2017 Supplemental ARTR, there are several locations within the APE where buried prehistoric archaeological deposits may present (i.e., areas of buried site sensitivity). Buried site sensitivity was also identified in the vicinity of the proposed stations, vents, and station portals. Additionally, Holocene-age sediments that may contain cultural materials may occur in the area between Coyote Creek and the Guadalupe River.

In addition to CA-SCL-363H, there are 163 ~~84~~ locations within or immediately adjacent to the APE where historic-period archaeological materials may be discovered based on archival research. Of those, 80 ~~77~~ are within or ~~the APE, and 7 are~~ adjacent to areas of proposed surface disturbance ~~the APE~~ (within 30 feet); adjacent resources ~~and~~ could potentially extend into the APE. ~~Of these~~The remaining 84 ~~locations, 55~~ are located above the ~~in areas of~~ proposed ~~surface disturbance by the BART Extension, and 29 are above the proposed~~ underground tunnel alignment and will not be impacted; however, some linear resources require more accurate mapping to determine their extent. Buried site sensitivity has been modeled for the project corridor, identifying areas with high to highest sensitivity~~.~~

Whether those resources qualify as significant under Section 106 of the National Historic Preservation Act cannot be determined without further research and testing. Preconstruction archaeological testing is recommended to test the sensitive areas within the APE that may be disturbed by construction. However, many of the sensitive areas are located under existing buildings or infrastructure that would have to be removed prior to testing, are located on private property, or both. Therefore, it is not feasible to test all areas of potential buried site sensitivity at this time.

Therefore, a Draft Programmatic Agreement (PA) has been prepared for the identification and evaluation of archaeological resources in phases prior to construction of the project and treatment of archaeological resources and burials in the event that such resources are discovered during construction activities. The Draft PA includes an ~~outline for an~~ Archaeological Resources Treatment Plan (ARTP)~~ that will be prepared~~. The ARTP ~~will~~ describes archaeological procedures, notification and consultation requirements, professional qualifications requirements, and procedures for the disposition of artifacts if any are discovered. The preparation and implementation of the Draft PA and ARTP are identified in Chapter 5, Section 5.5.6, *Cultural Resources*, as Mitigation Measure CUL-CNST-A. The Draft PA ~~i~~was included in Appendix D.3 in the Draft SEIS/SEIR and is available on the project website at www.vta.org/bart. The Draft PA and Draft ARTP are currently under consultation with the Office of Historic Preservation and other Consulting Parties. The Final PA and ARTP will be included as attachments to the Record of Decision.

~~O~~In letters on October 28, 2016 and December 8, 2017, the SHPO concurred that FTA and VTA's historic resources identification efforts to date were appropriate for the Undertaking, and the development of a Programmatic Agreement and Treatment Plan to address the phased archaeological identification efforts was appropriate (Polanco 2016 and 2017).

Historic Architecture

Area of Potential Effects

~~A separate APE, referred to as t~~The architectural APE~~,~~ was delineated for historic architectural resources, ~~or~~also known as built environment resources, to allow for the identification and analysis of potential effects on this type of historic property. The architectural APE, as shown in Appendix D.1, reflects the BART Extension Alternative as described in Chapter 2, *Alternatives*. In accordance with NHPA Section 106, CFR Part 800.4(a)(1), the architectural APE includes the Area of Direct Impact (ADI), plus a buffer area immediately adjacent to surface construction and the legal parcels immediately above the work for tunneled portions of the BART Extension Alternative. Where the BART Extension Alternative bisects a legal parcel, the architectural APE extends to encompass the entire legal parcel.

Background Records Search

Historic architectural resources generally include buildings, structures, objects, and districts that are more than 50 years of age. However, to account for the long lead time between preparation of the environmental documentation and actual construction, the age limit was extended to 40 years to include buildings, structures, and features constructed in or prior to 1975. The BART Extension is scheduled to be operational in 2025; therefore, resources constructed in 1975 or before would potentially be historic resources in 2025 and require evaluation. Those resources constructed in or before 1975 have been included in the survey population in addition to the resources added due to the expanded APE since 2003.

The initial survey efforts were completed in 2003 for the full 16-mile BART Silicon Valley Program (JRP Historical Consulting 2003). As previously discussed, design refinements such as station design options, construction staging areas, parking lots, ventilation structures, and other design features, resulted in a revised APE. Additional surveys and record searches were conducted for the revised APE. For reference purposes, the survey population resources have been assigned Map Reference numbers; these include properties identified as listed in or determined eligible for the NRHP as part of the initial survey efforts (JRP Historical Consulting 2003). The Map Reference numbers are identified in Tables 4.5-1, 4.5-2, 4.5-A, and ~~through~~ 4.5-3, below, and are shown on aerial base maps with a reference number that consists of the sheet letter and resource reference number (the~~se~~ final revised maps are included as Figure 3 in ~~Appendix~~ Attachment A of the *Addendum to the Supplemental Built Environment Survey Report* (JRP Historical Consulting ~~2016~~2017). For example, resources located on Figure 3-A have been assigned Map Reference numbers “A-01, A-02,” etc., and resources located on Figure 3-D are “D-01, D-02,” etc.

In addition to the background records search discussed above, which included built environment resources, additional research was conducted to determine which resources within the architectural APE were built in or before 1975 and would be studied further as part of the survey and evaluation process. This included property records research through First American Real Estate Solutions (FARES) and CoreLogic commercial databases; and the review of current and historic topographic and property maps, Santa Clara County property records, building permits for the City of San Jose, historic aerial photographs, Sanborn Fire Insurance Company maps, and other documents, including previous surveys of historic architectural resources. The following data sources were also examined for known historic architectural resources.

- National Register of Historic Places (both listed and determined-eligible properties).
- California Register of Historical Resources.
- California Inventory of Historic Resources (OHP 1976).
- California Points of Historical Interest (OHP 1992).
- California Historical Landmarks (OHP 1995).
- Directory of Properties in the Historic Property Data Files for Santa Clara County (updated April 2014).

Of the more than 500 historic-era built environment resources identified within the 0.5-mile buffer around the BART alignment and stations from the 2013 and 2015 record searches conducted at the NWIC, 7 were located within the architectural APE. These resources were found to be not eligible for the NRHP and are not historic properties under Section 106, nor are they historical resources for the purposes of CEQA. However, 27 known historic properties located within the current architectural APE were identified within previous survey reports, including the inventory and evaluation report completed in 2003 for VTA's 16-mile BART Silicon Valley Program (JRP Historical Consulting 2003). All 27 properties are listed in or determined eligible for the NRHP and CRHR (see Table 4.5-1). ~~Also, d~~During the field surveys in 2015 and 2016, an additional 2 resources were discovered to be eligible for the NRHP and are described in Table 4.5-2. Two other properties identified in the 2003 survey efforts were found not eligible for the NRHP but were previously identified as eligible for the CRHR (Table 4.5-3). The remaining resources identified through the NWIC record searches are not historic properties because they were previously found not eligible for the NRHP or CRHR, are no longer extant, or were not within the architectural APE.

The survey population was inspected in the field, photographed, and described in detail on Department of Parks and Recreation (DPR) 523 forms, as necessary. Research collected during the 2003 survey was utilized to the extent possible for the survey population and was augmented with additional research at the California State Library, Sacramento; Shields Library, University of California, Davis; Santa Clara County Assessor's Office; California Room, San Jose Public Library; the archives of "History San Jose" at Kelly Park; the San Jose City Planning Department, Building Division; and various online sources.

Consultation with Historic Preservation Groups

As part of earlier survey effort conducted for the first phase of the BART Silicon Valley Program (JRP Historical Consulting 2003) and pursuant to Section 106 of the National Historic Preservation Act, interested parties were contacted through a notification letter circulated in November 2002, with follow-up correspondence in January 2003. Letters were also sent to 25 local historical agencies and organizations requesting information regarding known or potential historic resources in the vicinity. These agencies and organizations included the following:

- Santa Clara County Planning Office
- Alameda County Planning Department
- City of San Jose Planning Department
- City of San Jose Historic Preservation Officer
- City of Milpitas Planning Department
- Alameda County Historical Society
- Santa Clara County Historical Heritage Commission
- Heritage Council of Santa Clara County
- Milpitas Cultural Resources Preservation Board
- Milpitas Historical Society
- Historical Preservation Society of Santa Clara
- History San Jose and Historical Association
- Preservation Action Council of San Jose
- San Jose Historic Landmarks Commission
- San Jose Redevelopment Agency
- East Santa Clara Street Revitalization Committee
- Los Fundadores–Santa Clara
- Victorian Preservation Association
- City of Santa Clara Planning Department
- City of Santa Clara Historical and Landmarks Commission
- Santa Clara County Historical and Genealogical Society
- South Bay Historical Railroad Society
- California Trolley and Railroad Corporation
- National Railroad Historical Society Central Coast Chapter
- Caltrain/Peninsula Corridor Joint Powers Board (JPB)

Responses were received from Los Fundadores–Santa Clara and the City of Milpitas. Follow-up meetings were held with the City of San Jose Historic Preservation Officer, Preservation Action Council of San Jose, San Jose Historic Landmarks Commission, City of Santa Clara Historical and Landmarks Commission, South Bay Historical Railroad Society, and JPB. Comment letters related to the 2004 EIR and 2007 Supplemental EIR were received from the City of San Jose Planning Department, City of San Jose Historic Preservation Officer, Preservation Action Council of San Jose, San Jose Historic Landmarks Commission, City of Santa Clara Historical and Landmarks Commission, and South Bay Historical Railroad Society. Coordination with the historical agencies and organizations remains ongoing.

FTA and VTA coordinated with SHPO regarding the inventory of cultural resources within the APE, the eligibility of these resources for listing on the NRHP, and the impacts of the alternatives to such eligible resources. Meetings with the SHPO were held on October 30, 2003, January 26, 2009, December 17, 2009, in 2013, and on January 17, 2014, February 29, 2016, May 5, 2016, and June 8, 2016.

In addition, VTA, FTA, and JRP Historical Consulting have worked closely with the historic preservation covenant holder for the two listed train stations within the APE: Ms. Lorie Garcia of the South Bay Historic Railroad Society (SBHRS), whose headquarters are located within the Santa Clara Station. VTA, principals of JRP, representatives of local communities, and Ms. Garcia also participated in a meeting and site visit on July 25, 2002, of both the NRHP-listed railroad stations within the APE: Diridon (Cahill) Station and Santa Clara Station. The SBHRS is the covenant holder for both these stations, which are currently part of the Caltrain system.

On January 30, 2015, VTA distributed a Notice of Preparation (NOP) to advise interested agencies and the public that VTA intends to prepare an SEIS/SEIR for the Phase II Project. VTA distributed the NOP to approximately 225 agencies, elected officials, and interested parties and organizations in the study area. VTA also notified potentially interested individuals and organizations regarding the scoping process and public scoping meetings for the Phase II Project. VTA used multiple methods to announce the scoping process and public meetings, including display advertisements in local newspapers, mailings to addresses located in the vicinity of the Phase II Project, emails sent to recipients on the VTA emailing list, news releases posted on the VTA website, and social media postings on VTA’s Facebook page and Twitter account.

VTA conducted three formal environmental scoping meetings to gather input and comments prior to the development of the SEIS/SEIR. Meetings were held on February 12, 17, and 19, 2015, in Santa Clara, downtown San Jose, and east San Jose. Each public scoping meeting included a sign-in/open house portion of the meeting, where the public could view Phase II Project informational display boards of the alignment and concept exhibits for the stations, and a presentation portion of the meeting during which VTA staff provided an overview of the Phase II Project and environmental process in PowerPoint format. Following the presentation, formal public comments on the presented materials were documented. Oral comments provided at the meetings were transcribed by a court reporter. Written comments were accepted at the meetings and via mail or email to VTA until the comment deadline.

Starting in 2015, VTA re-initiated three Community Working Groups (CWGs), one for the Alum Rock/28th Street Station area, one for the Downtown San Jose Station (East and West Options)/Diridon Station (South and North Options) area, and one for the Santa Clara Station area to communicate project information to key members of the community and provide feedback on strategies related to successfully delivering and completing the BART Extension. CWGs receive briefings on technical areas and project updates and act as a conduit for the community at large. Group members include the leaders of neighborhood and business associations, community organizations, advocacy groups, major property owners, and planning commissioners. VTA invited Mr. Jack Morash, who has been a Santa Clara CWG member since June 11, 2015, as a representative of the South Bay Historical Railroad Society. Mr. Morash provides project updates to Lorie Garcia and contributes to the CWGs by notifying VTA staff of the SBHRS concerns about the project.

In early 2017 when the Draft SEIS/SEIR was released for public circulation, copies of the Draft SEIS/SEIR and all cultural resources documentation reports were available for review on the project website. In early 2017, VTA made presentations about the project and the results of the cultural resources technical reports to the Historic Landmarks Commissions of the City of San Jose and Santa Clara. Throughout 2017 and into early 2018, FTA and VTA continued consultation with the Office of Historic Preservation, the Advisory Council on Historic Preservation, the California Department of Transportation (Caltrans) District 4, the Cities of San Jose and Santa Clara, the Peninsula Corridor Joint Powers Board (JPB), and the South Bay Historic Railroad Society regarding the preparation of the Programmatic Agreement (PA).

Consultation with historic preservation groups for the Phase II Project is ongoing and will be updated as responses are received.

Historic Architectural Resources Present in the APE

The architectural APE includes ~~129~~ 137 historic-period built-environment resources constructed in or before 1975. The SHPO concurred with the eligibility findings of the 2003 inventory and evaluation report (*Historic Resources Evaluation Report*) for the BART Silicon Valley Program (JRP Historical Consulting 2003) within letters dated June 9, 2003 and July 9, 2003 (Mellon 2003d, 2003e). In a letter dated October 28, 2016 (Polanco 2016) the SHPO also agreed with the eligibility determinations in the 2016 *Supplemental Built Environment Survey Report* (JRP Historical Consulting 2016). The SHPO further concurred with the eligibility determinations as presented in the *Addendum to the Supplemental Built Environment Survey Report* in October 2017 (JRP Historical Consulting 2017; Polanco 2017). The following summarizes the eligibility determinations of the historic built-environment resources ~~properties that were determined eligible or not eligible for the NRHP~~located within the architectural APE. ~~SHPO concurred with the eligibility of the properties on October 28, 2016 (Polanco 2016)~~.

- 27 are currently listed in or have previously been determined eligible for the NRHP and CRHR.
- 2 have been determined eligible for the NRHP and CRHR as part of the current study.
- 3 properties are assumed eligible for the NRHP and CRHR for this Project only.
- 2 have been determined not eligible for the NRHP but are eligible for the CRHR.

- ~~1 has been determined not eligible for the NRHP and CRHR but is a locally listed landmark and is therefore a historical resource for the purposes of CEQA (but is not a historic property under Section 106).~~
- 2 have been determined not eligible for the NRHP and/or CRHR, but are listed or eligible for listing in a local government register~~s~~ or inventory~~ies~~ and are therefore historical resources for the purposes of CEQA (but are not historic properties under Section 106).
- ~~95~~ 96 have been determined not eligible for listing in the NRHP or CRHR.

The ~~29~~ 32 historic architectural resources that are listed in, ~~or~~ determined eligible for, or ~~are~~ assumed eligible for the NRHP and CRHR are historic properties under Section 106 and historical resources under CEQA. Ten of these historic properties are contributing elements to a NRHP-listed historic district (the San Jose Downtown Commercial District; see tables below), but are not listed as individual properties~~ly eligible~~. The four properties that are eligible for the CRHR only or are listed or eligible for listing in a local register or inventory are historical resources for the purposes of CEQA only. Tables 4.5-1 and 4.5-2 list the 29 historic properties (Section 106), which are also historical resources (CEQA). Table 4.5-A lists the three properties that are assumed eligible for the NRHP and CRHR for the purpose of this project only; they are considered historical resources under CEQA. Table 4.5-3 lists the four properties that are only historical resources under CEQA. The remaining ~~95~~ 96 resources are not historic properties (Section 106) or historical resources (CEQA).

Table 4.5-1: Properties Listed in or Previously Determined Eligible for the National Register of Historic Places and California Register of Historical Resources

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]	Date of Determination or listing
C-25	467-08-007 467-08-009 467-08-014	1375–1401 Santa Clara Street	1916–1960	2S2	6/9/2003
C-26	467-10-043	1191 Santa Clara Street	1949	2S2	6/9/2003
C-27	467-10-046	1169 (1167) Santa Clara Street	1888	2S2	6/9/2003
D-03	467-57-082	227–247 Santa Clara Street	1928	2S2 2S3	2/6/2006
E-08[b]	467-23-035	142–150 Santa Clara Street	1913	1D	1/1/1983
E-09[b]	467-23-036	138 Santa Clara Street	1905	1D	1/1/1983
E-10[b]	467-23-038	124–126 Santa Clara Street	1900	1D	1/1/1983
E-11[b]	467-23-039	114–118 Santa Clara Street	1920	1D	1/1/1983
E-12[b]	467-23-089	100 Santa Clara Street	1912	1D	1/1/1983
E-13[b]	467-22-149	96 Santa Clara Street	ca. 1883	1D	1/1/1983
E-14[b]	467-22-148	52 Santa Clara Street	1900	1D	1/1/1983
E-15	467-21-028	19 East 2nd Street	1925	2S2	1/1/1981
E-18[b]	467-22-041 467-22-042	42–48 Santa Clara Street	1930s	1D	1/1/1983
E-19[b]	467-22-158	36–40 Santa Clara Street	1869	1D	1/1/1983

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]	Date of Determination or listing
E-20	467-54-001 through 467-54-034	22 North 1st Street	1926	2S2	8/3/1981
E-21[b]	467-62-001 467-62-007 through 467-62-020	8–14 South 1st Street	1926	1D	1/1/1983
E-22	259-40-038	34 Santa Clara Street	ca. 1880 1910s 1920s	2S2	6/9/2003
E-23	259-34-018	81 Santa Clara Street	1926	2S2	6/9/2003
E-24	259-34-046	101 Santa Clara Street	1942	2S2	6/9/2003
E-25	259-38-128	374 Santa Clara Street	1934	2D2	5/29/1990
E-35	259-35-05	151–155 Santa Clara Street	ca. 1884 1930 ca. 1970	2S2	2/6/2006
E-36	259-35-035	161–167 Santa Clara Street	1883	2S	6/4/1996
F-13	261-34-020	Cahill Station and Santa Clara / Alameda Underpass	1935	1D	4/1/1993
F-14	261-33-020	848 The Alameda	ca. 1884	2S	6/9/2003
F-15	261-01-074	176 North Morrison Avenue	ca. 1898	2S2	6/9/2003
I-01	230-06-031 230-06-032 230-06-050 230-06-051	1 Railroad Avenue (Santa Clara Station)	1863–1864 1877	1S	2/28/1985
I-02	230-06-040	Benton Street and Railroad Avenue (Santa Clara Tower, Speeder Shed, and Tool House)	1904 1927	2S2 2D	6/9/2003

[a] Applicable NRHP Status Codes are:

1D – Contributor to a district or multiple resource property listed in NRHP by the keeper. Listed in the CRHR.

2D – Contributor to a district determined eligible for the NRHP.

1S – Individual property listed in NR by the Keeper. Listing in the CRHR.

2D2 – Contributor to a district determined eligible for NRHP by consensus through Section 106 process. Listed in the CRHR.

2S – Individual property determined eligible for NRHP by the Keeper. Listed in the CRHR.

2S2 – Individual property determined eligible for NRHP by a consensus through Section 106 process. Listed in the CRHR.

[b] Contributor to the San Jose Downtown Commercial District, which was listed in the National Register of Historic Places in 1983.

Table 4.5-2: Properties Determined Eligible for Listing in the National Register of Historic Places and California Register of Historical Resources as Part of the Phase II Extension Project

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]
E-27	467-20-078	30 N. 3rd Street	ca. 1903	2S2
E-22	261-01-063	179-181 Rhodes Court	1948	2S2

[a] Applicable NRHP Status Codes are:

~~3S~~ 2S2 – Individual property determined ~~Appears~~ eligible for NRHP ~~as an individual property through survey~~

Table 4.5-A: Survey Population Properties that Are Assumed Eligible for Listing in the National Register of Historic Places and/or California Register of Historical Resources as Part of the Phase II Extension Project

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]
E-33	261-33-047	734 The Alameda	1930	n/a
F-34	261-33-048	88 Bush Street	ca. 1915–1947	n/a
F-35	261-010-068	865 The Alameda	1930	n/a

[a] FTA assumes eligibility to the NRHP for the purposes of this Project only.

Table 4.5-3: Survey Population Properties that Are Historic Resources for CEQA but Are Determined Not Eligible for Listing in the National Register of Historic Places and/or California Register of Historical Resources as Part of the Phase II Extension Project

Map Reference	APN	Street Address	Year Built	NRHP Status Code[a]
D-04	467-24-036	48-52 South 6th Street	ca. 1905–1907	5S2, 6Z, 6Y
~~D-05~~	~~467-24-035~~	~~58 South 6th Street~~	~~1921~~	~~6L, 6Z, 6Y~~
E-16	467-21-027	43–49 Santa Clara Street	1887, 1927	5S3, 6Z, 6Y
E-17	467-21-026	35–39 Santa Clara Street	1876, 1936	5S3, 6Z, 6Y
F-19	261-33-023	808 and 824–826 The Alameda	ca. 1920s-1930, 1954	5S1, 6Z, 6Y

[a] Applicable NRHP Status Codes are:

5S1 – Individual property that is listed or designated locally.

5S2 – Individual property that is eligible for local listing or designation.

5S3 – Appears to be individually eligible for local listing or designation through survey evaluation.

~~6L – Determined ineligible for local listing or designation through local government review process; may warrant special consideration in local planning.~~

6Y – Determined ineligible for NRHP by consensus through Section 106 process. Not evaluated for CRHR or local listing.

6Z – Found ineligible for NRHP, CRHR, or Local designation through survey evaluation.

4.5.2.2 Regulatory Setting

Federal

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) (United States Code [USC], Title 43, Section 4321 et seq.) requires the consideration of potential environmental effects, including potential effects on cultural resources, in the evaluation of any proposed federal agency action. This includes consideration of unique characteristics of the geographic area such as proximity to cultural resources and the degree to which the action may adversely affect districts, sites, highways, objects, or landscapes listed in or eligible for listing in the National Register of Historic Places (NRHP).

The NEPA regulations also require that, to the fullest extent possible, agencies integrate NEPA review concurrently with other environmental regulations, including surveys and studies required by the NHPA (described below), which, under Section 106, requires federal agencies to consider the effects of their actions on historic properties.

Section 106 of the National Historic Preservation Act

The NHPA (16 USC 470 et seq.) establishes the federal government policy on historic preservation and the programs—including the NRHP—through which this policy is implemented. Under NHPA, significant cultural resources, called historic properties, include any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the NRHP. A property is considered significant if it meets the NRHP criteria.

Section 106 requires that impacts on historic properties be taken into consideration in any federal Undertaking. The process for implementing the NHPA contains five steps: (1) initiating the Section 106 process, (2) identifying historic properties, (3) assessing adverse effects, (4) resolving adverse effects, and (5) implementing the project and any stipulations in an agreement document.

Section 106 affords the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on any Undertaking that would adversely affect historic properties eligible for listing in the NRHP. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for inclusions in the NRHP.

Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act (16 USC 469–469(c)-2) provides for preservation of significant historic or archaeological data, including relics and specimens that may otherwise be irreparably lost or destroyed by construction of a project by a federal agency or under a federally licensed activity or program.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (16 USC 470(a)-11) provides for the protection of archaeological resources and sites on public lands and Indian lands; establishes a procedure for the issuance of permits for conducting cultural resources research; and prescribes penalties for unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act (42 USC 1996) protects and preserves the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians. The act requires policies of all governmental agencies to respect the free exercise of Native religion and to accommodate access to and use of religious sites to the extent that the use is practicable and is not inconsistent with an agency's essential functions.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (25 USC 3001–3013) sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items on federal and tribal lands during implementation of a project. The act clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American tribes or tribes likely to be lineal descendants or culturally affiliated with the discovered remains or objects.

American Antiquities Act

The American Antiquities Act (16 USC 431–433) prohibits appropriation, excavation, injury, or destruction of “any historic or prehistoric ruin or monument, or any object of antiquity” located on lands owned or controlled by the federal government. The act also establishes penalties for such actions and sets forth a permit requirement for collection of antiquities on federally owned lands.

4.5.3 Methodology

4.5.3.1 Determination of Effect on Historic Architectural Resources

The analysis of potential effects on historic architectural resources is based on the Criteria of Adverse Effects contained within 36 CFR 800: “Effect means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register.” An *adverse effect* occurs “when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association….Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative."

Adverse effects include, but are not limited to, the following.

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines.
- Removal of property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

An *adverse effect* would occur if the BART Extension Alternative would cause perceptible changes to the significant characteristics of a resource and would inhibit the resource's interpretive potential.

4.5.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.5.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.5.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects may result in varying degrees of effects to cultural resources typically associated with transportation projects in a culturally rich and diverse area. Where architectural and archaeological resources have adverse effects from the No Build Alternative projects, mitigation measures could include, but not be limited to, avoidance, protection, data recovery, and public education. Inadvertent or unexpected discoveries of cultural resources would be addressed in accordance with federal and state laws related to the protection of cultural resources. These projects would undergo separate environmental review to define potential substantial effects on historic resources, both archaeological and architectural, and to determine appropriate mitigation measures.

4.5.4.2 BART Extension Alternative

Archaeological Resources

The only operational activity that would have the potential to affect the one known archaeological historic property during BART operations would result from potential vibration impacts of the trains operating along the tracks within the tunnel.

A *Noise and Vibration Technical Report* was prepared for the BART Extension (Wilson, Ihrig & Associates 2016), in which data were based on criteria defined in the FTA *Transit Noise and Vibration Impact Assessment*, also referred to as the FTA Guidance Manual. The FTA Guidance Manual provides criteria to evaluate operational impacts for the BART Extension. This study found that operational (ground-borne) vibration primarily causes human annoyance or interference with use of equipment sensitive to vibration. Damage to historic buildings from vibration resulting from train operation is “unlikely, except when the track will be very close to the structure.” In these cases, FTA provides direction to use the construction vibration threshold of 0.12 inches per second Peak Particle Velocity (PPV)—or alternatively 90 vibration velocity decibels (VdB) from the PPV limits—for those structures. Operational vibration levels at this historic property would be below 90 VdB; therefore, vibration from operation of the BART Extension would not adversely affect CA-SCL-363H or the elements of CA-SCL-363H that contribute to its eligibility to the NRHP. Therefore, operation of the BART Extension Alternative would result in *no adverse effect* on the one known archaeological historic property within the APE. Refer to Chapter 5, Section 5.5.6, *Cultural Resources*, for a detailed discussion about the BART Extension’s effects on archaeological resources caused by construction.

Historic Architecture

Elements of the BART Extension located near historic properties include the connection to the Phase I Berryessa Extension, tunnel portals, ventilation or electrical facilities, Twin-Bore and Single-Bore Options, stations (Alum Rock/28th Street, Downtown San Jose East and West Options, Diridon South and North Options, and Santa Clara), and the Newhall Maintenance Facility. Operation of the BART Extension would cause *no adverse effects* on any of the ~~29~~ 32 identified historic properties as described below.

Direct Adverse Effects

The elements of the BART Extension would result in no direct adverse effects on the identified historic properties because the proposed project elements, including those described in the paragraph above, ~~they~~ would not result in the partial removal of, physical destruction of, or damage to any historic property.

~~None of the aboveground components of the BART Extension alignment, including the elements described in the paragraph above, would result in the partial removal of, physical destruction of, or damage to any historic property.~~

Tunnel

Tunnel alignments under the Single- and Twin-Bore Options would not result in direct adverse effects on any of the 32 identified historic properties. While the tunnel proposed under either the Twin-Bore or Single-Bore Options would pass beneath (between approximately 40 feet and 90 feet below grade on average) some historic properties (Map Reference F-13, F-15, F-22, F-33, F-34, and F-35), none of the buildings, structures, or objects that contribute to these historic properties would be physically altered, demolished, or removed as a result of the proposed tunnels.

Alum Rock/28th Street Station

The historic property near Alum Rock/28th Street Station, the Church of Five Wounds (Map Reference C-25), is located across the street from the station under both the Single- and Twin-Bore Options; therefore, the station is located outside of the historic property boundary and would not result in the partial removal of, physical destruction of, or damage to this historic property.

Downtown San Jose Station (East and West Options)

While under the Twin-Bore Option some elements of the Downtown San Jose Station East and West Options, such as station entrance portals and elevators, would be located within the boundary of the San Jose Downtown Commercial District (see Map References E-08 through E-14, E-18, E-19, and E-21) and may alter the landscaping, infrastructure, and hardscape (i.e., sidewalks, curbs, light standards, and street furniture) within the public right-of-way at those locations, these features have been altered and/or replaced over time are not considered contributing elements of the district. Given the size of the historic district (28 contributing structures in total located within a more than two-square-block area over 11 acres), and that there are only three locations under the West Option and one location under the East Option where station entrance portals or elevators would be located within or immediately adjacent to the historic district, any potential alteration of the streetscape features within the public right-of-way would not present an adverse effect on the overall historic district.

Set in a dense urban ~~setting~~environment, the San Jose Downtown Commercial District, which consists of late nineteenth and early twentieth century buildings predominantly one to five stories in height, has already been altered by the construction of modern (i.e., not dating to the historic district's period of significance) buildings, structures, and infrastructure, including the addition and/or replacement of light standards, mailboxes, signage, traffic and pedestrian lights, bus shelters, parking meters, and sidewalk improvements. The Undertaking's proposed one-story entrance portals and elevators are small in scale relative to the surrounding buildings, and their massing would be consistent with the character of the commercial district and existing transportation corridors. The historic integrity of the historic district and its contributors, including those that are adjacent to entrance portals and elevators (Map References E-13, E-14, ~~and~~ E-18, and E-21), would remain unchanged.

Under the Twin-Bore Option, cut-and-cover construction of the Downtown San Jose Station East and West Options may result in the partial removal of sub-sidewalk features (basements and/or freight access elevators located within the public right-of-way) that may be associated with historic buildings adjacent to this type of construction; the presence or exact location of these sub-surface features is presently unknown. To avoid any direct adverse effect on historic properties, preconstruction surveys of all historic properties adjacent to cut-and-cover construction areas, as described in the *Preliminary Finding of Effects* (JRP Historical Consulting 2017) and Draft Programmatic Agreement, will be conducted to identify historic properties that may have these sub-sidewalk features within the public right-of-way. A qualified structural engineer, in consultation with an architectural historian or historic architect who meets the Secretary of the Interior's (SOI) Professional Qualification Standards (36 C.F.R. 61), will design the removal of the sub-surface features in a manner that will not cause more than cosmetic damage to historic buildings. The structural designs will be reviewed by an architectural historian or historic architect for consistency with SOI Standards. Implementation of this treatment will avoid direct adverse effects on historic properties that are immediately adjacent to the cut-and-cover construction for the tunnel alignment (Map References D-03, E-08, E-09, E-10, E-11, E-12, E-13, E-14, E-18, E-19, E-21, E-22, E-23. E-24, and E-27).

Cut-and-cover construction of the Downtown San Jose Station—East Option and Downtown San Jose Station—West Option under both the Single- and Twin-Bore Options would use tiebacks to secure shoring walls; however, tiebacks would extend underground beneath historic properties and would not directly affect any historic building. Therefore, the use of tiebacks for the proposed downtown station would result in *no direct adverse effect* on adjacent historic properties.

Under the Single- and Twin-Bore Options, the Downtown San Jose Station West Option would include~~,~~ a proposed station entrance ~~portal is proposed~~ within a vacant lot, currently used as a parking lot, adjacent to 81 Santa Clara Street (Map Reference E-23), which is individually eligible for the NRHP. ~~The station entrance would include an elevator, stairs, and escalators set back from Santa Clara Street behind a glass façade.~~ However, the ~~glass~~ proposed ~~façade of the~~ entrance under both options would be free standing and set back slightly from the façade of the historic property; therefore, it would result in *no direct adverse effect* on the historic building. For the same reason, a similar entrance proposed adjacent to two historic properties (Map References E-20 and E-15) under the Single-Bore Option for the Downtown San Jose Station West Option would result in *no direct adverse effects* to those historic properties.

Refer to the *Indirect Adverse Effects* section below for additional analysis of potential effects on historic properties from operation of the Downtown San Jose Station East and West Options.

Diridon Station South Option

Components of the Diridon Station South Option (Twin-Bore and Single-Bore Options), including a reconstructed bus transit center, station entrance portal, and tunnel ventilation, emergency exhaust ventilation, and fresh air shafts, would ~~also~~ be located within the boundary of the Cahill Station (Map Reference F-13). ~~For the same reasons described above for the Diridon Station North Option, t~~These station features would be in ~~an~~ areas already altered by ~~the~~ modern improvements, including the VTA bus ~~extant~~ transit center completed around 2000. None of ~~and would be a considerable distance away (approximately 50 or more feet) from the key contributors (depot, wrought-iron fencing, tracks, and passenger sheds). T~~these Undertakings would ~~not~~ cause the partial removal of, physical destruction of, or damage to any contributing elements of the historic property. The historic use and integrity of the historic property would be unchanged.

Diridon Station North Option

Portions of the Diridon Station North Option (Twin-Bore and Single-Bore Options) would be located within the boundary of the Cahill Station (Map Reference F-13). The aboveground features, including a reconstructed bus transit center, station entrance portal, and tunnel ventilation, emergency exhaust ventilation, and fresh air shafts, would be in an area already altered by the extant transit center and ~~would be approximately 20 or more feet away from the depot, wrought-iron fencing, tracks, passenger sheds, and undercrossing, all of which contribute to the significance of this historic property. These features~~ would not cause the partial removal of, physical destruction of, or damage to any contributing elements of the historic property. The historic use and integrity of the historic property would be unchanged.

Newhall Maintenance Facility

Two historic properties (Map References I-01 and I-02) are located adjacent to the Newhall Maintenance Facility; however, operation of the maintenance facility would not result in the partial removal of, physical destruction of, or damage to these two historic properties.

Santa Clara Station

Santa Clara Station would be located more than 150 feet from the historic properties (Map References I-01 and I-02) and across several active passenger and freight heavy rail lines; therefore, the station would not result in the partial removal of, physical destruction of, or damage to the~~se~~ ~~two~~ adjacent historic properties.

Indirect Adverse Effects

The BART Extension Alternative would also result in *no indirect adverse effects* on the identified historic properties from the operation of tunnels, stations (Alum Rock/28th Street, Downtown San Jose East and West Options, Diridon South and North Options, and Santa Clara), or the Newhall Maintenance Facility. Indirect effects on historic properties may be caused by the introduction of new visual, auditory, and vibration elements from the Build Alterative. However, all below-grade features of the Twin-Bore and Single-Bore Options and stations would not be visible from the surface near any historic property, and therefore would not result in any indirect adverse visual effects on the ~~29~~ 32 historic properties or the San Jose Downtown Commercial District Historic District. Each station would include the operation of aboveground station entrances; ventilation, fresh air, exhaust, and access shafts. In addition, the Downtown San Jose Station would include the construction of a new building to house the emergency exhaust shaft and streetscape improvements. None of these aboveground components would cause any indirect adverse visual effect on historic properties. Refer to the series of figures included in the *Preliminary Finding of Effects* (JRP, ICF, and Far Western ~~2016~~2017) that show existing conditions and simulated views depicting BART Extension elements such as station entrances and other aboveground elements in relation to eligible historic properties (see also, Chapter 5, Section 5.5, *Impacts from Construction of the BART Extension*). These figures are provided in Section 4.16, *Visual Quality and Aesthetics*.

Station entrance portals at ~~all four stations~~ the Single- and Twin-Bore Options' Alum Rock/28th Street Station, Diridon Station South and North Options, and the Santa Clara Station, and the Twin-Bore Option's Downtown San Jose Station East and West Options would consist of canopy structures that would measure approximately between 8 and 24 feet wide, 10 and 40 feet long, and up to approximately 15 feet high. The length and width of the canopies vary depending on the number of escalators and/or stairs at each entrance portal location. These entrances would be in proximity to various historic properties, some of which are contributors to the San Jose Downtown Commercial District but not individually eligible, and some of which are outside the historic district but individually eligible. The small scale of these structures, which would be one-story in height, and the use of transparent materials, which would have the effect of reducing the appearance of the massing, would minimize visual impacts on nearby historic properties and the historic district. The structures would be compatible with the existing urban setting and the character of the late nineteenth and early twentieth century historic district, which has already been modified by modern infill construction and infrastructure. These canopies would not noticeably block views when looking to or from historic properties, nor would they alter the character-defining features for which the historic properties or the historic district were found to be historically significant.

In addition, the Downtown San Jose West Option under the Twin-Bore Option would include an entrance portal set back behind a free-standing, one-story ~~glass façade~~ curtain wall adjacent to one historic property (Map Reference E-23), which is located outside of the boundaries of the historic district. The ~~free-standing façade~~curtain would be constructed of transparent glass and metal panels and would measure approximately 20 feet in height and160 feet in length. Similarly, the entrance canopies at this location, which would be behind the ~~free-standing façade~~curtain wall, would be constructed using transparent glass walls and roof with only a thin entrance archway of non-transparent material. The one-story façade and the even smaller entrance canopies would be subordinate in terms of size and massing to the adjacent two-story buildings, and the use of transparent materials would minimize visual impacts on the nearby historic property. The façade would not visually detract from the architectural character of the adjacent historic property because it would be lower in height and use materials that are architecturally differentiated but compatible with the historic building. These canopies and façade would not noticeably block views when looking to or from the historic property, nor would they alter the character-defining features for which the historic property was found to be historically significant.

The proposed E1 station entrance adjacent to an historic bank building (Map Reference E-23) for Downtown San Jose Station East and West Options under the Single-Bore Option would have no indirect adverse effect on that historic property for the same reasons described above. This free-standing entrance structure would be of similar construction, materials, scale, and massing and would be set back from the historic property's Santa Clara Street façade.

Ventilation, fresh air, exhaust, and access shafts associated with stations would extend approximately 12 feet above grade and measure approximately 15 by 20 feet. These station components would be visible from some historic properties; however, their viewshed and setting would not be adversely altered, and the historic integrity of the historic properties near these shafts would be unchanged. The small scale and massing of these elements would be consistent with the existing dense urban setting of these historic properties.

The operation of the Newhall Maintenance Facility and the Santa Clara Station would not cause any indirect adverse visual effects on the two nearby historic properties (Map References I-01 and I-02). All components of the station (except an underground pedestrian tunnel connection that would not be visible from either historic property), including a portal entrance, a one-story boarding platform, a parking structure that would be up to five stories in height, and two system facilities that would be 12 and 20 feet high, would be more than 200 feet from both historic properties, and all aboveground elements of the maintenance facility would be more than 150 feet from either historic property. Although both the station and maintenance facility would be visible from both historic properties, neither would adversely diminish the viewshed of the industrial and rail transportation setting of these historic properties. These historic buildings were originally constructed along a nineteenth century, at-grade railroad, and the introduction of a similar rail line and its associated station and maintenance facilities nearby would not diminish the qualities of these historic properties that qualify them for the listing in the NRHP.

Further, there are no indirect adverse effects on any historic property from predicted vibration or noise impacts from operation of the BART Extension Alternative at the location of any historic property. Operational noise has the potential to cause indirect adverse effects only on historic properties that have an inherent quiet quality that is part of a property's historic character and significance (i.e. churches, parks, and National Historic Landmarks with significant outdoor use). Of the ~~29~~ 32 historic properties addressed in this report, only one, the Church of Five Wounds (Map Reference C-25), is considered to have an inherent quiet quality. The predicted operational noise level at the location of this historic church would reach up to 25 A-weighted decibels (dBA), a level less than the FTA threshold of 40 dBA for institutional buildings and historic buildings with an indoor use that involves meditation and study (i.e., a church or school). Thus, the BART Extension Alternative would result in no indirect adverse effects on the historic church from operational noise.

All other historic properties, which consist of commercial, transportation, industrial, and residential resources, do not have an inherent quiet quality that is part of their historic character or significance; therefore, the BART Extension Alternative would not result in any indirect adverse effect on those 28 historic properties from operational noise.

According to the FTA *Transit Noise and Vibration Impact Assessment* (2006), operational (ground-borne) vibration primarily causes human annoyance or interference with use of equipment sensitive to vibration. Damage to historic buildings from vibration resulting from train operation is "unlikely, except when the track will be very close to the structure." In these cases, FTA provides direction to use the construction vibration threshold of 0.12 in/sec PPV—or alternatively 90 vibration velocity decibels (VdB) from the PPV limits—for those structures. Operational vibration levels at all ~~29~~ 32 historic properties would be below 90 VdB; thus, no adverse effects are anticipated on any historic properties from operational vibration.

In conclusion, under Section 106, the BART Extension Alternative would have *no adverse effect* on any of the ~~29~~ 32 identified historic properties, and therefore, no further mitigation is necessary.

4.5.5 NEPA Conclusion

Operation of the BART Extension Alternative would result in *no adverse effect* under NEPA on archaeological resources, historic properties, or historic districts listed or eligible for the NRHP, and no mitigation is required.

The extension consists of a corridor and large land areas, and areas where access to properties is restricted. In addition, portions of the corridor include areas of sensitivity for encountering buried archaeological deposits and features, and the effect on historic properties cannot be fully determined prior to the approval of the Undertaking. As described in Chapter 5, Section 5.5.6, *Cultural Resources*, construction of the BART Extension may adversely affect as-yet unidentified archaeological sites eligible for the NRHP. FTA and VTA have therefore chosen to conduct the identification and evaluation of potential historic properties, and the resolution of any adverse effects on historic properties within the APE, in phases pursuant to 36 CFR 800.4(b)(2) and 36 CFR 800.5(a)(3), subsequent to the approval of the Undertaking. Therefore, a Draft PA has been prepared, which includes an ~~outline for an~~ ARTP. The preparation and implementation of the Draft PA and ARTP are identified in Chapter 5, Section 5.5.6, *Cultural Resources*, as Mitigation Measure CUL-CNST-A. The Draft PA ~~i~~was included in Appendix D.3 in the Draft SEIS/SEIR and is available on the project website at www.vta.org/bart. The Draft PA and Draft ARTP are currently under consultation with the Office of Historic Preservation and other Consulting Parties. The Final PA and ARTP will be included as an attachment to the Record of Decision.

4.6 Electromagnetic Fields and Electromagnetic Interference

4.6.1 Introduction

This section describes the affected environment and environmental consequences related to electromagnetic fields (EMF) and electromagnetic interference (EMI) from operations of the BART Extension. EMF is associated with electromagnetic radiation, which is energy in the form of photons. Radiation energy spreads as it travels and has many natural and human-made sources. The electromagnetic spectrum, the scientific name given to radiation energy, includes light, radio waves, and X-rays, among other energy forms. For purposes of describing the EMF setting and effects for the BART Extension, human-made sources of radiation energy and associated EMF are relevant.

4.6.2 Environmental and Regulatory Setting

4.6.2.1 Environmental Setting

This section discusses the existing conditions related to EMF and EMI in the BART Extension area, including staging areas.

Because EMF levels are typically site-specific, the existing EMF environment along the corridor varies depending upon location. For example, commercial and industrial centers using major electrical systems and areas near high-voltage lines or other power transmission networks would likely have higher EMF levels than residential and undeveloped areas. Land uses within urbanized areas vary from industrial to commercial to residential. Table 4.6-1 shows measurements to establish EMF levels. Although these measurements were taken in 2003, these are considered valid in 2015 because background EMF levels typically change little over time in urban areas such as the area along the alignment. New development since 2003 has typically been urban infill that has not resulted in substantial new sources of EMF. It is anticipated that the range of EMF levels presented below represents the existing range of EMF levels along the alignment.

Table 4.6-1: EMF Levels along BART Extension

Location	Vertical Field Peak (in Gauss / µT)
Southwest corner of 28th and Santa Clara Streets	1.7 G / 170 µT
At Berryessa Road crossing of right-of-way	1.1 G / 110 µT
Center island of Montague Expressway (east side) at North Capitol Avenue (Tasman East light rail line right-of-way)	1.4 G / 140 µT
Along north side of Santa Clara Street between Market Street and North 1st Street	.9 – 1.4 G 90 – 140 µT
Along north side of Santa Clara Street between Terraine Street and Notre Dame Street	1.0 – 1.4 G 100 µT – 140 µT
At Caltrain Depot on Railroad Avenue at Palm Drive, Santa Clara (near airport)	.9 – 1.1 G 90 µT – 110 µT
Source: Earth Tech, Inc. 2003. µT = microTesla	

Medical facilities with magnetic resonance imaging are particularly susceptible to EMF because high EMF levels can interfere with the equipment.

The closest medical facilities (with imaging facilities) to the BART Extension Alternative where EMF interference would be of concern are listed below.

- Regional Medical Center of San Jose (225 N Jackson Avenue, San Jose, CA 95116), approximately 1 mile to the east of the BART Extension Alternative.
- Santa Clara Valley Medical Center and Valley Specialty Center (751 S Bascom Avenue, San Jose, CA 95128), approximately 2 miles to the southwest of the BART Extension Alternative.
- Santa Clara Imaging Center (1825 Civic Center Drive, Santa Clara, CA 95050), approximately 1.1 miles to the west of the BART Extension Alternative.

  The San Jose Medical Center was analyzed as a medical facility with magnetic resonance imaging as part of the 2004 FEIR. However, the Medical Center has since moved and is located more than 8 miles to the south of the BART Extension Alternative.

4.6.2.2 Regulatory Setting

The commonly known human-made sources of EMF are electrical systems such as electronics, telecommunications, electric motors, and other electrically powered devices. The radiation from these sources is invisible, non-ionizing, and low frequency. Generally, in most living environments, the level of such radiation plus background natural sources of EMF are low and not considered hazardous. Under extreme conditions, however, EMF can become intense, and hazards include shock and burn. Such conditions are nevertheless rare. The more pertinent concern over EMF exposure is the potential biological and health effects to individuals as the number of EMF-generating activities increases. As more sources of EMF are introduced, the extent and level of human exposure increases. The potential biological and health effects are under much study and intense debate.

Another concern over EMF generation is the potential interference to other electromagnetic systems that can result when new or more intense sources of radiation are introduced into the environment. These effects are better understood than health effects and are well documented. Electromagnetic interference (EMI) may include interruption, obstruction, or other degradation in the effective performance of electronics and electrical equipment. Depending upon the critical nature of this equipment, the effects can have serious consequences for the health and safety of individuals. Perhaps of less concern, but nonetheless important, is that the efficiency of affected systems may be reduced.

With the increasing number of personal computer systems in use in homes and businesses, a common problem is magnetic interference to computer monitors when used near alternating current (AC) or varying direct current (DC) magnetic fields. Computer monitors, particularly large screen monitors, are susceptible to interference created from nearby electrical sources, such as electrical panels, transformers, currents within internal systems wiring, and transmission and distribution lines.

Data corruption can also occur on magnetic or film media from very high magnetic fields. It is commonplace for data files to be transported using pocket-size magnetic or film media, particularly floppy or zip diskettes. The potential for computer monitor interference and data corruption on magnetic media from the operation of BART Extension Alternative is extremely small. It is worth noting that magnetic media materials (e.g., fare cards, credit cards, laptop computers with hard drives) are routinely carried by passengers on DC-powered transit systems throughout the world, with no reported negative effects.

As the name implies, EMF has electrical and magnetic field components. With respect to electrical systems, electric fields result from the strength of the electric charge (voltage), with DC generating stronger EMFs than AC at a given voltage, while magnetic fields result from the motion of the charge (current). Electric field strength is measured in units of volts per meter (V/m) and is greater the higher the voltage. Field strength deteriorates rapidly with distance from the source. Magnetic field strength has several units of measure; the most commonly used are milligauss (mG) and microTesla (µT). Ten milligauss equal one microTesla. Magnetic fields also deteriorate with distance but readily pass through most objects. Magnetic fields are typically the radiation of concern when evaluating EMFs.

Although modern society increasingly relies on electromagnetic systems, strong EMF fields are not associated with the normal living and working environment. Examples of EMF intensities from human activities include the following.

- Overhead power transmission line: 32 to 57 mG (range of exposure to utility workers).
- Household appliances: 8 to 165 mG (at a distance of 27 cm, or 12 inches).
- Computer video display: 2 to 4 mG (at 35 cm, or 16 inches).

- Rail vehicle (electrically powered): 400 mG (at 110 cm, or 43 inches from the vehicle floor) to 1,500 mG (at floor level).~~[1]~~ (USDOT and FRA 1993)

For comparison, in the natural environment apart from human activity, the earth's static magnetic field varies from 300 mG (30 µT) at the equator to more than 600 mG (60 µT) at the magnetic poles. In San Jose and Santa Clara, the earth has a natural static magnetic field of about 510 mG (approximately 50 µT).

Although short-term human health effects from exposure to elevated levels of EMFs are well established, such as effects on the central nervous system and heating of the body, the long-term effects from exposure to lower levels of EMFs continue to be studied. Several reports have proposed a link between EMF exposures and such health problems as cancer, including childhood leukemia. The preponderance of authoritative scientific studies, however, has found no firm evidence of long-term health risks from low-intensity EMF exposures. Despite the lack of scientific evidence of harm, the public continues to express concern, and health and regulatory agencies continue to study the matter.

Neither the federal government nor the state has set standards for EMF exposures. The Federal Drug Administration, Federal Communications Commission, U.S. Department of Defense, and the U.S. Environmental Protection Agency at various times have considered guidelines. The California Department of Education has established a policy of "prudent avoidance" for the location of schools in the vicinity of high-voltage power lines. Several states and other countries have standards for electrical field exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) publishes annual threshold limit values (TLVs) for chemical substances and physical agents, as well as biological exposure indices (BEIs). In the 2013 TLVs and BEIs published by the ACGIH, threshold limit values are recommended for static (DC) magnetic flux densities to which it is believed that nearly all persons may be repeatedly exposed day after day without adverse health effects. According to ACGIH, these values may be used as guides in the control of exposure to static magnetic fields but should not be regarded as fine lines between safe and dangerous levels.

The ACGIH guidelines suggest that routine occupational exposures should not exceed 60,000 µT to the whole body, or 600,000 µT to the body's limbs on a daily, time-weighted average basis (ACGIH 2001~~3~~). Recommended ceiling values are 2 Tesla (2,000,000 µT) for whole body, and 5 T for the limbs. Safety hazards may exist from the mechanical forces exerted by the magnetic field upon ferromagnetic tools and medical implants. Cardiac pacemakers and similar medical electronic device wearers should not be exposed to field levels exceeding 0.5 T (500,000 µT). These values are listed in Table 4.6-2.

~~[1] *Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports*, Federal Railroad Administration, August 199~~3.

Table 4.6-2: ACGIH Guidelines for EMF Exposure

	Whole Body	Limbs
Daily Average	60,000 µT	600,000 µT
Ceiling Values	2T	5T
Medical Device Wearers	0.5T	N/A
Sources: ACGIH 2001~~3~~. T = Tesla µT = microTesla		

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has published reference levels for general public exposure to time-varying magnetic fields (unperturbed root mean square values) of 40,000 µT for frequencies below 1 hertz (International Commission on Non-Ionizing Radiation Protection 1998). This reference level is given for the condition of maximum coupling of the field to the exposed individual, thereby providing maximum protection. The value is obtained from the basic restrictions by mathematical modeling and by extrapolation from the results of laboratory investigation. The ICNIRP guidelines on limits of exposure to static magnetic fields suggest that continuous exposure of the general public should not exceed a magnetic flux density of 40,000 µT (International Commission on Non-Ionizing Radiation Protection 1994).

The guidelines published by ICNIRP and ACGIH both recommend exposure limits well above those typically found within the passenger or pedestrian exposure fields from BART. Because the BART Extension would employ the same vehicles and propulsion system as those currently in use on BART, EMF influence on operators or passengers within the vehicles would not change from current operation levels.

4.6.3 Methodology

For the present analysis, a computer model was designed to calculate the worst-case static magnetic field strength that could result from BART Extension operations. An at-grade rail profile was developed in the model with the third rail located inside, or between, the running rails for each track. In each case modeled, a maximum third rail current of 12,000 amperes was used for simulation of a 10-car train under maximum load operation. This condition does not exist for extended operating periods, but typically only for short durations during maximum acceleration. Other moderating features that BART typically employs were omitted, such as multiple traction power substations and propulsion cross-bonding, which equalizes and distributes rail currents. This model is designed to illustrate the maximum potential field possible under normal operation. The earth's magnetic field of 50 µT, as it exists in San Jose and Santa Clara, was used as a reference.

4.6.4 Environmental Consequences and Mitigation Measures

4.6.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the BART Extension vicinity that are identified in the Bay Area's Regional Transportation Plan (RTP), *Transportation 2035 Plan for the San Francisco Bay Area*, adopted by the Metropolitan Transportation Commission in 2009; the *Valley Transportation Plan 2040*, adopted by VTA in 2014; and the *Expressway Plan 2040 Study* (County of Santa Clara Roads and Airports Department 2015). The No Build Alternative would not introduce major new EMF generators into the BART Extension vicinity. Transit improvements would be primarily related to expanded bus service. Although bus systems may have electrical systems that would generate EMF, the potential exposure to riders would differ little from the exposure an individual would experience when riding in a non-electric private automobile. Therefore, the No Build Alternative would have *no adverse effect* related to EMF.

4.6.4.2 BART Extension Alternative

The BART Extension would result in new sources of EMF generation, and exposure of passengers and individuals working on the systems or passing in the vicinity of such systems. The main sources of EMF generation would include train power distribution systems; traction power substations with connecting lines to the major utility lines; passenger facilities, with their various electrical systems for lighting, communications, utilities, fare machines, and other systems, and their proximity to power distribution networks; and electrically powered rail passenger vehicles. Because the BART Extension would use DC traction power, contributions to the magnetic field levels of the ambient power frequency (60 hertz AC) would be negligible.

Tables 4.6-3 and 4.6-4 show the measured EMF values found above and below BART rails. The values in these tables are well below the guidelines presented in Table 4.6-2.

Table 4.6-3: Vertical Field Peak Measurements above Existing, Operating BART Tracks at Hopyard Overpass, Pleasanton for Reference

Location	Vertical Field Peak (in Gauss / µT)
Over eastbound Interstate 580 lanes – approximately 14 meters (46 feet) above rails, approximately 35° from rail center	2.1 G / 210 µT
Over eastbound I-580 lanes – approximately 14 meters (46 feet) above rails, directly over rail center	2.1 G / 210 µT
Source: Earth Tech, Inc. 2003.	

Table 4.6-4: Vertical Field Peak Measurements below Existing, Operating BART Pleasanton Line at Rodeo Park Underpass at BART/Interstate 580 for Reference

Location	Vertical Field Peak (in Gauss / µT)
Approximately 6 meters (20 feet) directly below eastbound rails – no train present	1.7 G / 170 µT
Approximately 6 meters (20 feet) directly below eastbound rails – six-car train moving overhead	1.8 G / 180 µT
Approximately 10 meters (33 feet) directly below and between eastbound and westbound rails.	2.0 G / 200 µT[a]
Source: EarthTech, Inc. 2003.	
[a] Fairly constant field, with or without train movement overhead.	
µT = microTesla	

EMF intensities associated with trains vary considerably. The greatest potential fields would be within the electric rail vehicle. Therefore, the greatest potential for exposure would be for passengers, train operators, and attendants onboard the train. Passengers and workers would also be exposed to EMF fields in stations, and further exposure would occur to workers at traction power substations. Strong fields that carry a greater possibility of health risks would not be associated with these environments, however. The field strengths of electrified rail systems would be below maximum recommended exposure levels. Representative field measurements taken outside of existing BART stations are shown in Table 4.6-5.

Table 4.6-5: Vertical Field Peak and Range Measurements for Reference

Location	Range	Vertical Field Peak (in Gauss / µT)
Church of Christ, Pleasanton parking lot	Approximately 50 meters (164 feet) south of BART rails (with and without trains)	2.0 G / 200 µT
Church of Christ, Pleasanton parking lot	Approximately 100 meters (329 feet) south of BART rails (with and without trains)	1.9 G / 190 µT
Background field measurement between Dublin and Livermore	15 miles east of the end of BART tracks	1.3 – 1.7 G 130 µT – 170 µT
Background field measurement between Dublin and Livermore	15 miles east of the end of BART on farm	.8 – 1.4 G 80 µT – 140 µT
Source: EarthTech, Inc. 2003.		
µT = microTesla		

Measurements of DC magnetic fields were taken along the south wall of a substation at the Pleasanton Station where public exposure might occur. Additional measurements were taken at all three levels at the Lake Merritt Station. The values found at these BART stations are shown in Table 4.6-6. Field strengths onboard BART trains, which contain major propulsion equipment below floor level, show measurements ranging from 1,600 to 2,000 mG total (EarthTech, Inc. 2003~~USDOT et al. 2002~~). These values are equal to 160 to 200 µT, which is well within the ACGIH and ICNIRP guideline thresholds.

Table 4.6-6: Vertical Field Peak Measurements at Representative BART Stations

Location	Vertical Field Peak (in Gauss / µT)
Between Pleasanton Station and BART rails, parking lot center – max. along south wall of substation	2.2 G / 220 µT
Lake Merritt Station – platform level between rail centers	1.3 G / 130 µT
Lake Merritt Station – Level 1, approximately 7 meters (23 feet) directly above southbound rails	1.7 G / 170 µT
Lake Merritt Station – Level 2, street level, approximately 15 meters (49 feet) directly above southbound rails	1.9 G / 190 µT
Source: Earth Tech, Inc. 2003. µT = microTesla	

The results of the modeling show that static magnetic field levels above 50 µT do not extend beyond 10.0 meters (32.8 feet) from the center of the tracks. This finding is based on two trains running in opposite directions on two parallel tracks. Electric currents are assumed to be evenly distributed between the power rails (i.e., the third rails) and the running rails (i.e., the iron rails on which BART trains run), which return very low voltage current to electric power substations. Under conditions when electric currents are not evenly distributed (e.g., if only one of the third rails is supplying power to a train or return currents are not balanced among the running rails), static magnetic field levels above 50 µT can extend to approximately 15.0 meters (49.2 feet) from the center to the BART tracks. At approximately 15.0 meters (49.2 feet), static magnetic field strength returns to the normal background level when there are no other sources of static electric currents present.

BART trains would run underground in tunnels for much of the alignment, which would significantly reduce exposure. The Twin-Bore is typically 40 feet below ground level and the Single-Bore is typically 70 feet below ground level. The distance between the underground tunnel, power lines, and any EMF sensitive device aboveground in the medical centers are adequate to reduce possible EMF interference from BART Extension operations, as demonstrated by the model discussed above. This analysis assumes the sensitive devices/equipment are at ground level. The Regional Medical Center of San Jose is approximately 1 mile to the east of the BART Extension Alternative, and the elevation difference between the nearest part of the tunnel and the facility elevation would be at least 20 feet depending on the boring option. The Santa Clara Valley Medical Center and Valley Specialty Center is approximately 2 miles to the southwest of the BART Extension Alternative, and the elevation difference between the nearest part of the tunnel and the facility elevation would be at least 20 feet. The Santa Clara Imaging Center is approximately 1.1 miles to the west of the BART Extension Alternative, and the alignment would be at-grade at this location. Because of the distances and depths, there would be no adverse effects to these medical facilities related to EMF.

The measurements and models presented in this section demonstrate that exposure levels for BART Extension passengers and operators, passengers and BART employees in a station, and other BART Extension workers would be well below the guidelines for preventing health effects. Therefore, the potential for non-users, businesses, and residences at ground level to experience EMF exposures from BART Extension would be minimal, and present evidence suggests that there would be no demonstrable health risks from exposure to EMF. Therefore, the Build Conditions would have *no adverse effect* related to EMF.

An EMF Control and Test Plan will be included in the general contractor specifications to maintain awareness of the possible effects of BART Extension construction and operation, as well as provide field measurement for, and confirmation of, the final design. The plan will include EMF limits (based on ICNIRP and ACGIH guidelines) in the design and construction specifications and require testing and measurement of the final installed system.

Because EMF intensities and exposures from BART Extension operations would be below thresholds indicating potential health risks, no mitigation measures are necessary.

4.6.5 NEPA Conclusion

The BART Extension Alternative would have *no adverse effect* under NEPA. No mitigation measures are necessary.

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4.7 Energy

4.7.1 Introduction

This section describes the affected environment and environmental consequences related to energy from operations of the NEPA Alternatives. Information regarding energy resources was obtained from the following sources.

- *California State Profile and Energy Estimate* (U.S. Energy Information Administration 2015)
- *California Energy Demand 2012–2022 Final Forecast* (California Energy Commission. 2012)
- *California Energy Demand Updated Forecast 2015–2025* (California Energy Commission. 2015a)
- California-modified Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (CA-GREET) model (California Air Resources Board 2015)
- Air quality technical modeling outputs (*VTA's BART Silicon Valley—Phase II Extension Project Air Quality Study* included with this SEIS/SEIR)

4.7.2 Environmental and Regulatory Setting

4.7.2.1 Environmental Setting

This section discusses the existing conditions related to energy. Various forms of energy are used in vehicle propulsion and the operation of transportation facilities. Automobiles, buses, and trucks within the study area for the BART Extension Alternative use a variety of energy forms, including gasoline, diesel, and natural gas, whereas the BART fleet is powered by electricity. These energy forms would be delivered by regional and statewide distribution networks. Accordingly, the study area for energy resources consists of the physical boundaries of the construction area, as well as the larger statewide energy distribution network.

Existing State Energy Generation and Demand

California has a diverse portfolio of energy resources. Excluding offshore areas, the state ranked third in the nation in crude oil production in 2014, producing more than 15,720 barrels (equivalent to 1,154 trillion British thermal units [BTU]). The state also ranked fourth in the nation in conventional hydroelectric generation and second in the nation for net electricity generation from renewable resources. Other energy sources in the state include natural gas, nuclear, and biofuels (U.S. Energy Information Administration 2015).

According to the California Energy Commission (CEC), total statewide electricity demand is projected to grow from 277,140 gigawatt-hours (GWh) in 2013 to 320,862 GWh in 2025 (1.23 percent annually; mid-energy demand scenario) (California Energy Commission 2015a). Natural gas demand is predicted to grow at a slightly slower rate, 0.81 percent annually between 2010 and 2022, and is forecasted to reach 14,075 million therms by 2022 (California Energy Commission 2012). While alternatively fueled vehicles will continue to penetrate the transportation market, demand for gasoline and diesel is also forecasted to increase steadily over the next 10 years.

Local Energy Providers and Distribution

Pacific Gas & Electric Company (PG&E) is the largest publicly owned utility in California and is the electricity and natural gas provider for residential, industrial, and agency consumers in the area. PG&E buys electricity from a diverse mix of generating sources, including fossil-fueled plants, hydroelectric powerhouses, wind farms, solar facilities, and nuclear power plants. Under the authority granted to BART in California Public Utility Code Section 701.8 (b), BART purchases its own power. In addition to a small amount of power purchased directly from the Western Area Power Administration, the bulk of BART's power is provide via power contracts entered into by the Northern California Power Agency (NCPA) specifically to serve BART loads, and by market power purchases via NCPA. These purchases are made from resources located in the Pacific Northwest, and are delivered into California and scheduled into the California Independent System Operator's (CAISO) market along with a day-ahead load forecast to provide a load/resource balanced schedule to the CAISO. As BART's current power contracts expire December 31, 2016, BART will be actively pursuing zero carbon resources, with a stretch goal up to 100 percent carbon free supply.

Electricity is supplied to the area through a network of distribution and transmission lines. Although transmission lines are continuously being upgraded, and new routes are being constructed, increasing electrical demand throughout the state has strained system reliability and power quality. The transmission capabilities of some portions of the state's electrical grid are occasionally inadequate to transmit electricity at a rate that satisfies the quantities of electricity demanded. This phenomenon is known as a transmission bottleneck and can result in power blackouts. The CAISO operates the transmission system to minimize such bottlenecks using a congestion charge mechanism that prices congestion into the transmission cost. The CAISO is also responsible for taking remedial actions to avoid blackouts or other operational problems, as well as to identify any grid upgrades that need to be made for reliability purposes.

Diesel and gasoline are distributed by a number of methods, including pipelines, railroads, and trucks. Natural gas is supplied through a combination of interstate and intrastate pipelines. The majority of PG&E's natural gas supply comes from Canada.

Local Energy Consumption

Santa Clara County consumes a small amount of energy relative to the state. As shown in Table 4.7-1, electricity and natural gas usage in Santa Clara County are approximately 6 percent and 4 percent of the statewide total, respectively. Gasoline usage for Santa Clara County is about 5 percent of statewide usage, and diesel fuel usage is about 3 percent of the statewide total. For reference, Santa Clara County is home to about 4.8 percent of California residents.

Table 4.7-1: Santa Clara County Energy Usage in 2010

Fuel	Santa Clara County Energy Use	Percent of State Consumption
Electricity (million kWh)	16,251	6%
Natural Gas (million therms)	446	4%
Gasoline (million gallons)	727	5%
Diesel (million gallons)	88	3%
Sources: California Department of Transportation 2009; California Energy Commission 2015b. kWh = kilowatt-hours		

4.7.2.2 Regulatory Setting

Federal

In accordance with NEPA regulations, the Council on Environmental Quality requires that the energy requirements for each alternative be analyzed and the energy conservation and mitigation measures be identified (Code of Federal Regulations, Title 40, Section 1502.16(e)). Refer to Chapter 6, Section 6.7, *Energy*, for a summary of state and local energy policies relevant to the BART Extension.

4.7.3 Methodology

4.7.3.1 Overview

Guidance for evaluating energy impacts of transportation projects subject to NEPA is outlined in Federal Highway Administration (FHWA) Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. The FHWA Advisory applies to projects for which an EIS is prepared. Among these projects, the majority will not require a detailed energy study, but rather a “general” discussion of project energy requirements during construction and operation. Large-scale projects with “potentially substantial energy impacts” should prepare a more robust energy analysis that includes computations of construction and operational energy requirements. Consistency with state and regional energy plans should be discussed, as well as an analysis of direct and indirect energy impacts, which are defined by the FHWA Advisory as follows.

- **Direct energy**: Energy consumed by vehicles using the facility.
- **Indirect energy**: Construction energy and such items as the effects of any changes in automobile usage.

The Federal Transit Administration has not issued guidance on energy impact analysis. Thus, FHWA guidance is used in this analysis. Consistent with FHWA's guidance, this section analyzes operational energy requirements, as well as consistency with state and regional energy plans and the conservation potential of the BART Extension. Effects on energy production and natural resource consumption are also assessed pursuant to U.S. DOT Order 5601.1D.

This analysis characterizes effects related to energy as *no effect, no adverse effect*, or *adverse effect.*

- *No effect* on energy resources would occur if the Build Alternative results in no new increase in energy consumption.
- *No adverse effect* on energy resources would result if the Build Alternative implements energy conservation policies consistent with applicable state and local energy plans and policies, and if the Build Alternative would not place a substantial strain on statewide energy resources.
- The BART Extension would result in an *adverse effect* if it would involve energy consumption that is wasteful, inefficient, and unnecessary, or is otherwise inconsistent with applicable state and regional energy plans and polices.

4.7.3.2 Calculation Approach

Operation of the BART Extension would increase electricity consumed for vehicle propulsion. The stations and related facilities built as part of BART Extension would also use electric power. This "other" energy requirement was calculated on a percentage basis. About 22 percent of BART's existing power requirements are for station and facilities operations, with the other 78 percent for vehicle propulsion. It was assumed this relationship would apply to the BART Extension as well. Based on data obtained from the air quality analysts, annual electricity consumption for vehicle propulsion along the BART Extension would be 1.4 million kilowatt-hours (kWh) (Hosseini pers. comm.). Additional electricity consumed by other facilities was therefore estimated to be about 392,000 kWh per year (1.4 million kWh x 28 percent).

Although the BART Extension would increase electricity consumption, it would improve existing transit opportunities, which would facilitate the removal of single occupancy vehicles from the transportation network. Regional vehicle miles traveled (VMT) with and without the extension under 2015 Existing, 2025 Opening Year, and 2035 Forecast Year conditions were obtained from the air quality analysts and are summarized in Table 4.7-2. The VMT estimates were converted to gallons of diesel and gasoline based on light duty vehicle fuel economy data for Santa Clara County obtained from the California Air Resources Board's EMFAC2014 model.[1]

Table 4.7-2: Annual Regional Vehicle Miles Traveled (million) for the BART Extension Alternative

Mode[a]	2015 Existing		2025 Opening Year		2035 Forecast Year)	
	No Build	BART Extension	No Build	BART Extension	No Build	BART Extension
Automobile	18,057	17,944	19,075	18,970	20,663	20,557
Change from No Build		*-113 (-0.6%)*		*-105 (-0.5%)*		*-106 (-0.5%)*

Source: Hosseini pers. comm.

[a] Implementation of the BART Extension would not have a measurable effect on regional bus or truck activity (Van den Hout pers. comm.). Accordingly, VMT from regional buses and trucks are not include in the VMT analysis for the BART Extension.

Because transit and auto modes consume different types of energy, to provide for a common measure of comparison, kWh of electricity and gallons of gasoline and diesel consumed (or saved) were converted to their BTU equivalents. Energy use is expressed at two levels: in terms of the direct energy content of electricity and fuels consumed (or saved), as well as the total energy content of each energy unit. The former is the specific energy available at the point of use while the latter also includes the energy required to generate or refine and transmit or transport the energy unit to the final point of use. For instance, a kWh has a final or direct energy content of 3,414 BTUs, but an additional 4,586 BTUs of energy is required to generate and transmit the kWh to its point of use. The total energy content of a kWh is therefore estimated to be 8,000 BTUs (see Table 4.7-3). The BTU conversion factors used in the analysis are summarized in Table 4.7-3.

Table 4.7-3: Direct and Total BTU Conversion Factors by Fuel Type

Fuel Type	Direct Energy BTU per Unit	Total Energy BTU per Unit
Gasoline (gallon)	116,090	138,766
Diesel (gallon)	127,464	156,765
Electricity (kWh)	3,414	8,000

Sources: California Air Resources Board 2014; United States Department of Energy 2014.

BTU = British thermal units

kWh = kilowatt-hours

[1] Weighted fuel economy factors for light-duty vehicles (EMFAC vehicle categories of LDA, LDT1, and LDT2) under 2015 Existing, 2025 Opening Year, and 2035 Horizon Year conditions are 24.3, 35.1, and 45.4 miles per gallon, respectively.

4.7.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.7.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.7.4.1 No Build Alternative

The No Build Alternative consists of the existing transportation network and all programmed improvements outlined in regional transportation planning documents. The transportation projects completed under the No Build Alternative would be consistent with local policies that encourage alternative transportation and energy conservation, but would not be as supportive of regional plans to promote BART and transit-oriented joint development. Because BART is a more energy efficient form of transportation than personal automobiles are, the No Build Alternative would have greater energy use than the BART Extension Alternative. All individual projects planned under the No Build Alternative would undergo separate environmental review to define effects on energy and to determine appropriate mitigation measures, as needed.

4.7.4.2 BART Extension Alternative

Energy consumption under the BART Extension Alternative for 2015 Existing, 2025 Opening Year, and 2035 Forecast Year conditions is summarized in Table 4.7-4. The BART Extension Alternative would increase electricity usage as a result of BART vehicle propulsion and station operations, but would reduce vehicular fuel use through the removal of passenger vehicle trips from the transportation network. As shown in Table 4.7-4, this reduction in vehicular fuel use would offset increases in BART electricity consumption, resulting in a net energy reduction, relative to the No Build Alternative.

Table 4.7-4: Annual Direct and Total Energy Use for the BART Extension Alternative (Million BTU)

Condition and Source	Direct Energy[a]	Total Energy[b]
2015 Existing		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-538,819	-644,067
Overall Net Change in Energy Consumption (Existing Plus BART Extension vs. No Build)	*-532,431*	*-629,098*
2025 Opening Year		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-347,882	-415,834
Overall Net Change in Energy Consumption (Opening Plus BART Extension vs. No Build)	*-341,494*	*-400,865*
2035 Forecast Year		
BART Electricity	6,388	14,969
Change in Vehicular Fuel from Increased Ridership	-270,620	-323,480
Overall Net Change in Energy Consumption (Forecast Plus BART Extension vs. No Build)	*-264,232*	*-308,511*

[a] Direct energy includes energy required at the point of use.

[b] Total energy includes the energy required to generate or refine and transmit or transport the energy unit to the final point of use.

BART's Policy Framework for Sustainability includes a goal to "Apply sustainable techniques and procedures into BART's maintenance projects and operations in a cost-effective manner." Energy conservation is an important aspect of this goal. For example, variable speed escalators that stop and re-start or that operate at a low-speed mode will be evaluated for implementation to reduce off-peak energy consumption as they are being done on VTA's Phase I Project.

Although the BART Extension would increase electricity consumption, relative to the No Build, the adjacent transit centers, parking garages and other supporting facilities would incorporate VTA's Sustainability Program green strategies, which would help conserve energy. For example, LED lighting, photosensor-driven lighting and dimming controls could be applied to minimize artificial lighting during daylight hours and reduce power during off-peak periods. Photovoltaic solar panels may also be incorporated, which would minimize purchased power and demand on PG&E loads. These strategies are consistent with state and local energy plans and policies to reduce energy consumption, including the State of California Energy Action Plan. The BART Extension Alternative would also facilitate implementation of the Metropolitan Planning Commission's *Plan Bay Area* by promoting regional transit and reductions in single occupancy vehicle use. Plan Bay Area is a long-range integrated transportation and land-use strategy through 2040 for the San Francisco Bay Area.

With regard to effects on local and regional energy supplies, BART would procure and PG&E would distribute electricity to the BART Extension through 115-kilovolt alternating current lines. Power feed lines connecting high-voltage substations to existing PG&E towers and lines would be required. Electricity consumption would be highest during peak-periods (3 to 7 p.m.) and would be on the order of 11 megawatts, which is approximately 0.018 percent of historic (2011) peak demand (California Energy Commission 2015c). The degree to which VTA is able to conserve energy and generate renewable power through implementation of the strategies described above would dictate the BART Extension Alternative's dependency on PG&E.

Natural gas consumption, which would be supplied by PG&E, would be highest during peak-periods (3 to 7 p.m.), with demand greatest during the winter months. The degree to which VTA is able to utilize natural gas conservation would dictate its dependency on PG&E and have a direct effect on supply from PG&E.

PG&E uses local and regional development plans to forecast and plan for the energy needs of its service territory. This dynamic process is subject to regulatory oversight by the Public Utilities Commission (PUC), where every 2 years in Long Term Procurement Plan proceedings, the PUC assesses the system and local resource needs of the state's three investor-owned utilities over a 10-year horizon. The PUC establishes upfront standards for utility procurement activities and cost recovery by reviewing and approving proposed procurement plans prior to their implementation. Integral to this process is the utility demand forecast, which is subject to review by the CEC. As part of this process, BART's 20-year load forecast, which includes extension loads, is submitted to PG&E for long-term planning. To ensure consistency with approved plans, the PUC conducts annual Energy Resource Recovery Account proceedings in which energy forecasts are refined based on existing procurement. This continual planning process ensures local utilities will accommodate the current and planned local energy requirements for a region. Consequently, it is anticipated the BART Extension Alternative would have *no adverse effect* on local and regional energy supplies, nor on any requirements for additional capacity. No mitigation would be required.

4.7.5 NEPA Conclusion

The BART Extension Alternative would result in a net energy reduction, relative to the No Build Alternative. Implementation of VTA's Sustainability Program green strategies would ensure the BART Extension Alternative is consistent with state and local energy plans and policies to reduce energy consumption. Peak electrical demand would not impede PG&E's ability to meet regional loads, and ongoing utility and system planning processes would be employed to accommodate increases in future electricity consumption. Accordingly, the impact would have negligible intensity under NEPA and there would be *no adverse effect*. No mitigation is required.

4.8 Geology, Soils, and Seismicity

4.8.1 Introduction

This section describes the affected environment and environmental consequences related to geology, soils, and seismicity from operations of the NEPA Alternatives. The analysis in this section is based on *VTA's BART Silicon Valley Phase II Extension Project Geotechnical Memorandum* prepared by PARIKH Consultants, Inc. in February 2014.

4.8.2 Environmental and Regulatory Setting

4.8.2.1 Environmental Setting

This section discusses the existing conditions related to geology, soils, and seismicity within the BART Extension, including staging areas.

Geologic Setting

Topography

Santa Clara County is primarily in a flat alluvial plain that lies between the Santa Cruz Mountains and the Diablo Range. Most of the area consists of level terrain, which gives way to rolling foothills toward the east and west. These foothill areas become steeper and graduate into mountain ranges. The Salinas Valley lies to the south, and San Francisco Bay is located to the north. The elevations in the county range from approximately 0 feet to 4,370 feet above mean sea level, and the slope of the land is toward the bay. The mountains and foothills in the western and southern portions of the county are the sources of the watercourses that flow through the northern county (Santa Clara County 1994).

The alignment is located on relatively flat terrain within Santa Clara County.

Geology

The BART Extension would be located in the Santa Clara Valley, which extends southeastward from San Francisco Bay and is a northwest/southeast trending valley within the Coast Ranges Geomorphic Province of Northern California. The Santa Clara Valley is an alluvium-filled basin located between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast. The valley is covered by alluvial fan, levee, and active stream channel deposits with marine estuary deposits located along the bay margins. These unconsolidated deposits cover Tertiary through Cretaceous age bedrock. The BART Extension would be located in an area of the valley where the ground surface has no steep slopes.

The BART Extension is underlain by a variety of alluvial deposits. The alluvium has been identified as Holocene age alluvial fan deposits (Qf & Qhf), fine-grained Holocene alluvial fan deposits (Qhff), Holocene alluvial fan levee deposits (Qhl), Holocene stream channel deposits (Qhc), and historic artificial channel deposits (ac). Fine-grained Holocene alluvial fan deposits (Qhff) occur on the flatter distal portions of fans and consist primarily of silt and clay-rich sediments with interbedded layers of coarser sand and occasional gravel. The Holocene alluvial fan levee deposits (Qhl) consist of silt, sand, and clay. Artificial fill may be present over any of the Holocene age deposits along the BART Extension.

Bedrock buried at great depth beneath the BART Extension is presumed to be the Franciscan Complex of the upper Jurassic to Cretaceous age. The Franciscan Complex bedrock is overlain by a thick (over 1,000 feet) deposit of Tertiary marine/non-marine sediments and by Pleistocene to Recent deposits.

Geologic Hazards

Fault Rupture

The BART Extension lies between the San Andreas Fault to the west and the Hayward and Calaveras Faults to the east. Both the Hayward Fault and Calaveras Fault are known active faults. The Hayward fault is located approximately 12 miles north of the Alum Rock/28th Street Station and extends from San Jose about 74 miles northward along the base of the East Bay Hills to San Pablo Bay. The Silver Creek Fault crosses the alignment perpendicularly between the Downtown San Jose and Alum Rock/28th Street Station locations. Based on geomorphic and preliminary paleoseismic evidence, Silver Creek fault is considered to be potentially active. The Silver Creek Fault is also characterized as potentially active in the *Envision San Jose 2040 General Plan*. The following provides additional detail on the aforementioned faults:

- **Hayward Fault** – Last major earthquake occurred in October 1868 and had a Richter magnitude of 7. Capable of generating a maximum credible earthquake[1] of moment magnitude (Mw) 7.1.
- **San Andreas Fault** –Largest active California fault, responsible for the largest earthquake in California: the 1906 Mw 7.9 San Francisco earthquake.
- **Silver Creek Fault** – Maximum magnitude distribution for this fault ranges from 6.3 to 6.9.

Other faults in the region that are capable of producing large magnitude earthquakes are the San Gregorio, Rodgers Creek, Hayward Southeast Extension, Sargent, Concord-Green Valley, Ortigalita, and Greenville Faults, along with the faults of the Foothills thrust belt. All of these faults are located within 40 miles of the BART Extension.

[1] Maximum credible earthquake is the largest earthquake that can be expected to occur on a fault over a particular period of time.

Liquefaction

Liquefaction occurs when saturated, low-density, loose materials (e.g., sand or silty sand) are weakened and transformed from a solid to a near-liquid state as a result of increased pore water pressure. The increase in pressure is caused by strong ground motion from an earthquake. Liquefaction most often occurs in areas underlain by silts and fine sands and where shallow groundwater exists. Liquefaction can cause structures built on or above liquefiable soils to experience bearing capacity failure and collapse. Flow failure, lateral spreading, differential settlement, loss of bearing capacity, ground fissures, and sand boils are evidence of generation of excess pore pressure and liquefaction. In areas susceptible to liquefaction, one of the primary liquefaction hazards is seismically-induced settlement and temporary increase in lateral earth pressures on below-grade structures. Although a soil layer may or may not fully liquefy during an earthquake, it can still experience settlement.

All of the stations and the Newhall Maintenance Facility would be located on Holocene alluvial fan deposits, which are identified as having a moderate liquefaction potential. Post-liquefaction settlements of less than 1 inch to 2 inches are anticipated near Alum Rock/28th Street, Diridon (South and North Options), and Santa Clara Stations (PARIKH Consultants 2014). A portion of the alignment near the Alum Rock/28th Street Station location crosses a narrow historic artificial channel that is also rated with a moderate liquefaction potential.

Approximately 100 and 700 feet northeast of Diridon Station (South and North Options) the alignment crosses the two (approximately 100-foot-wide) stream channels (Los Gatos Creek and Guadalupe River, respectively), where the liquefaction potential is characterized as being very high. The approximately 500-foot-long segment of the alignment near the Diridon Station (South and North Options) location between the two stream channels is rated as having moderate liquefaction potential.

Landslides

The BART Extension is located on nearly flat terrain and is not identified as being susceptible to earthquake-induced landslides.

4.8.2.2 Regulatory Setting

There are no specific federal regulations related to geologic conditions. The BART Extension must be in compliance with state laws. The state regulations relevant to the BART Extension are provided in Chapter 6, Section 6.8, *Geology, Soils, and Seismicity*.

4.8.3 Methodology

The following section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.1, *Introduction*. An *adverse effect* would pose an increased risk of personal injury, loss of life, and damage to property on a regional scale. The section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.8.4 Environmental Consequences and Mitigation Measures

4.8.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area(see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). The No Build Alternative projects would likely result in geologic and seismic effects typically associated with transit, highway, bicycle, and pedestrian, facilities, and roadway projects. Structures associated with the projects would be designed in accordance with applicable seismic design standards in the California Building Code. Additionally, it could be anticipated that engineering studies would be performed to identify the appropriate design measures needed for the geologic and seismic conditions of any project sites. Projects planned under the No Build Alternative would undergo separate environmental review to determine geologic effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.8.4.2 BART Extension Alternative

Potential seismic hazard sources in the study area are surface fault rupture, ground shaking, and liquefaction. Potential expansive soils and erosion impacts are also discussed because they have the potential to negatively affect the BART Extension.

Surface Fault Rupture

The BART Extension is not located within an Earthquake Fault Zone as defined and mapped under the Alquist-Priolo Act. The Silver Creek Fault, which is a potentially active fault, runs northwest to southeast and crosses the alignment between the Downtown San Jose and Alum Rock/28th Street Stations. Although there may be potential for fault rupture impacts along the Silver Creek Fault near Alum Rock/28th Street Station, the BART Extension would comply with requirements set forth in the California Building Code and the pertinent BART Facilities Standards to withstand forces associated with the maximum credible earthquake. The California Building Code and the pertinent BART Facilities Standards provide standards intended to permit structures to withstand seismic hazards. The code sets standards for excavation, grading, construction earthwork, fill embankments, expansive soils, foundation investigations, liquefaction potential, and soil strength loss. Adherence to the requirements in the California Building Code and the pertinent BART Facilities Standards would reduce the potential of fault rupture impacts to *no adverse effect*, and no mitigation is required.

Ground Shaking

The San Andreas, Hayward, and Calaveras Faults are capable of generating large magnitude earthquakes that can result in strong ground shaking. Additionally, the Silver Creek Fault is considered a potentially significant seismic source. Seismically induced ground shaking within the BART Extension would depend on the magnitude of the earthquake, distance from the BART Extension to the fault source, directivity (focusing of earthquake energy along the fault in the direction of the rupture), and subsurface conditions. Therefore, the potential for strong ground shaking to occur within the BART Extension is considered moderate to high. The proximity of these faults and other nearby active faults means that strong ground shaking would eventually subject the alignment and structures to strong seismic shaking. Structures could be damaged or destroyed and people could be harmed during a major seismic event originating on any of the nearby faults.

The BART Extension would be designed and constructed to meet or exceed the current seismic design standards set forth by the California Building Code, as well as the pertinent BART Facilities Standards, Release 1.2. These codes and standards are designed to reduce major structural damage and avoid major injury and loss of life in the event of an earthquake. The seismic performance goals generally expect that some property damage would result from a moderate to large earthquake, but that damage would generally be reparable and not life threatening. With adherence to the standards mentioned above, potential exposure of people to harm from geologic or seismic hazards would result in *no adverse effect*, and no mitigation is required.

Liquefaction

As described in Section 4.8.2.2, *Environmental Setting*, the majority of the BART Extension is located in an area with moderate liquefaction potential, and a portion of the alignment is located in an area with very high liquefaction potential. Settlement after liquefaction could range from 1 to 2 inches at the Alum Rock/28th Street, Diridon (South and North Options), and Santa Clara Stations. BART Facilities Standards Design Criteria limit the total settlements for structure foundations to 1 inch or less; therefore, there would be a need to reduce liquefaction-related settlement hazards along some portions of the alignment. The exact methodologies to reduce these hazards to be used will be determined during final engineering, but examples are included in Mitigation Measure GEO-CNST-A (see Chapter 5, Section 5.5.9, *Geology, Soils, and Seismicity*). These design requirements would reduce the potential exposure of people to hazard from seismic risk associated with liquefaction.

Liquefaction could also affect underground structures if the structures are buoyant. The liquefied soil could uplift the underground structures resulting in the deformation of ground surface, buildings, and utilities located above an uplifted structure. This would be a potentially adverse effect.

The BART Extension would be designed and constructed to meet or exceed standards set forth by the California Building Code and the pertinent BART Facilities Standards. Because the BART Extension would be constructed with adherence to the aforementioned standards, requirements, and mitigation measure, potential operational impacts would result in *no adverse effect*, and no mitigation is required.

Because the ground surface is relatively flat along the alignment, the impacts from lateral spreading would be *no adverse effect*, and no mitigation is required.

Landslides

The BART Extension is located on nearly flat terrain and is not identified on any California Geological Survey Seismic Hazard Zone maps as being susceptible to earthquake-induced landslides. Therefore, impacts from landslides would result in *no adverse effect*, and no mitigation is required.

Expansive Soils

Expansive soils are fine-grained soils (generally high-plasticity clays) that can undergo a significant increase in volume with an increase in water content as well as a significant decrease in volume with a decrease in water content. Changes in the water content of highly expansive soils can result in severe distress for structures constructed on or against the soils.

Expansive soils are a concern for the structures for system facilities, parking garages, and vehicular and pedestrian access at the stations. Some of the soils at station locations and the Newhall Maintenance Facility have high Plasticity Indices of between 21 and 40 meaning that they have moderate to high expansion potential.

The BART Extension would be designed and constructed to meet or exceed standards set forth by the California Building Code and the pertinent BART Facilities Standards.

Because the BART Extension would be constructed with adherence to the aforementioned standards, requirements and mitigation measures, operational impacts result in *no adverse effect*, and no mitigation would be required.

4.8.5 NEPA Conclusion

For the BART Extension Alternative, adherence to California Building Code requirements and pertinent BART Facilities Standards would ensure that impacts related to liquefaction would result in *no adverse effect* under NEPA. Impacts related to fault rupture, ground shaking, liquefaction, landslides, erosion, and expansive soils would result in *no adverse effect* for the BART Extension Alternative, and no mitigation would be required.

4.9 Greenhouse Gas Emissions

4.9.1 Introduction

This section describes the affected environment and environmental consequences related to greenhouse gas emissions (GHG) from operation of the NEPA Alternatives. Information in this section is based on Terry A. Hayes Associates Inc. (2017~~6~~) *VTA's BART Silicon Valley – Phase II Extension Project Air Quality Study* (included as a technical report with this SEIS/SEIR).

4.9.2 Environmental and Regulatory Setting

4.9.2.1 Environmental Setting

GHG emissions refer to a group of emissions that are generally believed to affect global climate conditions. The greenhouse effect compares Earth and the atmosphere surrounding it to a greenhouse with glass panes. The glass panes in a greenhouse let heat from sunlight in and reduce the amount of heat that escapes. GHGs, as defined in accordance with Section 19(i) of Executive Order (EO) 13514 (Focused on Federal Leadership in Environmental, Energy, and Economic Performance), include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These GHGs, in addition to water vapor, keep the average surface temperature of Earth close to 60 degrees Fahrenheit (°F).

CO_2 is the most abundant pollutant that contributes to climate change through fossil fuel combustion. The other GHGs are less abundant but have higher global warming potential than CO_2. To account for this higher potential, emissions of other GHGs are frequently expressed in the equivalent mass of CO_2, denoted as CO_2e.

The Bay Area Air Quality Management District (BAAQMD) has published an emissions inventory that includes direct GHG emissions due to human activities within the boundaries of the BAAQMD (BAAQMD 2015). The emissions are estimated for industrial, commercial, transportation, residential, forestry, and agriculture activities. For generation of electricity, both direct GHG emissions from locally generated electricity in the Bay Area and indirect emissions from electricity generated elsewhere for consumption in the region are reported.

In 2011, 86.6 million metric tons of CO_2e ($MMTCO_2e$) GHG were emitted by the Bay Area (83.9 $MMTCO_2e$ were emitted within the Bay Area Air District and 2.7 MMT CO_2e were indirect emissions from imported electricity).

CO2 accounts for 90.3 percent of total Bay Area GHG emissions in 2011. CO_2 emissions are mainly associated with carbon-bearing fossil fuel combustion. Other activities that produce CO_2 emissions include mineral production, waste combustion, and land use and forestry changes.

CH_4 emissions also contribute to climate change and represent 3.0 percent of the Bay Area's total CO_2e emissions. Major sources of CH_4 emissions in the Bay Area are municipal solid waste landfills, raising of livestock and other agricultural activities, stationary and mobile fuel combustion, gas and oil production fields, and natural gas distribution systems.

N_2O emissions account for 1.7 percent of the total 2011 GHG emissions inventory. Municipal wastewater treatment facilities, fuel combustion, and agricultural soil and manure management are the major contributors of N_2O emissions in the Bay Area.

Emissions from high-global warming potential (GWP) gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) make up about 4.9 percent of the total CO_2e. High-GWP gases are substitutes for stratospheric ozone depleting substances (e. g., chlorofluorocarbons). These gases are used in applications such as refrigeration and air-conditioning, semi-conductor/electronic industry manufacturing processes, and electric power distribution systems.

4.9.2.2 Regulatory Setting

Relevant to GHG emissions and climate change, NEPA recognizes "the profound impact of man's activity on the interrelations of all components of the natural environment." (U.S. Code, Title 42, Section 4331). It was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." (U.S. Code, Title 42, Section 4321). In December 2009, the U.S. Environmental Protection Agency (EPA) Administrator signed two distinct findings regarding GHGs under Section 202(a) of the Clean Air Act (CAA). The Endangerment Finding found that the current and projected concentrations of the six key GHGs (i.e., CO_2, CH_4, nitrous oxides, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride) in the atmosphere threaten the health and welfare of current and future generations. The Cause or Contribute Finding found that the combined emissions of these GHGs from new motor vehicles and motor vehicle engines contribute to GHG pollution, which threatens public health and welfare. These findings were necessary prerequisites for implementing GHG emissions standards for vehicles. In collaboration with the National Highway Traffic Safety Administration, EPA finalized emissions standards for light-duty vehicles (2012–2016 model years) in May 2010 and heavy-duty vehicles (2014–2018 model years) in August 2011.

On August 1, 2016, the Council on Environmental Quality (CEQ) released revised final guidance that describes how federal departments and agencies should consider the effects of GHG emissions and climate change in their National Environmental Policy Act (NEPA) reviews.[1] The final guidance is designed to allow decision makers and the public to fully understand the potential climate impacts of federal actions, and in turn, assist agencies in comparing alternatives and considering measures to mitigate the impacts of climate change. In

[1] Council on Environmental Quality. 2016. *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. August 1.

addition to providing agencies with a reasoned approach as to how to describe climate change impacts, the guidance:

- Advises agencies to quantify projected GHG emissions of proposed federal actions whenever the necessary tools, methodologies, and data inputs are available.
- Encourages agencies to draw on their experience and expertise to determine the appropriate level (broad, programmatic or project- or site-specific) and the extent of quantitative or qualitative analysis required to comply with NEPA.
- Counsels agencies to consider alternatives that would make the action and affected communities more resilient to the effects of a changing climate.
- Reminds agencies to use existing information and science when assessing proposed actions.

The federal guidance provides a common approach for assessing actions, while recognizing each agency's unique circumstance and authority. Agencies have discretion in how they tailor their individual NEPA reviews to accommodate the final guidance. The final guidance does not create new or additional regulatory requirements or NEPA implementing procedures. Importantly, the final guidance does not include a quantitative emissions limit that could be used to identify potential adverse effects.

Published on June 10, 2015, EO 13693, Planning for Federal Sustainability in the Next Decade, revokes multiple prior EOs and memorandum, including EO 13514. The goal of EO 13693 is to maintain federal leadership in sustainability and GHG emission reductions. The new EO outlines forward-looking goals for federal agencies in the area of energy, climate change, water use, vehicle fleets, construction, and acquisition. Federal agencies must, where life-cycle cost-effective, beginning in 2016 do the following.

- Reduce agency building energy intensity (as measured in British thermal units per square foot) by 2.5 percent annually through 2025.
- Improve data center energy efficiency at agency buildings.
- Ensure a minimum percentage of total building electric and thermal energy is from clean energy sources.
- Improve agency water use efficiency and management (including stormwater management).
- Improve agency fleet and vehicle efficiency and management by achieving minimum percentage GHG emission reductions.

4.9.3 Methodology

4.9.3.1 Overview

There are no adopted quantitative thresholds that are relevant to the NEPA analysis. Potential adverse effects of quantified GHG emissions are assessed by comparing the magnitude of emissions associated with the BART Extension Alternative to the No Build Alternative. Consistent with the CEQ's final GHG guidance, implications of climate change on the proposed action are qualitatively assessed.

4.9.3.2 Methods

Operational emissions associated with the BART Extension Alternative have been estimated related to changes to regional vehicle miles traveled (VMT) and electricity production to support facilities. Because BART provides an alternative to vehicle trips, it would contribute to a decrease in regional emissions from reductions in personal vehicle use (also known as mode shift). The America Public Transportation Association (APTA) (2009) recommends GHG analyses for transit projects account for this emissions "credit" associated with avoided car trips through mode shift. Consistent with APTA recommendations, FTA has used this methodology for other transit projects (i.e., Phase I Project) throughout the region.

Emissions from changes in regional VMT were estimated using the California Air Resources Board's (ARB's) emissions model (EMFAC2014) and daily VMT data obtained from *VTA's BART Silicon Valley – Phase II Extension Project Draft Traffic Impact Analysis* by Hexagon Transportation Consultants, Inc. (2017). The VMT data were provided in 5-mile-per-hour (mph) speed bins (or ranges) for the 2015 Existing, 2025 Opening Year, and 2035 Forecast Year under the with- and without-BART Extension Alternative scenarios.

GHG emissions to support BART electricity consumption associated with traction, station lighting, and station auxiliary power have been quantified using a power consumption rate of 0.00267 megawatt-hour per BART VMT per day. To calculate total daily power consumption, the above power consumption rate was multiplied by the total length of the BART Extension Alternative and the total number of train departures/arrivals in a day. It is assumed that there would be 6-minute headways between 6:00 a.m. and 7:30 p.m., 20-minute headways between 4:00 a.m. and 6:00 a.m., and between 7:30 p.m. and 1:30 a.m., resulting in 13.5 hourly train trips. The stations and related facilities built as part of BART Extension Alternative would also use electric power. This "other" energy requirement was calculated on a percentage basis. About 25 percent of BART's existing power requirements are for station and facilities operations, with the other 75 percent for vehicle propulsion. It was assumed this relationship would apply to the BART Extension as well. Based on data obtained from the air quality analysts, annual electricity consumption for vehicle propulsion along the BART Extension would be 1.4 million kilowatt-hours (kWh). Additional electricity consumed by other facilities was therefore estimated to be about 468,000 kWh per year. The electricity intensity factors were obtained from the CalEEMod and used to calculate CO_2

emissions associated with the production of electricity consumed by operation of the BART Extension (California Air Pollution Control Officers Association 2013).

4.9.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.9.3, *Methodology*. This section also identifies measures to avoid, minimize, or mitigate impacts.

4.9.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). Given the mix of projects, some of the projects may reduce GHG emissions by providing transit, bicycle and pedestrian improvements and also reducing congestion. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse GHG effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts. Without the transit improvements, the No Build Alternative would not result in the GHG reduction benefits of the BART Extension Alternative.

As discussed above, other projects would undergo separate environmental review to determine whether they would result in adverse GHG effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.9.4.2 BART Extension Alternative

Greenhouse Gas Emissions

The operational analysis for the BART Extension Alternative considers electricity-related emissions from operation of BART, as well as GHG benefits associated with vehicle mode shift. As discussed above, it is anticipated that the BART Extension Alternative would increase ridership, thereby decreasing regional passenger VMT through mode shift from private automobiles to transit. Accounting for GHG emissions reductions associated with mode shift is consistent with recommendations from APTA (2009).

As shown in Table 4.9-1, operation of the BART Extension Alternative would decrease GHG emissions because of reductions in VMT-related emissions. This is a beneficial effect of the BART Extension Alternative, and there would be no potential for an adverse effect associated with increased GHG emissions.

Table 4.9-1: Estimated Carbon Dioxide Emissions – BART Extension Alternative

Alternative	Carbon Dioxide Metric Tons per Year
2015 Existing	
No Build	7,907,605
BART Extension Alternative – VMT Related Emissions	7,864,744
BART Extension Alternative – Emissions Related to Electricity Production for Operations	615
Net Emissions (No Build minus BART Extension Alternative)	(-42,246)
2025 Opening Year	
No Build Change in Vehicular Emissions from Increased Ridership	6,154,061
BART Extension Alternative Change in Vehicular Emissions from Increased Ridership	6,124,275
BART Extension Alternative Electricity-Related Emissions	615
Net Emissions (No Build minus BART Extension Alternative)	(-29,171)
2035 Forecast Year	
No Build Change in Vehicular Emissions from Increased Ridership	5,314,428
BART Extension Alternative Change in Vehicular Emissions from Increased Ridership	5,291,677
BART Extension Alternative Electricity-Related Emissions	615
Net Emissions (No Build minus BART Extension Alternative)	(-22,136)
Source: ARB EMFAC2014, CalEEMod version 2013.2.2.	

Climate Change Effects on the BART Extension Alternative

Several impacts on the environment are expected throughout California as a result of global climate change. The extent of these effects is being defined as climate modeling tools become more refined. Regardless of the uncertainty in precise predictions, it is widely understood that substantial climate change is expected to occur in the future. Potential climate change impacts include, but are not limited to, extreme heat events, increased water and energy consumption, and changes in species distribution and range. Certain low-lying parts of cities of San Jose and Santa Clara may be susceptible to flooding that has been influenced by climate-change events. Section 4.17, *Water Resources, Water Quality, and Floodplains*, includes a detailed discussion of potential flooding. Currently, all of the BART Extension Alternative within the floodplain is developed, partially developed, or zoned for development. Some of the projected base floodplain development would occur regardless of the BART Extension Alternative. In general, the BART Extension Alternative would be consistent with development plans for the area and would not significantly change the land use in the area because it is currently developed or zoned for development. The change in water surface elevation would be minimal because there would be minimal fill in the base floodplains with proper minimization measures (WRECO 2017~~5~~). The BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. Natural and beneficial floodplain values would not be affected by the BART Extension Alternative.

Regarding adapting to climate change, the Bay Area Joint Policy Committee (JPC) is tasked with producing a Bay Area Climate and Energy Resilience Strategy to provide guidance on how to include protecting the Bay Area's economy, public health, infrastructure, and ecosystems from sea-level rise, water shortages, high energy prices, and other impacts in long-term regional and local planning, including *Plan Bay Area*. This work focuses on the institutional structures and resources that will be needed to create a multi-stakeholder adaptive management process on regional resilience. In September 2012, the JPC adopted a work plan to develop a Regional Sea Level Rise Adaptation Strategy. The objective of the project is to ensure the ongoing health and ecological viability of regional natural resources, such as San Francisco Bay; coordinate adaptation mechanisms that transcend local jurisdictional boundaries; and share the costs of adaptation responses at a regional level, especially when regional resources are involved. The sea-level rise adaption strategy work plan focuses on providing enough background information and support to develop a "bottom-up" regional strategy where the regional agencies work with local entities to assess vulnerabilities and risks, identify critical assets, explore adaptation options, and use a balanced approach to identify costs, benefits, and adaptation strategies for the natural resources/ecosystem services provided by the Bay and its watersheds.

In addition, *Plan Bay Area* provides a long-range framework to minimize transportation impacts on the environment, improve regional air quality, protect natural resources, and reduce GHG emissions by encouraging new development to locate near transit rather than areas poorly served or not served by transit. Mitigation Measure 2.5(c) in *Plan Bay Area* states that, "[m]itigation measures that shall be considered by implementing agencies and/or project sponsors where feasible based on project-and site-specific considerations include, but are not limited to the following. The project sponsors and implementing agencies shall coordinate with BCDC, Caltrans, local jurisdictions (cities and counties), and other transportation agencies to develop Transportation Asset Management Plans (TAMPs) that consider the potential impacts of sea level rise over the asset's life cycle." As stated above, the BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation.

A range of other potential climate change impacts may affect the BART Extension Alternative, including increased temperatures, heat stress days, and water supplies. The BART Extension Alternative would not exacerbate these issues.

4.9.5 NEPA Conclusion

For operation of the BART Extension Alternative, there would be a beneficial reduction in GHG emissions and *no adverse effect* related to climate change emissions under NEPA.

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4.10 Hazards and Hazardous Materials

4.10.1 Introduction

This section describes the affected environment and environmental consequences related to hazards and hazardous materials from operations of the NEPA Alternatives. The hazardous materials information contained herein is based on the *VTA's BART Silicon Valley Phase II Extension Project—Phase II Extension Initial Site Assessment* (ISA) prepared by BASELINE Environmental Consulting (2017~~6~~).

4.10.2 Existing Conditions and Regulatory Setting

4.10.2.1 Environmental Setting

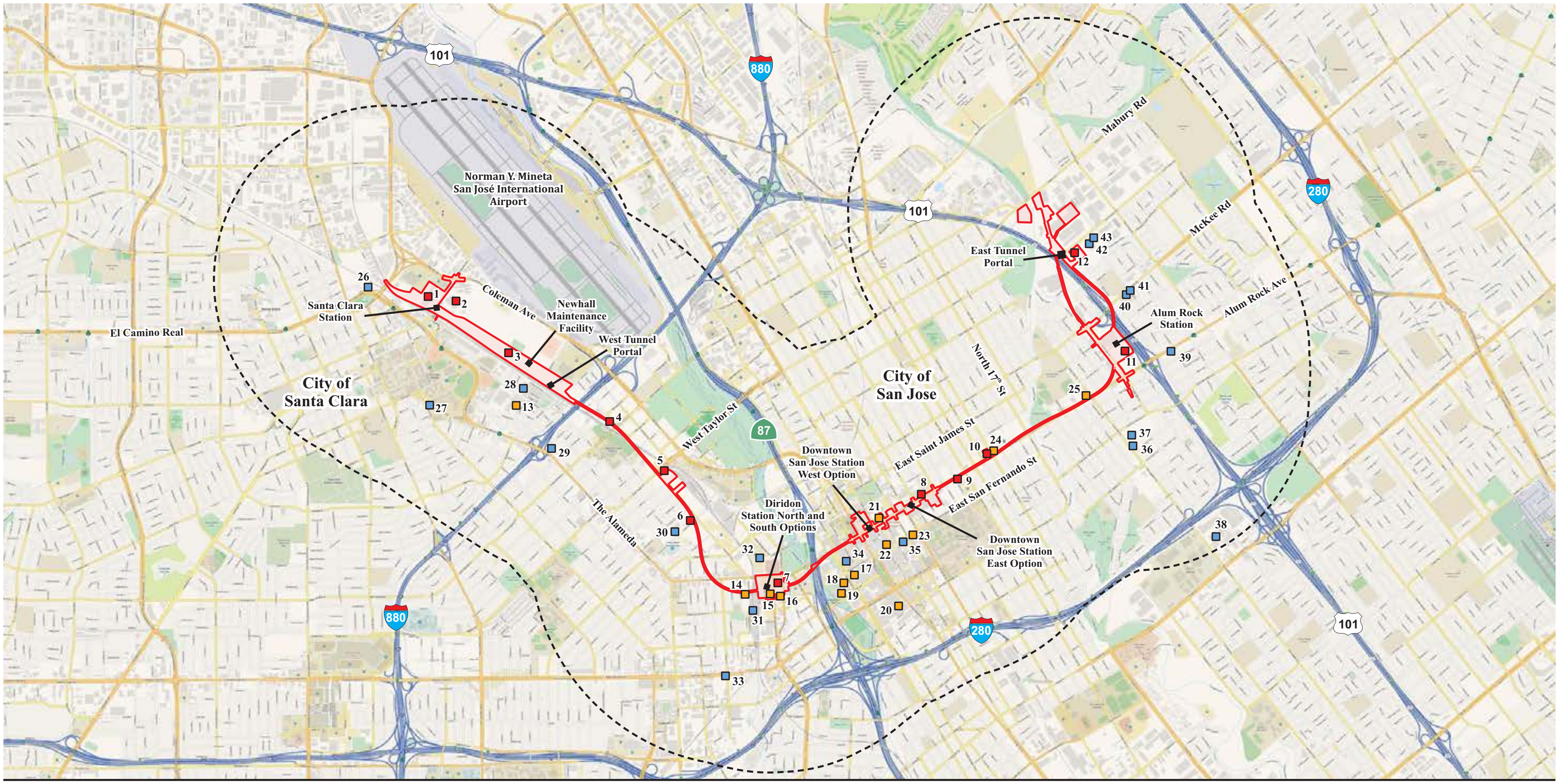
This section discusses the existing conditions related to hazards and hazardous materials for the BART Extension and in the surrounding area, including staging areas.

Hazardous Materials

The ISA identified numerous sources of hazardous materials in soil, railroad ballast, groundwater, and buildings for the BART Extension that could possibly be encountered during construction and operations. They are described in detail below.

Hazardous Materials Release Sites

The ISA identified 437 records of sites with known releases of hazardous materials within a 1-mile radius of the BART Extension (BASELINE Environmental Consulting 2017~~6~~). Based on the findings of the ISA, only 43 of the 437 hazardous materials release sites are under active regulatory oversight and/or have land use restrictions and are located on, adjacent to, or hydraulically upgradient of the BART Extension (Figure 4.10-1). Petroleum hydrocarbons, chlorinated solvents, and metals are the primary contaminants of concern in soil and groundwater associated with the 43 hazardous materials release sites. Two release sites located at the Santa Clara Station, one release site located at the Diridon Station (South and North Options), and one release site located above the tunnel alignments between the Santa Clara Station and the Diridon Station (South and North Options) have land-use restrictions that prohibit subsurface work or groundwater extraction without prior approval from the San Francisco Bay Regional Water Quality Control Board (Regional Water Board), Santa Clara County Department of Environmental Health, and/or City of San Jose Planning Department. The ISA evaluates the 43 sites to identify whether the releases have resulted in either known, potential, or no subsurface contamination on the BART Extension.



Legend

- Project Area of Potential Effect
- 1-Mile Buffer
- Release Site of Concern with Known Subsurface Contamination on the Project
- Release Site of Concern with Potential Subsurface Contamination on the Project
- Release Site of Concern with No Subsurface Contamination on the Project

Notes: "Release Sites of Concern" are under active regulatory oversight and/or have land use restrictions, and are located on, adjacent to, or upgradient within one mile of the Project. Site information is summarized in Table 3 and Section 5.3.
Base: MapQuest OpenStreetMap.
Sources: Release Sites of Concern (SWRCB, 2015 and DTSC, 2015).

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Figure 4.10-1
Hazardous Materials Locations
VTA's BART Silicon Valley–Phase II Extension Project

Potential Hazardous Materials Release Sites

As early as the 1950s, numerous commercial and industrial properties have been located in the vicinity of the BART Extension. The ISA identified five permitted underground storage tank (UST) facilities and 69 Resource Conservation and Recovery Act (RCRA) generator sites on or adjacent to the BART Extension (within 500 feet) that are generally associated with commercial and industrial properties (e.g., dry cleaners and gas stations) (BASELINE Environmental Consulting 2017~~6~~). The large quantity and apparent long history of commercial and industrial properties that have managed hazardous materials in the vicinity could have resulted in undocumented releases of hazardous materials that could have impacted soil and/or groundwater.

The ISA identified 107 hazardous materials release sites on or adjacent to the BART Extension that have obtained regulatory closure for cleanup activities (BASELINE Environmental Consulting 2017~~6~~). Due to the large number of sites, residual soil and groundwater contamination, if any, from closed release sites, impacted soil and/or groundwater beneath the BART Extension could pose an unacceptable health risk under future land use and development scenarios (e.g., grading, excavation, and/or dewatering). As a result, future developers of many of these sites are required to notify the Santa Clara County Department of Environmental Health and the appropriate planning/building department prior to redevelopment to state that residual contamination exists on the property and to list all measures necessary to protect human health and the environment.

Railroad Corridors

Between 2001 and 2008, several investigations were conducted to evaluate the environmental issues related to the soil and ballast along the existing railroad corridor for the Phase I Project that will connect to the eastern terminus of the BART Extension. The results from the investigations indicated there were no significant impacts on soil or ballast from polychlorinated biphenyls (PCBs), volatile organic compounds, semi-volatile organic compounds, or petroleum hydrocarbons. However, significant arsenic and lead contamination in the shallow soil and ballast materials was present along much of the Phase I Project. The primary source of arsenic appears to be from slag used as ballast for track maintenance from about 1960 to 1983, and potential secondary sources may have included use of inorganic pesticides. The occurrence of elevated lead concentrations appears to be attributed to aerially distributed automobile exhaust emissions and lead-acid batteries used to power signals near railroad crossings. Overall, arsenic appears to be the primary metal impacting shallow soil and ballast along the railroad corridor.

Existing and former railroad corridors are located along the following portions of the BART Extension.

- From Mabury Road to Las Plumas Avenue in the city of San Jose.
- Parallel to 28th Street in San Jose along construction staging areas for the Alum Rock/28th Street Station.

- Immediately west of the Diridon Station (South and North Options).
- Near the intersection of Emory Street in San Jose.
- Immediately south of and parallel to the Santa Clara Station and Newhall Maintenance Facility.

Based on the previous investigations for the Phase I Project, similar arsenic and lead impacts on shallow railroad soils and ballasts would be expected on the BART Extension (AECOM Technical Services, Inc. 2014).

Hazardous Building Materials

Construction may require demolition of existing buildings that could possibly contain hazardous building materials. Building materials such as thermal system insulation, surfacing materials, and asphalt and vinyl flooring materials installed in buildings prior to 1981 may be asbestos-containing materials (ACMs). Also, lead-based paints (LBP) may have been applied to the interior and exterior surfaces of commercial and industrial buildings, regardless of construction date. Lead and asbestos are state-recognized carcinogens. Other hazardous building materials of concern include PCB-containing light ballasts; mercury vapor lamps; and/or wood, concrete, or sheetrock contaminated from chemical use, storage, and/or handling (AECOM Technical Services, Inc. 2014).

Naturally Occurring Asbestos

Geologic mapping from the United States Geological Survey does not show any areas of rock likely to contain naturally occurring asbestos (ultramafic rock) along the BART Extension. Therefore, naturally occurring asbestos in bedrock along the BART Extension would not be expected to be a potential hazard.

4.10.2.2 Regulatory Setting

The following federal regulations are relevant to the BART Extension.

Federal

Resource Conservation and Recovery Act/Federal Toxic Substances Control Act/Hazardous and Solid Waste Act

The United States Environmental Protection Agency (EPA) is the lead agency responsible for enforcing federal laws and regulations governing hazardous materials that affect public health or the environment. The major federal laws and regulations enforced by EPA that could relate to the management of hazardous materials in the alignment are the RCRA; the Toxic Substances Control Act (TSCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and the Hazardous Material Transportation Act (HMTA).

The Federal Toxic Substances Control Act (1976) and the RCRA established an EPA-administered program to regulate the generation, transport, treatment, storage, and disposal of hazardous waste. The RCRA was amended in 1984 by the Hazardous and Solid

Waste Act, which affirmed and extended the "cradle to grave" system of regulating hazardous.

In 1976, TSCA was enacted to provide EPA authority to regulate the production, importation, use, and disposal of chemicals that pose a risk of adversely impacting public health and the environment, such as PCBs, ACMs, and LBP. TSCA also gives EPA authority to regulate the cleanup of sites contaminated with specific chemicals, such as PCBs.

In 1972, an amendment to FIFRA provided EPA authority to regulate the manufacture, distribution, and import of pesticides. EPA approves registered uses of a pesticide based on an evaluation of its potential adverse effects to human health and the environment. EPA has granted the California Department of Pesticide Regulation (DPR) authority to enforce federal laws pertaining to the proper and safe use of pesticides. DPR can also designate pesticides as "restricted material" based on potential adverse effects on public health, applicators, farm workers, domestic animals, honeybees, the environment, wildlife, or crops other than those being treated.

In 1990 and 1994, the HMTA was amended to improve the protection of life, property, and the environment from the inherent risks of transporting hazardous material in all major modes of commerce. The United States Department of Transportation (USDOT) developed hazardous materials regulations, which govern the classification, packaging, communication, transportation, and handling of hazardous materials, as well as employee training and incident reporting. The transportation of hazardous materials is subject to both RCRA and USDOT regulations.

Cortese List

U.S. Code 65962.5 (commonly referred to as the Cortese List) includes Department of Toxic Substances Control (DTSC)-listed hazardous waste facilities and sites, Department of Health Services lists of contaminated drinking water wells, sites listed by the State Water Resources Control Board as having underground storage tank leaks or a discharge of hazardous wastes or materials into the water or groundwater, and lists from local regulatory agencies of sites with a known migration of hazardous waste/material.

Department of Transportation Hazardous Materials Regulations (Code of Federal Regulations, Title 49, Sections 100–185)

USDOT Hazardous Materials Regulations cover all aspects of hazardous materials packaging, handling, and transportation. Parts 107 (Hazard Materials Program), 130 (Oil Spill Prevention and Response), 172 (Emergency Response), and 177 (Highway Transportation) would apply to the BART Extension.

OSHA Lead Standard for the Construction Industry – Title 29 Code of Federal Regulations 1926.62

This standard covers lead in a variety of forms, including metallic lead, all inorganic lead compounds, and organic lead soaps. The standard establishes maximum limits of exposure to lead for all workers covered, including a permissible exposure limit (PEL) and action level (AL).

4.10.3 Methodology

The BART Extension would result in *an adverse effect* if it would represent a measurable localized increased risk that does not pose an immediate threat to health or safety and entail increased risks on a regional scale.

4.10.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.10.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.10.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects would likely require consideration of hazardous materials exposure during construction and operation. Typically a worker health and safety plan would be prepared and adopted to prevent exposure of maintenance workers, control emissions of hazardous dusts, and safeguard offsite transport of hazardous materials. Additionally, a Phase 2 site assessment, Contaminant Management Plan (CMP), and associated permits could be required. Projects planned under the No Build Alternative would undergo separate environmental review to determine the potential for exposure to hazardous materials. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.10.4.2 BART Extension Alternative

Operation

Handling and Storage of Hazardous Materials

Hazardous materials, such as motor fuels, oils, solvents, and lubricants, would be routinely managed during operations, particularly at the Newhall Maintenance Facility. Diesel would also be used for standby generators located at each station, yard, shop, and pump station, and possibly at the train control buildings. BART Extension workers, the public, and/or the environment could be exposed to hazardous materials during routine operations if the materials are not properly managed, thus posing a potentially significant adverse effect. Workers handling hazardous materials are required to adhere to federal Occupational Safety and Health Administration health and safety requirements. Handling of these materials would also be compliant with applicable regulations such as the RCRA, USDOT Hazardous Materials Regulations, and local Certified United Program Agencies (CUPA) regulations via implementation of Hazardous Materials Business Plans (HMBP). HMBPs are designed to protect both human and environmental health from adverse effects as a result of the storage or possible release of hazardous materials. This is accomplished by documenting significant amounts of hazardous materials (thresholds are 55 gallons of a liquid, 200 cubic feet of a gas, and 500 pounds of a solid) so that emergency responders can effectively protect the public in case of an emergency. Furthermore, the HMBP would be modified, if necessary, to include a description of any new hazardous materials that might be used during future operations and would be subject to approval and oversight by the San Clara Fire Department (SCFD) and Hazardous Material Compliance Division (HMCD), including routine inspections. With the adherence to these regulations, potential significant adverse effects on human health or the environment related to hazardous materials handling and storage would be reduced to *no adverse effect*, and no mitigation would be required.

Disturbance of Contaminated Materials

Sources of known and/or anticipated subsurface contamination on the BART Extension sites include 43 known release sites, 5 permitted UST facilities, 69 RCRA generators sites, and existing railroad corridors. Contaminated materials encountered during construction and operations activities could pose a potential threat to human health and the environment. The disturbance of contaminated soil and/or ballast during construction and maintenance activities could pose a direct exposure hazard to workers. Vapor intrusion of groundwater contaminants (e.g., chlorinated solvents) into future BART Extension buildings, such as the stations, system facilities, and maintenance facilities, could pose an inhalation hazard to indoor workers and residents. BART passengers at the above-grade Santa Clara Station could be exposed to hazardous materials in soil and/or ballast (if any) by direct contact and/or inhalation of dust. Offsite residents near the Santa Clara Station and above-grade corridors of tracks could also be exposed to hazardous materials in soil and/or ballast (if any) by inhalation of dust disturbed by passing trains.

The level of potential health risks posed by the disturbance of subsurface contamination would primarily depend on the sensitivity of the receptors, contaminant concentrations, and duration of exposure. Health risks posed by existing subsurface contamination would not be expected to pose an immediate threat to human health. Operations could potentially expose maintenance workers, indoor workers, indoor residents, passengers, and offsite residents to subsurface hazardous materials and pose an adverse effect on human health.

The approach for assessing and managing hazardous materials in soil and ballast materials that would be encountered during earthwork activities is described in the CMP. For example, the CMP has developed screening values for the reuse of soil and ballast that are protective of potential human and ecological receptors. The CMP will be implemented through site-specific Remedial Action Plans (RAPs) prepared for the BART Extension and approved by the Regional Water Board. Under the oversight of the Regional Water Board, compliance with the CMP and BART Extension RAPs is mandatory. In accordance with the CMP, the RAPs will identify site-specific hazards to human and ecological receptors and propose preferred site-specific remedial strategies. With compliance with the CMP and RAPs, there would be *no adverse effect*.

4.10.5 NEPA Conclusion

Potential impacts related to handling and storage of hazardous materials for the BART Extension Alternative would result in *no adverse effect* with adherence to the hazardous materials regulations.

4.11 Land Use

4.11.1 Introduction

This section describes the affected environment and environmental consequences related to land use from operations of the NEPA Alternatives. Information regarding land use and planning in the Cities of San Jose and Santa Clara was obtained from the following sources.

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan Environmental Impact Report* (City of San Jose 2011b).
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan Environmental Impact Report* (City of Santa Clara 2010b).

4.11.2 Environmental and Regulatory Setting

4.11.2.1 Environmental Setting

This section discusses the existing conditions related to land use within the BART Extension vicinity, including the construction staging areas.

A broad range of land uses exists along the alignment, including residential, commercial, retail, and industrial uses. There are no agricultural properties located along the alignment, at station locations or parking areas, or at the sites of systems facilities. The BART Extension would begin at the terminus of the Phase I Project, east of U.S. 101 and south of Mabury Road in San Jose, and would terminate at grade in Santa Clara near the Caltrain Station.

Figures 4.11-1 to 4.11-7, 4.11-A, and 4.11-B show existing land uses at the station sites. Current land uses along the corridor are also shown on the plan and profile drawings in Appendix B of this SEIS/SEIR. Existing land uses are described using the following standard categories.

- Low-density residential: single-family and one- to two-story housing units.
- Medium-density residential: apartments, condominiums, and duplex buildings.
- High-density residential: residential buildings over three stories in height.
- Light industrial: industrial parks, research and development, and automotive repairs.
- Heavy industrial: manufacturing warehouses, industrial plants, and freight facilities.
- General commercial/office: offices, business parks, small businesses, restaurants, clothing stores, and other vendors of general consumer goods.
- Public/civic/community center: public venues and government-related buildings.

- School/educational: colleges, universities, and other schools.
- Open space/parks: public parks, waterway corridors, and other undeveloped areas.
- Airport/highway service/transit: transit-related buildings and areas.

City of San Jose

Connection to Phase I Berryessa Extension

Both the Twin-Bore and Single-Bore Options would follow the same tunnel alignment in this location. Land uses along the east side of the alignment are predominantly industrial between Mabury Road and Coyote Creek. South of Coyote Creek is Anne Darling Elementary School, and south of McKee Road land uses are predominately single-family residences. U.S. 101 is located immediately adjacent and to the west of the alignment north of McKee Road. The alignment crosses under U.S. 101 south of McKee Road.

Alum Rock/28th Street Station

The Alum Rock/28th Street Station would be excavated to approximately 40 feet below ground level with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. Both stations would be below an existing industrial area and within an urban village boundary. Industrial uses are located along the former railroad right-of-way (ROW) and along the west side of U.S. 101. Industrial uses are located within the station area. Other industrial buildings, warehouses, and storage yards are located immediately adjacent to the station site. Low- and medium-density residential uses are located across U.S. 101 to the north and east of the station site, as well as to the west of 28th Street and the former railroad ROW. The Portuguese Band and Social Center is located to the west of the station site, and the Five Wounds ~~National~~ Portuguese National Church and ~~associated elementary school~~ the Cristo Rey San José Jesuit High School are located to the southeast. Commercial uses border the southwestern corner of the station site along Santa Clara Street.

Tunnel Alignment near Coyote Creek

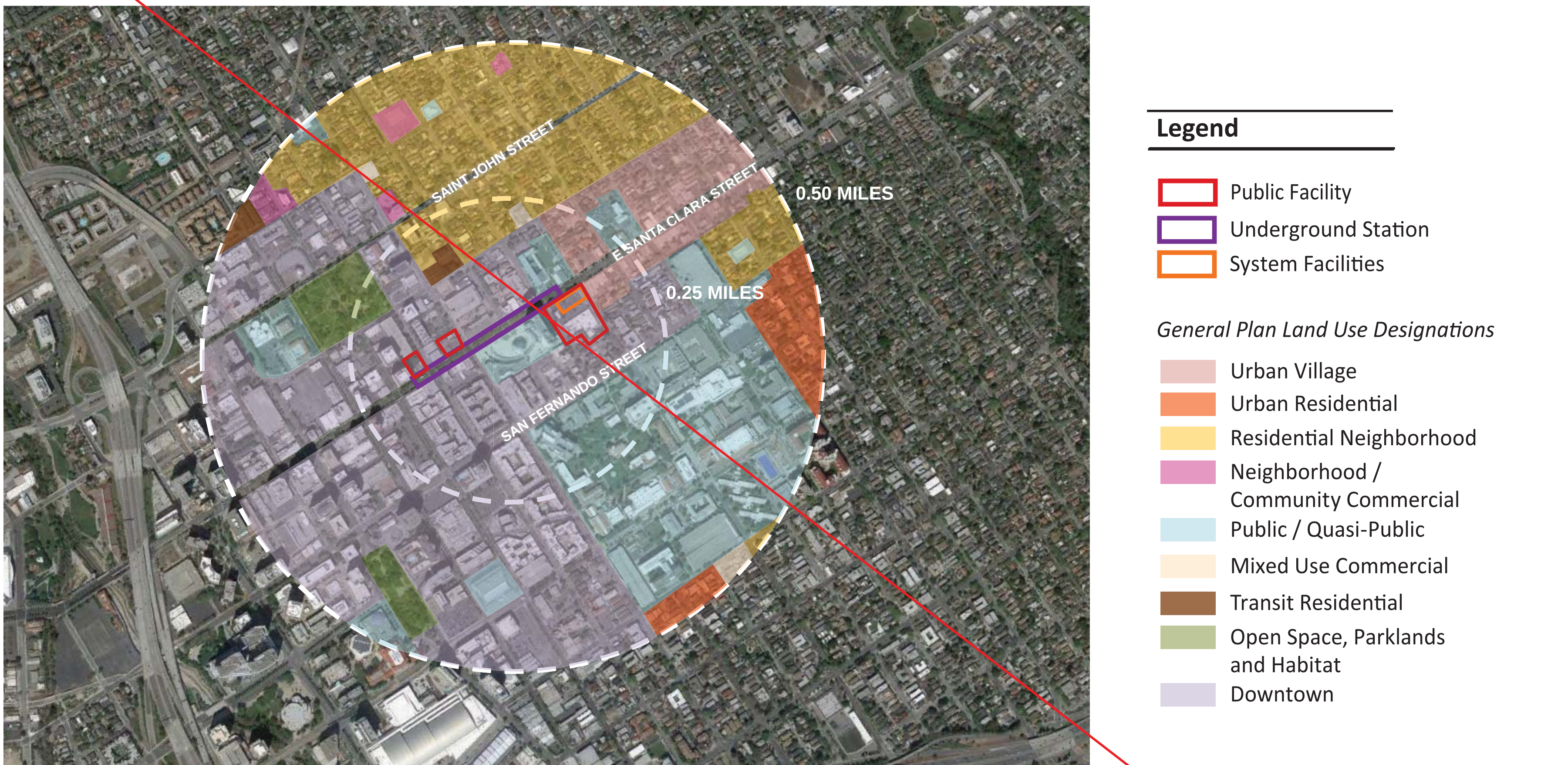
The Twin-Bore Option would curve slightly north of Santa Clara Street as it passes under Coyote Creek. The Single-Bore Option would remain in line with Santa Clara Street, going under the bridge abutments. Uses along Santa Clara Street from 28th to 18th Streets are generally commercial, with residential areas to the north and south of the commercial corridor. The East San Jose Carnegie Branch Library is directly south of the alignment at South 23rd Street. From 18th Street heading west into downtown San Jose, land uses are primarily commercial and retail. Older single-family residential neighborhoods are located beyond the commercial strip to the north and south of the alignment. Horace Mann Elementary School is located along the north side of the alignment, and San Jose State University and San Jose City Hall are to the south.

Source: Circlepoint; Google Earth, 2015.

Figure 4.11-1
San Jose General Plan Land Use Designations – Alum Rock/28th Street Station
VTA's BART Silicon Valley–Phase II Extension Project

Graphics ... 00332.13 (11-15-2017)

Figure 4.11-1
San Jose General Plan Land Use Designations – Alum Rock/28th Street Station (Single and Twin Bore) (Revised)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

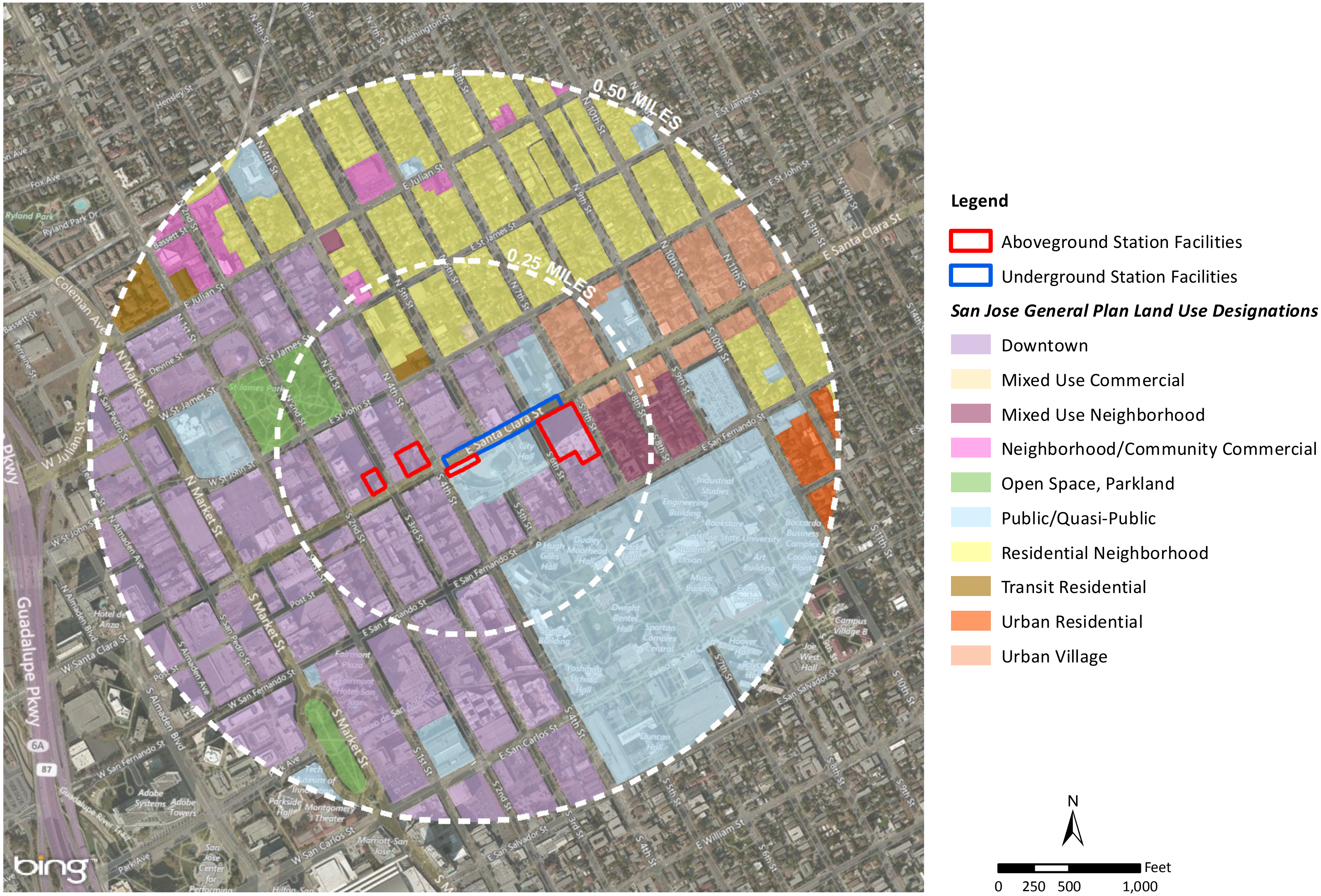
Graphics ... 00332.13 (6-9-2016) tm

Figure 4.11-2
San Jose General Plan Land Use Designations – Downtown San Jose Station East Option
VTA's BART Silicon Valley–Phase II Extension Project

Source: Circlepoint, 2017; City of San Jose, 2011

Graphics … 00332.13 (11-15-2017)

Figure 4.11-2
San Jose General Plan Land Use Designations – Downtown San Jose Station East Option (Twin Bore) (Revised)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint, 2017; City of San Jose, 2011

Graphics … 00332.13 (11-15-2017)

Figure 4.11-A

San Jose General Plan Land Use Designations – Downtown San Jose Station East Option (Single Bore)

VTA's BART Silicon Valley–Phase II Extension Project

Legend

- Public Facility
- System Facilities
- Underground Station

General Plan Land Use Designations

- Urban Village
- Urban Residential
- Residential Neighborhood
- Neighborhood / Community Commercial
- Public / Quasi-Public
- Mixed Use Commercial
- Transit Residential
- Open Space, Parklands and Habitat
- Downtown

Source: Circlepoint; Google Earth, 2015.

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Graphics … 00332.13 (6-9-2016) tm

Figure 4.11-3
San Jose General Plan Land Use Designations – Downtown San Jose Station West Option
VTA's BART Silicon Valley–Phase II Extension Project

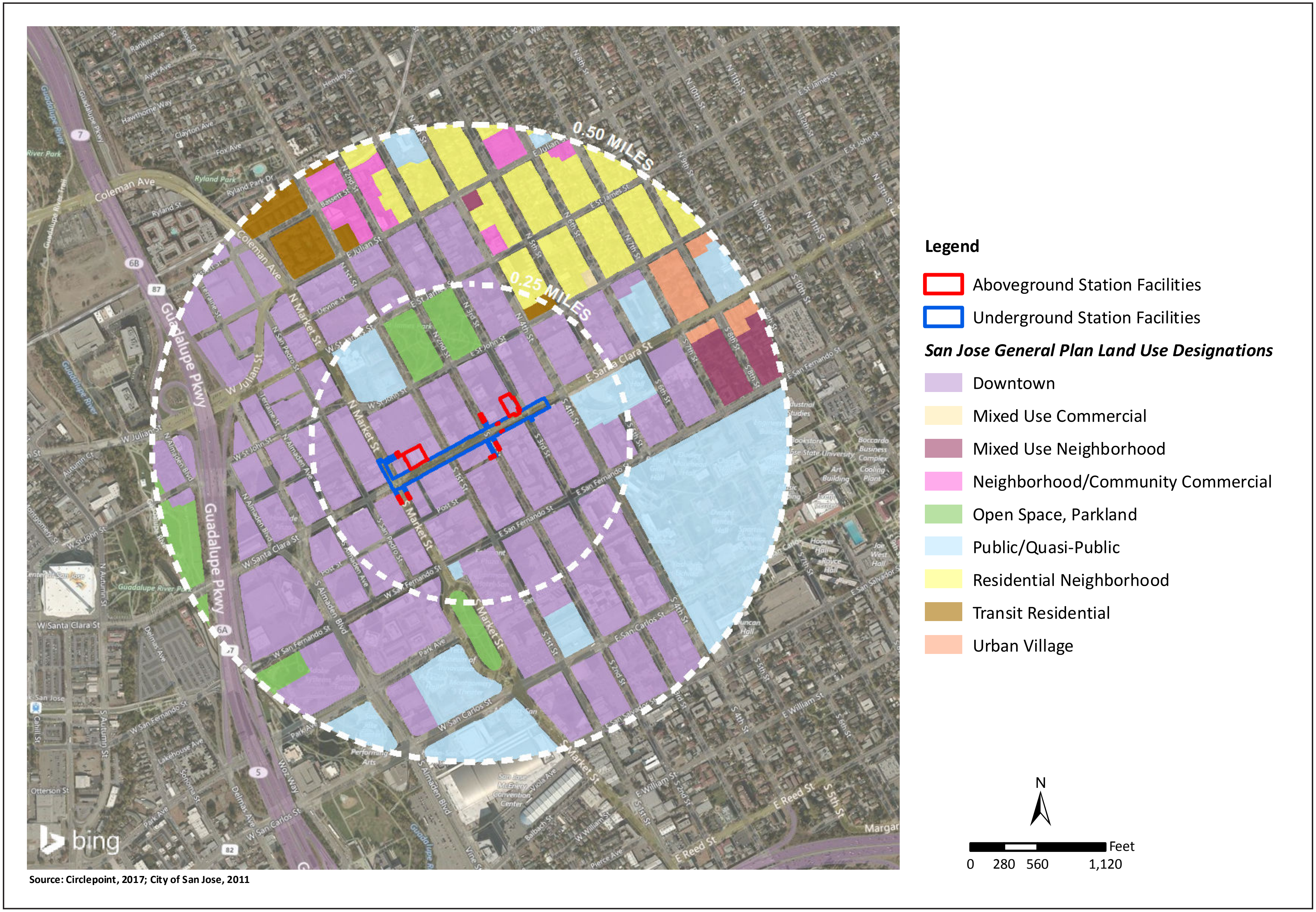


Figure 4.11-3

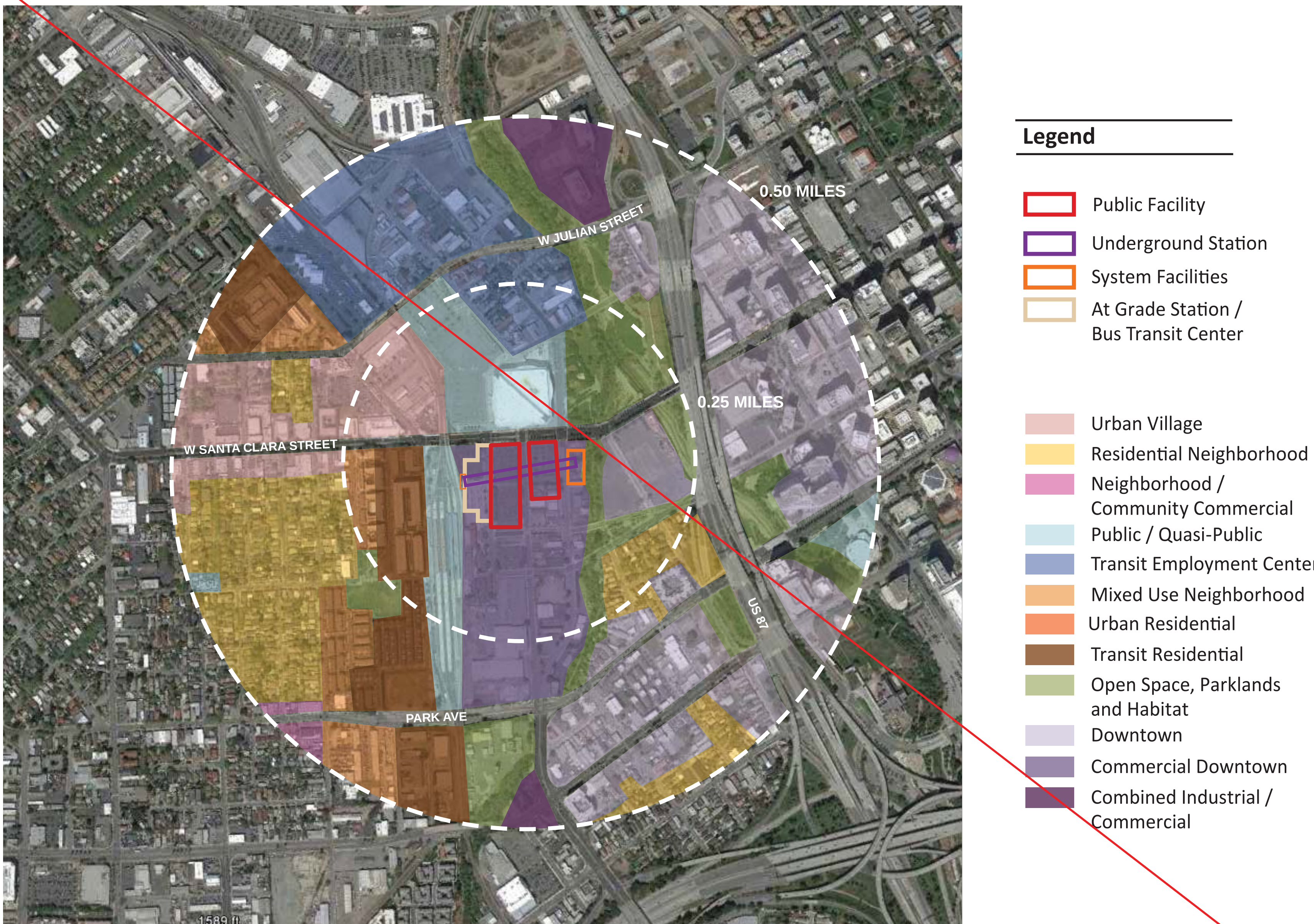
San Jose General Plan Land Use Designations – Downtown San Jose Station West Option (Twin Bore) (Revised)

VTA's BART Silicon Valley–Phase II Extension Project

Source: Circlepoint, 2017; City of San Jose, 2011

Graphics … 00332.13 (11-15-2017)

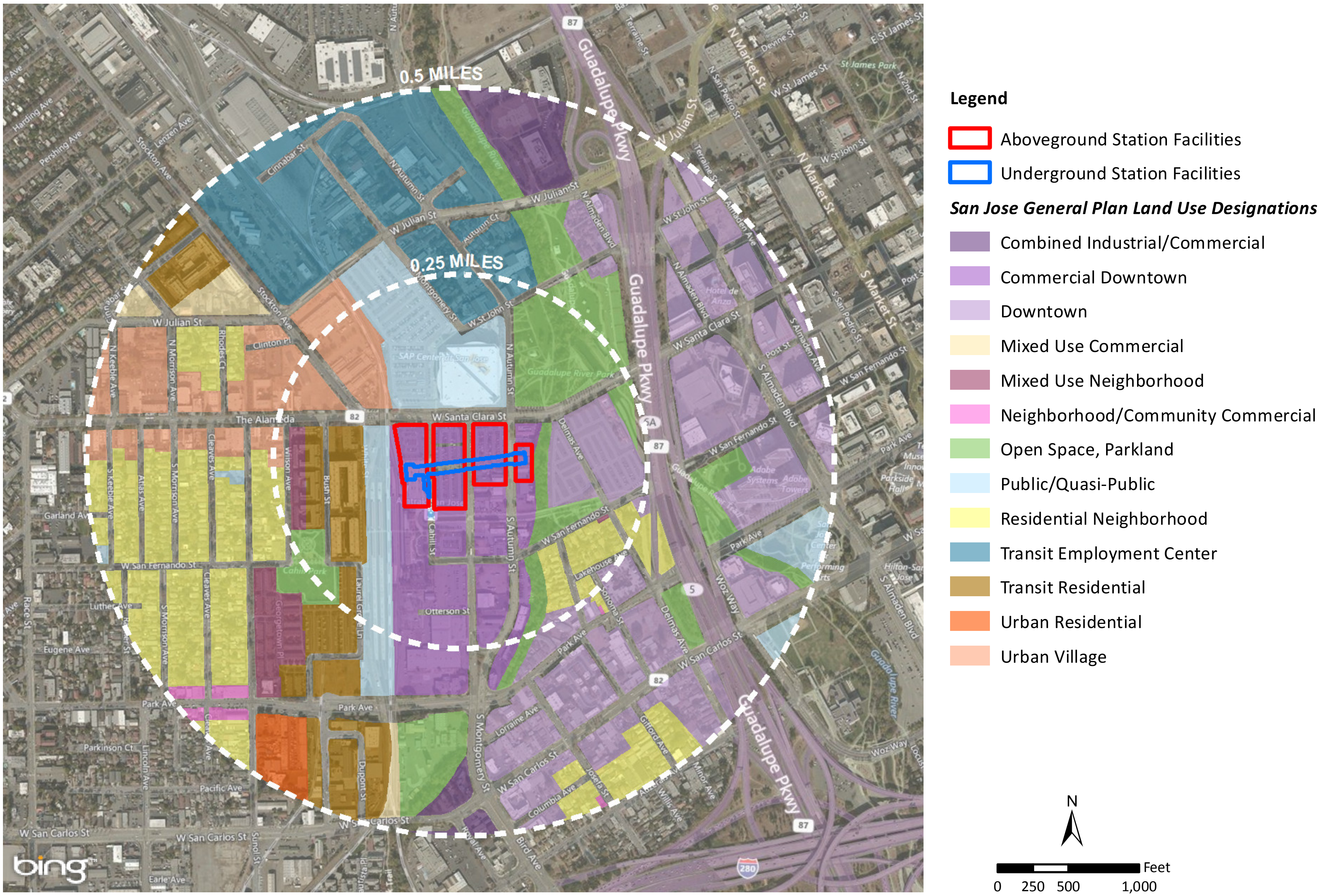
Figure 4.11-B
San Jose General Plan Land Use Designations — Downtown San Jose Station West Option (Single Bore)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics … 00332.13 (6-9-2016) tm

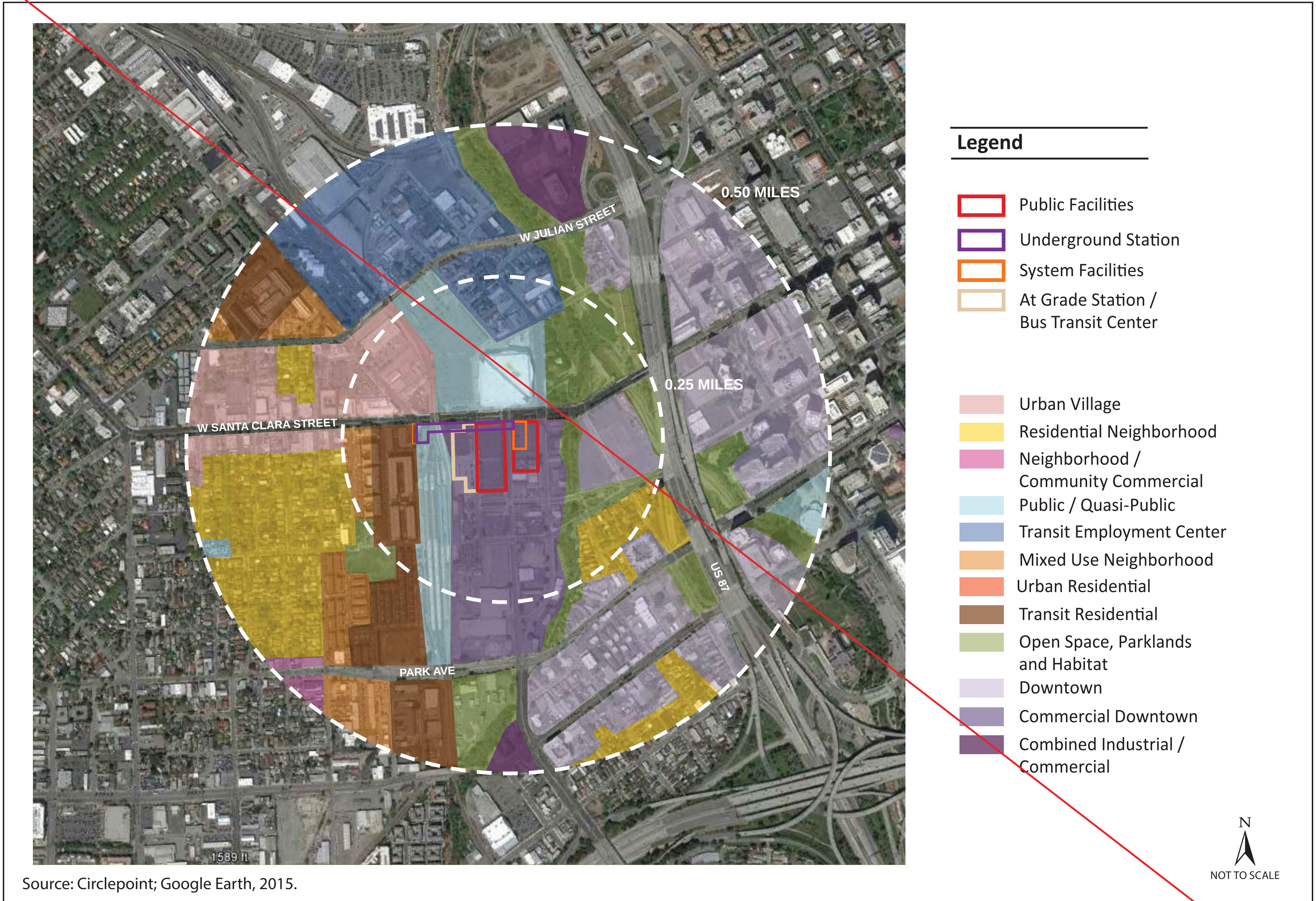
Figure 4.11-4
San Jose General Plan Land Use Designations – Diridon Station South Option
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint, 2017; City of San Jose, 2011

Graphics … 00332.13 (11-15-2017)

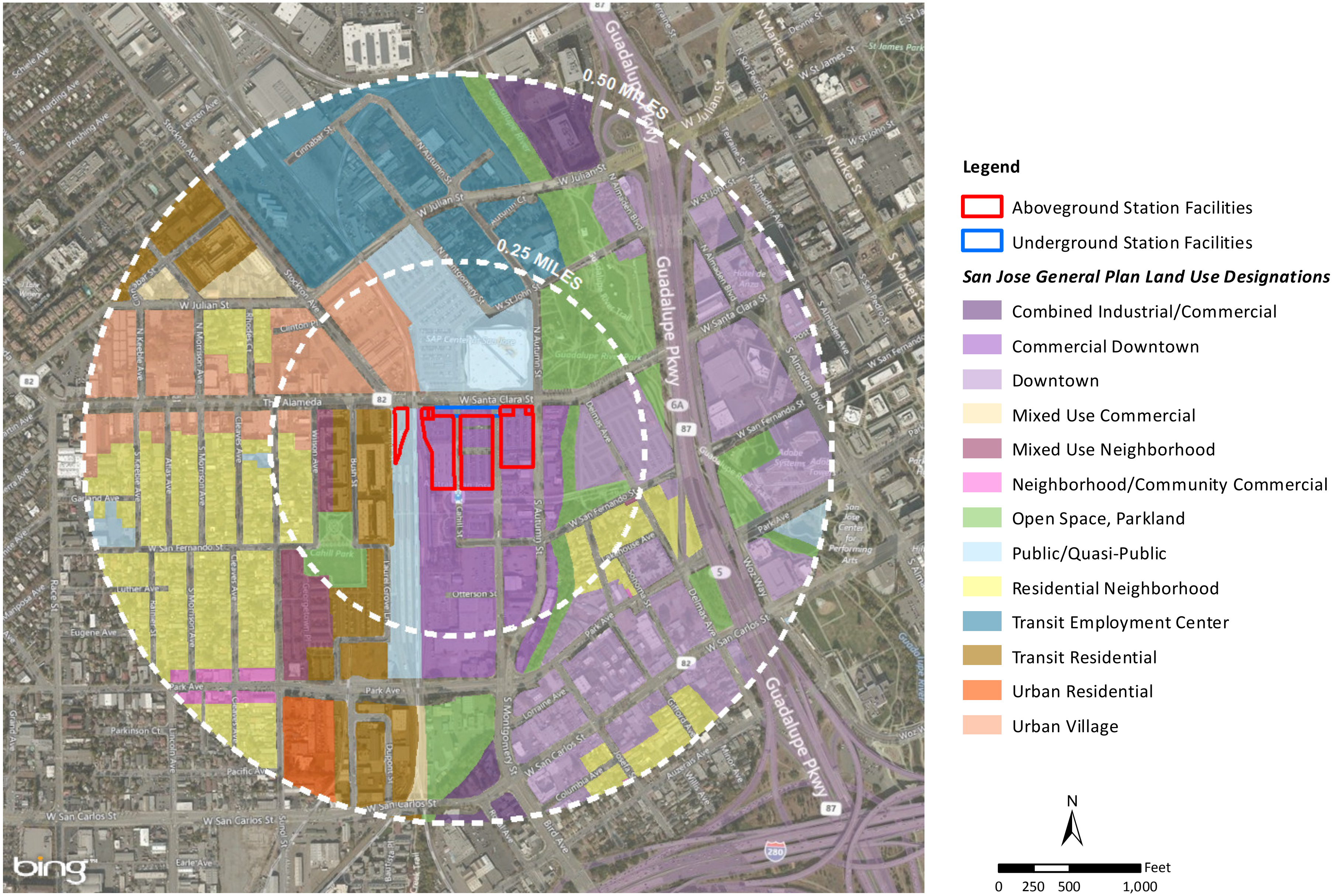
Figure 4.11-4
San Jose General Plan Land Use Designations – Diridon Station South Option (Single and Twin Bore) (Revised)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics … 00332.13 (6-9-2016) tm

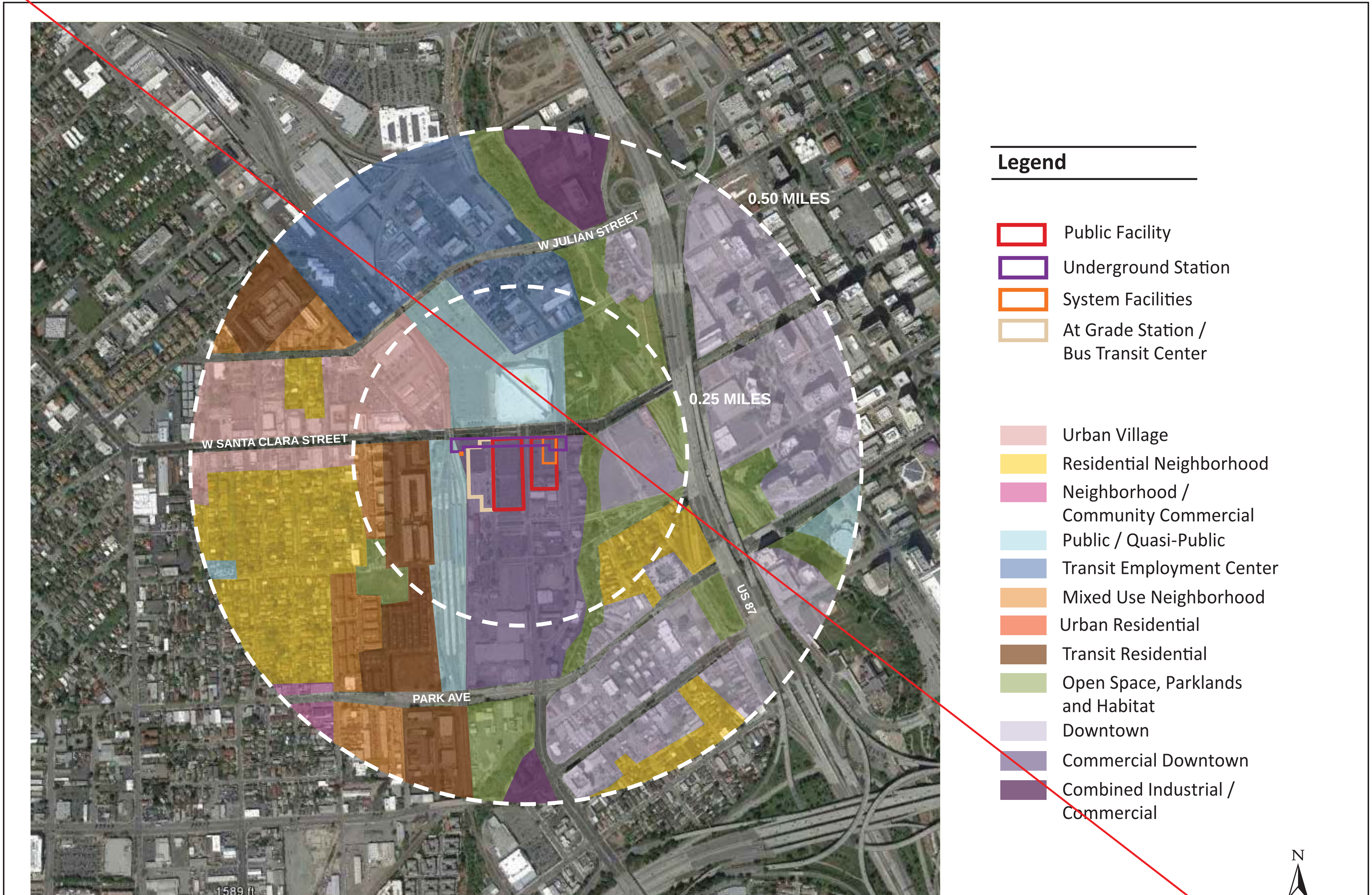
Figure 4.11-5
San Jose General Plan Land Use Designations – Diridon Station North, Single-Bore Option
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint, 2017; City of San Jose, 2011

Graphics ... 00332.13 (8-29-2017)

Figure 4.11-5
San Jose General Plan Land Use Designations – Diridon Station North Option (Single Bore) (Revised)
VTA's BART Silicon Valley–Phase II Extension Project



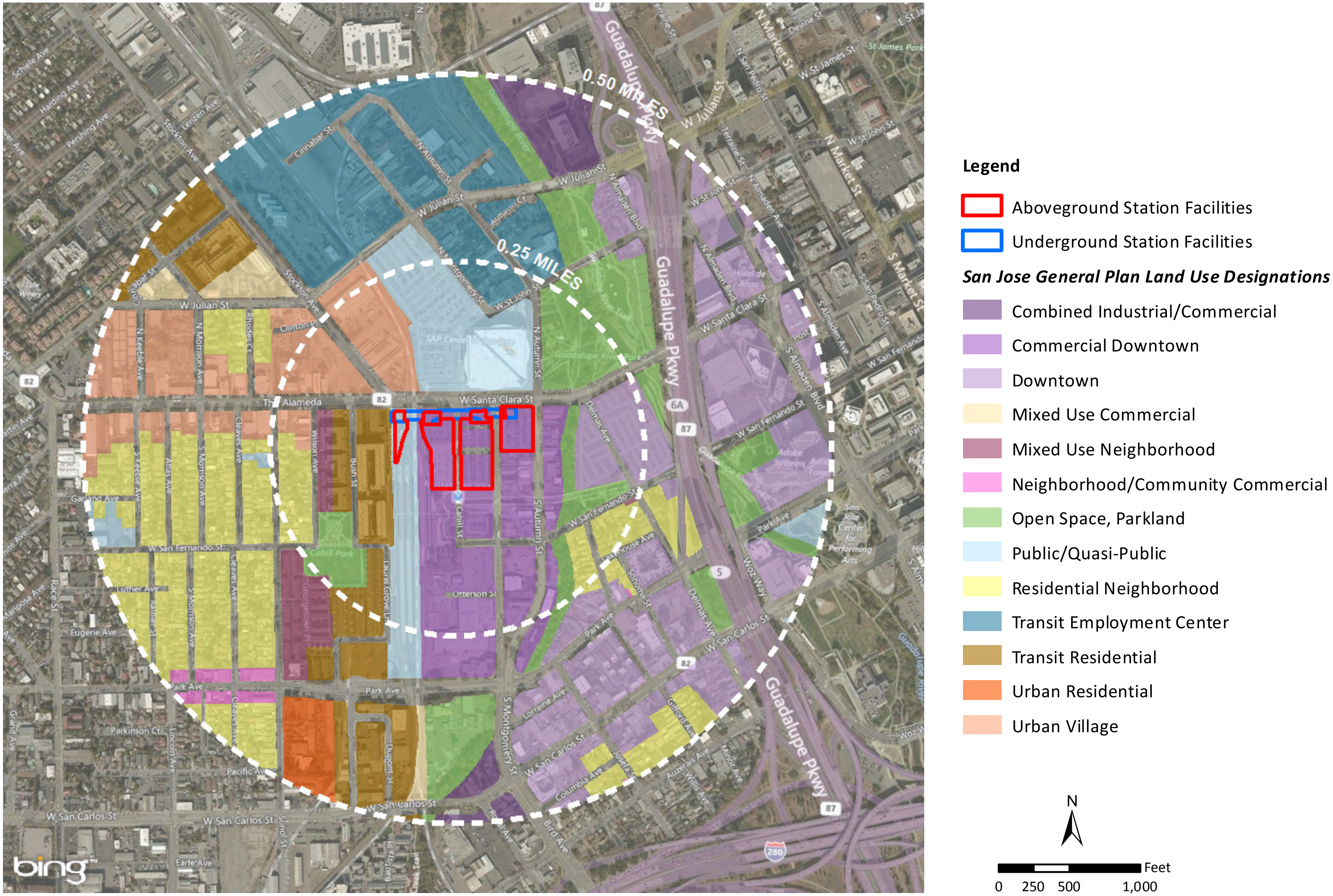
Source: Circlepoint; Google Earth, 2015.

Graphics … 00332.13 (6-9-2016) tm

Figure 4.11-6

San Jose General Plan Land Use Designations – Diridon Station North, Twin-Bore Option

VTA's BART Silicon Valley–Phase II Extension Project



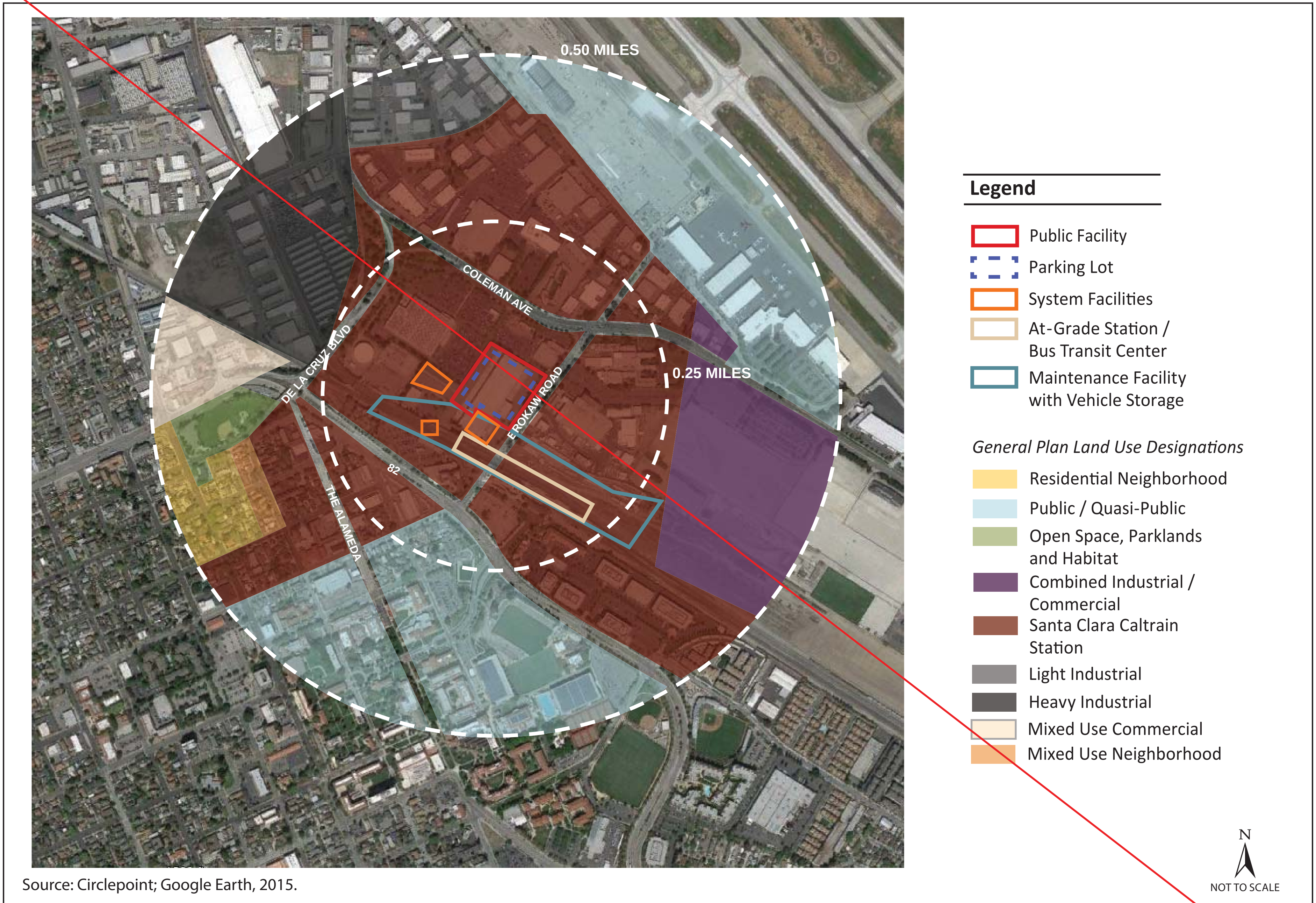
Source: Circlepoint, 2017; City of San Jose, 2011

Graphics ... 00332.13 (8-29-2017)

Figure 4.11-6

San Jose General Plan Land Use Designations – Diridon Station North Option (Twin Bore) <u>(Revised)</u>

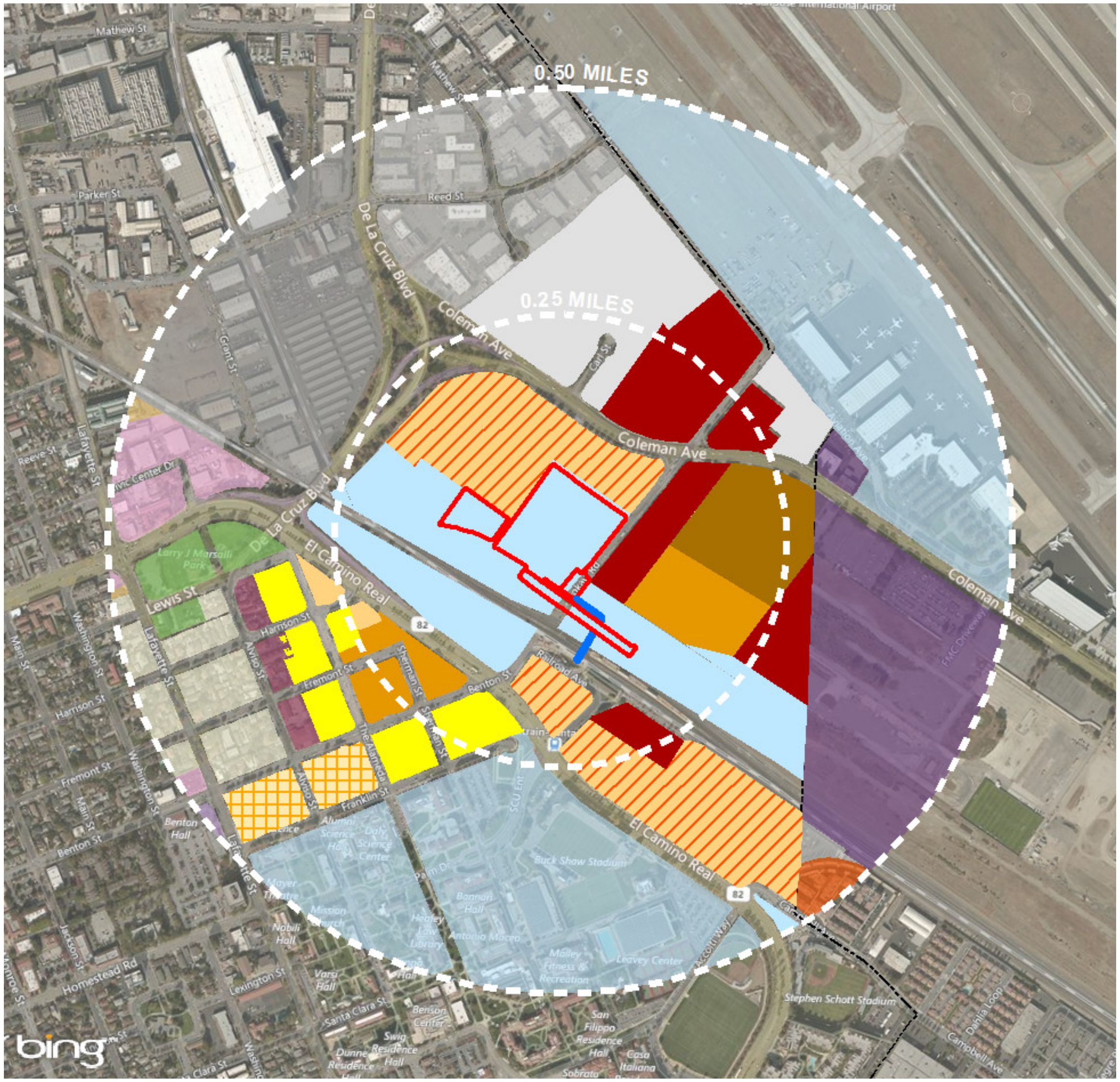
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint; Google Earth, 2015.

Graphics ... 00332.13 (6-9-2016) tm

Figure 4.11-7
Santa Clara General Plan Land Use Designations – Santa Clara Station
VTA's BART Silicon Valley–Phase II Extension Project



Source: Circlepoint, 2017; City of San Jose, 2011

Legend

- Aboveground Station Facilities
- Underground Station Facilities

Santa Clara Station Focus Area Land Use Designations

- Santa Clara Station Low Density Residential
- Santa Clara Station Medium Density Residential
- Santa Clara Station High Density Residential
- Santa Clara Station Very High Densityy Residential
- Santa Clara Station Regional Commercial
- Santa Clara Station Regional Mixed Use
- Santa Clara Station Community Mixed Use Commercial
- Santa Clara Station Public/Quasi Public
- Santa Clara Station Light Industrial

Municipal Land Use Designations

- Combined Industrial/Commercial
- Commercial Mixed Use
- Downtown
- Heavy Industrial
- Light Industrial
- Medium Density Residential
- Neighborhood Mixed Use
- Open Space, Parklands and Habitat
- Public / Quasi Public
- Urban Residential
- Very Low Density Residential

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Graphics … 00332.13 (11-15-2017)

Figure 4.11-7

Santa Clara General Plan Land Use Designations – Santa Clara Station (Single and Twin Bore) (Revised)

VTA's BART Silicon Valley–Phase II Extension Project

Downtown San Jose Station

Downtown San Jose contains high-rise office buildings lining Santa Clara Street. These buildings have first floor retail uses that mainly serve downtown employees, residents, and visitors. Downtown is characterized by a strip of retail uses along the street frontage, with older residential uses just beyond the retail corridor. The San Jose State University campus is located one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is located south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Santa Clara Street is a busy retail, commercial, and business thoroughfare leading into downtown San Jose. Commercial businesses include many restaurants, bars, retailers, a grocery store, and a gas station. Low- and medium-density residential uses are located to the north of Santa Clara Street, just outside of downtown San Jose.

Downtown San Jose Station East Option

The Downtown San Jose Station East Option would be excavated to approximately 40 feet below ground level under Santa Clara Street between 5th and 2nd Streets with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. The station would consist of a boarding platform level, a ~~mezzanine~~ concourse one level above, and entrances at street level. Several station portal entrance location options are being evaluated for the Single-Bore and Twin-Bore Options. Potential station option locations for the Single-Bore Option include the following: ~~such as in sidewalks along Santa Clara Street near 6th, 4th, and 3rd Streets, alongside commercial and entertainment venues.~~

- South of Santa Clara Street between 4th Street and 5th Street
- South of Santa Clara Street on the corner of 6th Street and Santa Clara Street

Potential station option locations for the Twin-Bore Option include the following:

- Along Santa Clara Street between 2nd Street and 3rd Street
- Along Santa Clara Street between 6th Street and 7th Street
- South of Santa Clara Street between 4th Street and 5th Street
- North of Santa Clara Street between 3rd Street and 4th Street

Downtown San Jose Station West Option

The Downtown San Jose Station West Option would be excavated to approximately 40 feet below ground level under Santa Clara Street between 2nd and Market Streets. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. Businesses along this portion of Santa Clara Street include several restaurants, retailers, a bank, and hair salons. The station would consist of a boarding platform level, a ~~mezzanine~~ concourse one level above, and entrances at street level. ~~Several station portal entrance~~

~~location options from sidewalks on 3rd Street north of Santa Clara Street, along Santa Clara Street between 2nd and 3rd Streets, on 2nd Street both north and south of Santa Clara Street, north of Santa Clara Street and east of Market Street, and along Market Street south of Santa Clara Street are being evaluated.~~ Several station portal entrance location options are being evaluated for the Single-Bore and Twin-Bore Options. Potential station option locations for the Single-Bore Option include the following:

- On east Market Street north of Santa Clara Street
- Along Santa Clara Street between Market Street and 1st Street
- In the center of the block surrounded by Santa Clara Street, East St. John Street, Market Street, and 1st Street
- Along Santa Clara Street between 1st Street and 2nd Street

Potential station option locations for the Twin-Bore Option include the following:

- On either side of Market Street south of Santa Clara Street
- North of Santa Clara Street between Market Street and 1st Street
- On either side of 2nd Street south of Santa Clara Street
- Along Santa Clara Street between 2nd Street and 3rd Street
- On the east side of 2nd Street north of Santa Clara Street
- On the west side of 3rd Street north of Santa Clara Street

Diridon Station

Land uses near the Diridon Station South and North Options include Guadalupe River Park and Gardens to the north, and low- to medium-density residential, commercial, and industrial uses to the south. Between the station and ~~Stockton Avenue~~Race Street, the land uses are predominately low- to medium-density residential with some park/open space, as well as commercial uses along The Alameda. Industrial land uses are located east of the alignment near the Caltrain corridor. Cahill Park is located one block south of the station on West San Fernando Street.

Diridon Station South Option

The Diridon Station South Option would be located between Autumn Street to the east, the existing Caltrain tracks to the west, Santa Clara Street to the north, and the existing Diridon Caltrain Station to the south. The Diridon Station South Option would be located approximately 40 feet below ground level and would be located slightly south relative to the North Option with the Twin-Bore Option. The top of the Single-Bore Option would be a maximum of approximately 70 feet below ground. The alignments for the Twin-Bore and Single-Bore Options would be the same as they enter and exit the Diridon Station South Option.

Primary land uses within the Diridon Station South Option area are industrial and office/commercial, with office/commercial and institutional/education to the west. To the south are industrial uses and residential uses are to the southwest of the station area. Commercial and industrial uses, as well as the Los Gatos Creek are located to the east. The SAP Center is directly north of the station and is anticipated to draw substantial numbers of riders during entertainment and sporting events. Transportation-related infrastructure dominates the landscape within the footprint of the Diridon Station South Option.

Diridon Station North Option

Under the Twin-Bore Option, the Diridon Station North Option would be located slightly to the east, between the exiting Caltrain tracks to the west and Autumn Street to the east. Excavation for this option would extend approximately 40 feet below ground level. Under the Single-Bore Option, the top of the Diridon Station North Option would be located a maximum of approximately 70 feet below ground level between Montgomery Street to the east, White Street to the west, Santa Clara Street to the north, and the existing Diridon Caltrain Station to the south. The track alignments for the Twin-Bore and Single-Bore Option would also vary slightly as they enter and exit the Diridon Station North Option.

Primary land uses within and in the vicinity of the Diridon Station North Option area are the same as described above for the Diridon Station South Option.

Continuation of Tunnel Alignment

Around Pershing Avenue, all of the options—the Twin-Bore and Single-Bore Options and the Diridon Station South and North Options—converge back onto the same alignment under Stockton Avenue. The top of the Twin-Bore Option would be approximately 40 feet below ground level and the top of the Single-Bore Option would be approximately 70 feet below ground level. Exiting the stations, the alignment would continue west and cross under the Caltrain tracks. Residential and commercial uses are along the alignment before reaching Stockton Avenue. Residential land uses dominate the southwest side of the alignment, and commercial and industrial uses occupy areas to the northeast approaching Schiele Avenue. Some commercial and institutional uses are also located along the alignment in this area.

The alignment would continue on the east side of the Caltrain tracks and cross under Interstate 880 (I-880) before ascending and exiting the West Tunnel Portal near Newhall Street. City of Santa Clara

Newhall Maintenance Facility

Within Santa Clara, the alignment begins north of I-880 and extends to the Santa Clara Station. North of I-880, the uses are primarily industrial, while single-family and multi-story residences are located to the west. The Santa Clara University campus also lies to the west.

The Newhall Maintenance Facility would begin north of the West Tunnel Portal at Newhall Street in San Jose and extend to Brokaw Road near the Santa Clara Station in Santa Clara. The facility would be constructed on the former Union Pacific Railroad (UPRR) Newhall

Yard that was purchased by VTA in 2004. Land uses on the southwest side of the maintenance facility and storage area and across the existing railroad tracks are primarily single-family and multi-family residences. On the northeast side of the storage area there are primarily commercial and industrial uses, such as a home improvement business and an athletic club, as well as Avaya Stadium.

Santa Clara Station

The Santa Clara Station would be bounded by railroad tracks to the southwest, De La Cruz Boulevard to the northwest, and Coleman Avenue to the northeast near the intersection of Brokaw Road in an area currently occupied by industrial and commercial uses. The station would be at grade, centered at the west end of Brokaw Road, and would contain an at-grade boarding platform with a ~~mezzanine~~ concourse ~~level~~ one level below.

The Santa Clara Caltrain Station is located west of the station site. Land uses along the southern and western boundaries of the station site include the Santa Clara Police Station and office and commercial land uses. Santa Clara University occupies a substantial portion of land to the southwest of the station area. There are also medium- and low-density residential developments to the south of the Santa Clara Station site. Santa Clara Station would be located within ~~in~~ the *Santa Clara Station Area Plan,* which proposes commercial, mixed use, public, and high-density residential land uses in the area. Refer to Section 6.11.2.2, *Regulatory Setting,* for a description of the *Santa Clara Station Area Plan*.

The station site was formerly a FedEx shipping and receiving facility but is now leased to another tenant, Apple Inc. Apple Inc. operates a research and development facility at this site. Retail uses are located immediately adjacent to the northwest. Industrial buildings and Mineta San Jose International Airport are located to the north and northeast. The existing Caltrain tracks and station are located southwest of the station.

4.11.2.2 Regulatory Setting

There are no federal land use regulations that would be applicable to the BART Extension. However, there are several state and local land use regulations applicable to the BART Extension. Please refer to Chapter 6, Section 6.11, *Land Use,* for a summary of state and local land use policies applicable to the BART Extension.

4.11.3 Methodology

The land use analysis of the BART Extension focuses on four primary components: the alignment, the station areas, the support facilities required for operation, and parking areas. The BART Extension is evaluated against the existing and planned developments adjacent to and surrounding the BART Extension in order to evaluate the compatibility of the facilities with neighboring land uses. The land use study area incorporates areas along either side of the alignment and a 0.5-mile radius around the BART stations.

An *adverse effect* on land use would involve physically dividing an established community, conflicting with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the BART Extension Alternative, or conflicting with any applicable habitat conservation plan or natural community conservation plan.

4.11.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.11.3, *Methodology*. This section also identifies design commitments to avoid, minimize, or mitigate impacts.

4.11.4.1 No Build Alternative

The No Build Alternative consists of existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). The No Build Alternative projects could result in effects on land uses typically associated with transit, highway, bicycle, pedestrian facilities, and roadway projects. These projects are anticipated to cause a similar range of the type and intensity of impacts as caused by the BART Extension Alternative. This would include typically include transportation, noise and vibration, air quality, and land use impacts and associated mitigation measures. However, projects planned under the No Build Alternative would undergo separate environmental review to determine whether these projects would result in adverse effects to surrounding land uses. The No Build Alternative would not be as supportive of regional plans and policies to promote BART use, infill development, and densification around BART stations as would the BART Extension Alternative.

4.11.4.2 BART Extension Alternative

The final property acquisitions required to construct the BART Extension Alternative may change (i.e., increase or decrease in size, change type, and/or change from permanent to temporary, etc.) during final design. Also, during final design, additional easements may be identified such as temporary construction easements, temporary access easements, and long-term maintenance and access easements. It is the intent of this and previous environmental documents to disclose the potential environmental impacts of acquisitions known at the time the environmental document is prepared while recognizing that some adjustments may be necessary based on final design, working with individual property owners during the acquisition process, and/or during construction. Should additional modifications beyond the scope of this environmental document trigger the need for additional environmental review, the necessary additional environmental analyses will be prepared.

Physically Divide an Established Community

Community cohesion addresses the degree to which residents feel a sense of belonging to their neighborhood or experience attachment to community groups and institutions as a result of continued association over time. Possible adverse effects of a project on community cohesion include effects on interactions among persons and groups; isolation of certain people from others; and the perceived effect on community quality of life due the creation of a new barrier or physical division within an established community.

VTA has taken measures to ensure the public is aware and has been engaged during the design period of the BART Extension. The community offered suggestions and concerns at several public forums, including scoping meetings. During the scoping process for the BART Extension, VTA invited the community to provide input on the BART Extension. VTA conducted three public scoping meetings (on February 12, 17, and 19, 2015) which provided BART Extension-related information to the community and initiated public involvement in the environmental review process. The community offered suggestions and voiced concerns related to several BART Extension components. Such community input has helped to guide the development of BART Extension plans, particularly for aboveground station areas, to minimize adverse community effects of the BART Extension.

Alignment

The BART Extension is approximately 6 miles long and would pass through the Cities of San Jose and Santa Clara. Of those 6 miles, approximately 5 would be underground. The BART Extension would descend from the connection to Phase I Berryessa Extension into the East Tunnel Portal just north of Las Plumas Avenue. From here, the alignment would travel underground through San Jose before ascending at the West Tunnel Portal north of I-880 near Newhall Street. The alignment would continue to the Santa Clara Station (approximately 0.75 mile) near the existing Santa Clara Caltrain Station. The only tunnel locations where the Twin-Bore and Single-Bore Options would differ would be near Coyote Creek and entering/exiting the Diridon Station North Option. However, both of these portions of the alignment would be underground and vary only slightly; thus the discussion of surrounding land uses is the same for both the Twin-Bore and Single-Bore Options.

No new physical barriers would be created within the community surrounding the 5-mile-long underground alignment, and there would be no division of an existing community. The underground alignment would transition from an at-grade alignment into a trench and into a tunnel portal at both the east and west ends of the BART Extension. Approximately 1 mile of the alignment would be located aboveground either at grade or in a trench. The aboveground portion of the alignment north of the East Tunnel Portal would be located near U.S. 101 and within an existing industrial area. The portion in Santa Clara would travel within an existing heavily-utilized rail corridor, including passenger service by Altamont Corridor Express, Caltrain, and Capitol Corridor and infrequent Union Pacific Railroad operations. Therefore, neither aboveground segment would create a new division in an existing community. There would be *no adverse effect*, and mitigation would not be required.

Station Locations

Alum Rock/28th Street Station

The Alum Rock/28th Street Station is located within the Five Wounds Urban Village Area, as developed under the *Five Wounds Urban Village Plan*. This Plan emerged from the Five Wounds/Brookwood Terrace Strong Neighborhoods Initiative (SNI), and was developed in 2010 by the community and San Jose State University, with support from the City, under the umbrella of CommUniverCity. The Plan establishes a framework for a mixed-use and pedestrian-oriented district that supports planned transportation improvements (including BART) and creates a safe environment for all modes of travel, a healthy mix of uses, and public gathering places. ~~and the *Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan*. This Plan was conceptualized through a collaboration between the City, community, and University of San Jose. This plan envisions the Alum Rock/28th Street Station as a center for a conceptualized “Town Square,” and associated pedestrian promenades and mixed use developments. The ultimate goal of the community in designing the *Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan* was to enhance the area and create a community gathering place with mixed land uses.~~

The Alum Rock/28th Street Station would be underground and include aboveground facilities, such as street level station entrances, a parking structure, system facilities, and roadway improvements to North 28th street. The Alum Rock/28th Street Station would be contained within an approximately 11-acre station campus that is currently in industrial uses. As previously described, the station campus area is surrounded by a mix of industrial, commercial, institutional/civic and residential land uses that all operate independently from each other. The current uses on the site do not provide primary access to adjacent users. The Alum Rock/28th Street BART Station would replace the existing industrial buildings contained within the station campus; however, it would not take any streets out of the existing roadway network, create new barriers, or divide an existing neighborhood. Buildout of the Alum Rock/28th Street Station would be consistent with the *Five Wounds Urban Village Plan* ~~*Five Wounds/Brookwood Terrace BART Station Area Community Concept Plan*~~. Thus, operation of the Alum Rock Station would not substantially disturb the cohesiveness in the area or substantially interfere with community interaction. Furthermore, implementation of this station would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect,* and no mitigation would be required.

Downtown San Jose Station Options

Downtown San Jose Station would be located underground and consist of a boarding platform level, a ~~mezzanine~~ concourse one level above, and entrances at street level. Land uses surrounding both station options are primarily institutional/civic, commercial, and residential uses and are located near VTA's Santa Clara Light Rail Station. The current uses around the station options do not provide primary access to adjacent users. Both station options have relatively little aboveground infrastructure; aboveground features would not create a new barrier or substantially interrupt the community interaction in the area. The aboveground features would be designed to blend with the existing urban fabric of the downtown area. The station would not take any streets out of the existing roadway network, remove any residential neighborhoods, or put up barriers between any neighborhoods. Furthermore, implementation of either of the downtown station options would not divide any existing established community in the area. Implementation of a new BART station in downtown San Jose would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect,* and no mitigation would be required.

Diridon Station Options

The Diridon Station South and North Options would be located underground and would consist of a boarding platform level, a ~~mezzanine~~ concourse one level above, and entrances at both the east and west ends of the station at street-level portals. Diridon Station is included in the *Diridon/Arena Station Area Plan*. This plan was the result of ~~a~~ collaboration between the City and the community, and conceptualizes the station as a landmark facility with opportunities for a variety of mixed land uses. The ultimate goal of the *Diridon/Arena Station Area Plan* is to create a community-designed transit-oriented development (TOD) that enhances San Jose as an attractive urban center in which to work and live.

Existing land uses within the Diridon Station areas consist mostly of transportation infrastructure as well as industrial, residential, entertainment, and office/commercial land uses. Transportation infrastructure is located all around the Diridon BART Stations including the Caltrain Station and tracks which lie to the west, VTA's Vasona Light Rail Line which passes under the station area traveling east to west, and VTA's Bus Transit Center which is located to the north. Most of the existing land uses within the Diridon Station footprints are surface parking lots. SAP Center is located to the north of Santa Clara Street. Industrial uses are located to the south and east, and residential uses are located to the southwest of the station area. Office and commercial land uses are located to the northwest, south, and northeast of the station area. The current uses on the site are parking lots, which primarily support the surrounding transportation infrastructure, SAP Center, and nearby office/commercial uses.

Aboveground infrastructure onsite includes station entrance portals, systems facilities, and the reconfigured Diridon Station Bus Transit Center. Construction of either the Diridon Station South or North Option would cause the displacement of one single-family residence on South Autumn Street (APN 259-38-009). However, the property owner would be compensated in compliance with all the requirements of the federal law Uniform Relocation Act, 42 U.S.C. chapter 61, Government Code Sec. 7260 (Relocation Assistance) through Sec. 7267; and State Regulations—Relocation Assistance and Real Property Acquisition

Guidelines (Title 25, California Administrative Code Ch. 6, Art 1, Section 6000 et seq.) (refer to Section 4.14, *Socioeconomics*, for more information). The residence is surrounded by industrial and commercial uses; only one other residence is located on Autumn Street between Santa Clara and San Fernando Streets. The removal of this residence would not cause or contribute to the physical division of a community.

Aboveground station features are intended to ~~would~~ be consistent with the existing transportation land uses in the area associated with the Diridon Caltrain Station. The Diridon Station South and North Options would be consistent with the *Diridon/Arena Station Area Plan,* which calls for new opportunities for expanded, more efficient transit between community hubs, residential areas, and downtown. The station would not permanently take any streets out of the existing roadway network or put up barriers between any neighborhoods, and the one single-family home displacement would occur in accordance with state and federal laws, the owner would be compensated appropriately, and the removal of one residence within a non-residential and predominantly industrial neighborhood would not cause or contribute to the physical division of a community. Therefore, implementation of the Diridon Station South and North Options would not physically divide an existing established community. Furthermore, implementation of the Diridon Station South and North Options would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Santa Clara Station

The station would be at grade, centered at the west end of Brokaw Road, and would contain an at-grade boarding platform with a ~~mezzanine~~ concourse one level below. A parking structure of up to five levels would be located north of Brokaw Road and east of the existing railroad tracks. Existing land uses in the vicinity of the station consist of industrial, commercial/retail, and entertainment uses as well as transportation infrastructure. Industrial uses are located directly to the east, including Mineta San Jose International Airport and supporting aviation-related businesses to the north and northeast. The station area was formerly a FedEx shipping and receiving facility ~~and is now leased to Apple Inc.~~but is now occupied by ~~a research and~~Apple Inc. on lease for research and development~~ development tenant now vacant~~, and commercial/retail uses are located immediately adjacent to the north and northwest. Avaya Stadium is located to the southeast. Transportation infrastructure includes railroad tracks to the south running northwest to southeast that support Altamont Commuter Express, Capitol Corridor, and Caltrain passenger service and infrequent Union Pacific Railroad operations. The Santa Clara Caltrain Station is located to the south across the existing railroad corridor. The closest residences are located across El Camino Real southwest of the station site. The existing uses within the station footprint do not provide access to the adjacent users. Santa Clara Station would be constructed on a site that is currently occupied by ~~a research and development tenant~~Apple Inc. on lease. ~~on the vacant site and, b~~Because the adjacent land uses consist mostly of industrial, infrastructure, and commercial uses, ~~it~~the station is not located in an area that would cause adverse impacts on an existing community. The station and parking structure would not take any streets out of the existing roadway network, remove any residential neighborhoods, or put up barriers between any neighborhoods. The BART Extension would also construct the final segment of the Santa Clara Pedestrian Undercrossing, which would allow for pedestrians and cyclists to travel between El Camino Real and the Santa Clara Caltrain Station in the west directly to Brokaw Road and Coleman Avenue in the east. Furthermore, implementation of this station would increase the availability of transit options and allow for enhanced mobility to surrounding neighborhoods. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Newhall Maintenance Facility

The Newhall Maintenance Facility would begin north of the West Tunnel Portal at Newhall Street in San Jose and extend to Brokaw Road near the Santa Clara Station in Santa Clara. The Newhall Maintenance Facility would provide primarily industrial uses, including a BART vehicle storage area, general maintenance facilities, engineering offices, and a yard control tower. The facility would be located on the former UPRR Newhall Yard that was purchased by VTA in 2004. For more information on the Newhall Maintenance Facility, refer to Chapter 2, Section 2.2.2.1, *Alignment and Station Features by City*.

The Newhall Maintenance Facility site is adjacent to an existing actively used railroad corridor including Altamont Commuter Express, Caltrain, and Capitol Corridor, and UPRR service. Existing land uses to the south and west include a police station, the Santa Clara Caltrain Station and parking lot, other commercial, retail, and office uses, and single-family and multi-family residences. The residences are separated from the existing rail corridor and future BART corridor by existing 10- to 12-foot-high soundwalls. Farther to the west across El Camino Real is Santa Clara University. North and east of the yard, existing land uses include retail, commercial, and industrial uses, including Avaya Stadium and, farther to the north, Mineta San Jose International Airport. Southeast of the yard is I-880. The existing site does not provide access to the adjacent users. Given that the maintenance facility would be located within the existing railroad corridor, would be located farther from the residences than the active rail corridor, and would be separated from the residential uses by existing 10- to 12-foot-high soundwalls, the Newhall Maintenance Facility would not adversely affect or divide an existing community, create new physical barriers, or substantially interrupt existing community interaction in the area. Therefore, there would be *no adverse effect*, and no mitigation would be required.

System Facilities

The BART Extension's supporting system facilities include electrical facilities—including traction power substations and a sectionalizing station, high-voltage substations and switching stations, auxiliary power substations, and gap breaker stations—as well as train control and communication equipment, emergency ventilation facilities, and fresh air intake and exhaust facilities for the tunnels, underground stations, and underground pump stations. Supporting system facilities would be, limited in size and located along the alignment, within station areas, and often underground. Two mid-tunnel ventilation facilities, one located at the northwest corner of Santa Clara and 13th Streets and another located east of Stockton Avenue south of Taylor Street, would be aboveground structures housing the equipment required to ventilate the tunnel and would be the same under the Twin-Bore and Single-Bore Options. All publicly visible system facilities would be visually screened by a concrete block wall or fence. Refer to Chapter 2, Section 2.2.2.2, *Description of NEPA BART Extension Alternative Auxiliary Features,* for more detail regarding the sizes, locations, etc. of the system facilities.

Land uses surrounding the site of the 13th Street ventilation facility include commercial and residential uses. Commercial, residential, and industrial land uses surround the Stockton Avenue ventilation facility site options. The final decision regarding the four optional locations for the Stockton Avenue ventilation facility would be based on environmental impacts and property negotiations including availability and costs. Although residential uses are nearby, neither of the system facility sites would replace any community facilities, take any roads out of the existing roadway system, or physically divide an established community. In addition, both system facility sites would be designed to be aesthetically compatible to the surrounding existing uses. Therefore, there would be *no adverse effect*, and no mitigation would be required.

Conflict with any Applicable Land Use Plan, Policy, or Regulation

Consistency of the BART Extension with specific goals and policies is summarized below. An in depth analysis of applicable land use plans, policies, and regulations is located in Section 6.11, *Land Use*.

The BART Extension would be consistent with the regional plans of MTC, ABAG, VTA, and BART to extend BART service, enhance transit service to the South Bay, support the creation of a unified transit system that encircles the bay, and encourage higher-density, mixed-use development adjacent to new transit stations.

The BART Extension would contribute to a coordinated transit system that circles the South Bay and the Peninsula, as the Diridon Station (South and North Options) and the Santa Clara Station would provide intermodal connections from BART to existing rail lines and stations. Thus, the alignment and stations would be consistent with regional land use policies, and there would be *no adverse effect*. No mitigation would be required.

Providing a high-capacity regional rail station in the vicinity of land uses approved for TOD is consistent with the local land use goals of the Cities of San Jose and Santa Clara. The consistency with local plans is described below.

Alignment

As previously described, the tunnel alignments for the Twin-Bore and Single-Bore Options would be similar, and, in the areas in which they differ, the alignment would be underground. Because both alignments would primarily travel underground, and the only aboveground portions of the alignments, which are near the West and East Tunnel Portals, would be within an active rail corridor already established in the area surrounded by primarily industrial uses, additional rail transit use would not be incompatible with the land use plans, policies, or regulations. Thus, there would be *no adverse effect*, and mitigation would not be required.

Station Locations

The station campuses and associated parking structures would be located within areas of an adopted urban village plan (Five Wounds; City of San Jose 2013), adopted station area plans (Diridon; City of San Jose 2014 and *Santa Clara Station Area Plan*), the ~~Strong Neighborhoods Initiative (~~SNI~~)~~, and strategic development plans. Locating BART stations and associated parking structures in these areas would achieve compatibility with adjacent land uses and approved plans because TOD is a key component of many of these plans. Locating BART and supporting transit facilities near planned, mixed land uses would help facilitate a pedestrian-friendly environment that is consistent with the adopted land use plans and future proposed land uses. Furthermore, as previously discussed, VTA has taken measures to ensure communities are engaged during the design period of the BART Extension. During the scoping process for the BART Extension, VTA invited the community to provide input on the BART Extension. VTA plans to include the community throughout the entire planning process and into final design of the BART Extension.

The existing land uses surrounding the station areas are described in detail in the section above. For a full description of existing land uses surrounding the stations, refer to the beginning of Section 4.11.4.2, *BART Extension Alternative*. As previously described, the station campuses would be located within areas that are regulated by adopted development plans.

The Alum Rock/28th Street Station is located within the *Five Wounds Urban Village Plan*. This Urban Village Plan recognizes the location of the Alum Rock/28th Street BART Station and describes it as an opportunity to achieve the job goals of the General Plan for the Five Wounds Urban Village. This Urban Village Plan envisions the station area to be a part of a mixed-use town square. Locating a new BART station within this area would be compatible with the existing industrial and residential land uses and would be compatible with the proposed land uses within the *Five Wounds Urban Village Plan*.

The Downtown San Jose Station East and West Options are generally located within the San Jose SNIs for 13th Street and University Neighborhood. Each SNI supports the General Plan designation of Santa Clara Street as a transit-oriented development corridor, allowing for new development that would be compatible with public transit investments such as the extension of BART through downtown San Jose. Therefore, both Downtown San Jose Station Options ~~would~~ are intended to ~~would~~ be consistent with adjacent land uses and with the adopted SNIs.

The *Diridon Station Area Plan* provides an overview of the future development of the Diridon Station area, which integrates open space, transportation, and land uses to create an expansion of downtown San Jose. One of the primary objectives of the plan is to establish a land use plan and policy framework that will guide future development and redevelopment toward land uses that support transit ridership and economic development. New transportation infrastructure such as the Diridon Station South and North Options would be compatible with the existing land uses, as well as with future land uses proposed in the *Diridon Station Area Plan*.

The *Santa Clara Station Area Plan* has been incorporated into the SCGP as the Santa Clara Station Focus Area and guides the future development of the Santa Clara Transit Center and surrounding area. With a planning horizon to 2030, the plan articulates a vision and policies for the future development of the Santa Clara Station Area, providing guidance for changes as appropriate to the general plans and the Santa Clara zoning ordinance. The Santa Clara Station would achieve compatibility with existing and future surrounding land uses (as described in the *Santa Clara Station Area Plan*) for the same reasons described previously for San Jose station sites; however, given that it would be located adjacent to an existing Caltrain station, the Santa Clara Station would achieve even greater compatibility with surrounding land uses. <u>Land uses under the *Santa Clara Station Area Plan* have not been formally adopted by the City of Santa Clara. Therefore, a general plan amendment to adopt the applicable land use designations under the *Santa Clara Station Area Plan* would be required. With approval of this general plan amendment, the BART Extension would be consistent with the land use vision for Santa Clara Station.</u>

Therefore, the BART station areas would be compatible with existing and future land uses. There would be *no adverse effect*, and mitigation would not be required.

Additionally, VTA will design the BART Extension to be aesthetically compatible to adjacent land uses. Considerations would include urban design, pedestrian/transit integration, cost/value capture, safety and security, engineering requirements, operating requirements, maintenance, and BART design criteria and standards. These criteria would be developed in coordination with BART, the cities, and the community and would help to achieve even greater compatibility with surrounding land uses.

Newhall Maintenance Facility

The Newhall Maintenance Facility would be located within an existing heavily-used rail corridor with Altamont Commuter Express, Caltrain, Capitol Corridor passenger service and infrequent Union Pacific freight movements. Locating maintenance facilities in this area would be consistent with the adjacent land uses and thus there would be *no adverse effect*, and mitigation would not be required.

System Facilities

As previously described, supporting facilities would be contained within system facility sites, limited in size, and located along the alignment. All of the systems facilities are 12 feet or less in height.

Facility sites at the Alum Rock/28th Street, Diridon, and Santa Clara Stations within public view would be surrounded by an approximately 9-foot-high concrete block wall, and sites outside of public view would be surrounded by a 9-foot-high fence. The locations of system facilities associated with the Diridon Station would differ slightly between the Diridon Station South and North Options. However, they would all be blocked from public view and would not conflict with any applicable land use plan, policy, or regulation.

Other system facilities, including the two mid-tunnel ventilation structures, would be located within buildings and designed to be compatible with the surrounding land uses. The two mid-tunnel ventilation structures would be the same for both the Twin-Bore and Single-Bore Options. VTA will also design the system facilities to be compatible with adjacent land uses, and thus there would be *no adverse effect*. Therefore, mitigation would not be required.

Conflict with any Applicable Habitat Conservation Plan or Natural Community Conservation Plan

The *Santa Clara Valley Habitat Plan* (SCVHP), which is both a habitat conservation plan and natural community conservation plan, aims to enhance the viability of threatened and endangered species throughout the Santa Clara Valley. The majority of the Bart Extension area is within the boundaries of the SCVHP. However, except for the Newhall Maintenance Facility, all of the BART Extension area has already been disturbed by urban development. A portion of the Newhall Maintenance Facility is within the western burrowing owl (*Athene cunicularia hypogea*) survey area covered by the SCVHP, and construction activities could result in a significant impact on the species. Furthermore, the SCVHP regulates nitrogen deposition in the vicinity of the BART Extension. However, once operational, the BART Extension reduce vehicle miles traveled and thus reduce nitrogen deposition which would benefit the Bay checkerspot butterfly (*Euphydryas editha bayensis*), a species listed as threatened under the Endangered Species Act. VTA would implement Mitigation Measure BIO-CNST-~~G~~E and BIO-CNST-F, which require VTA to perform preconstruction surveys, and, if necessary, implement avoidance or relocation measures for tricolored blackbird and burrowing owls if present to comply with the SCVHP. With the implementation of these mitigation measures, this impact would be less than significant. Refer to Chapter 5, Section 5.5.4, *Biological Resources and Wetlands*, for mitigation measure details and more information regarding the BART Extension's consistency with the SCVHP.

4.11.5 NEPA Conclusion

The BART Extension Alternative is consistent with regional plans, the Midtown Specific Plan, Strong Neighborhoods Initiative, Urban Village Plans, SJGP, and SCGP that encourage development of land uses and densities that maximize transit ridership. As previously discussed, one single-family residence would be displaced by both Diridon Station South and North Options. However, the displacement would occur in accordance with state and federal laws, the owner would be compensated appropriately, and the removal of one residence within a non-residential and predominantly industrial neighborhood would not cause or contribute to the physical division of a community (refer to Section 4.14, *Socioeconomics*). With the implementation of Mitigation Measures BIO-CNST-~~G~~E and BIO-CNST-F, the BART Extension Alternative would be consistent with the HCP. Therefore, there would be *no adverse effect* on land use, and no additional mitigation would be required.

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4.12 Noise and Vibration

4.12.1 Introduction

This section describes the affected environment and environmental consequences related to noise and vibration from operations of the NEPA Alternatives. The information provided in this discussion is based on *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* prepared in 2017~~6~~ by Wilson, Ihrig & Associates. The analysis also draws upon a study prepared by ATS Consulting LLC prepared in January 2005, the *Station Noise Mitigation and Acoustical Treatment Study*, which outlined the noise and acoustical mitigation measures that need to be considered during the design of the BART stations. The descriptions of existing noise conditions along the BART Extension alignment are based on information and data provided by Wilson Ihrig & Associates.

4.12.2 Existing Conditions and Regulatory Setting

4.12.2.1 Noise and Vibration Terminology

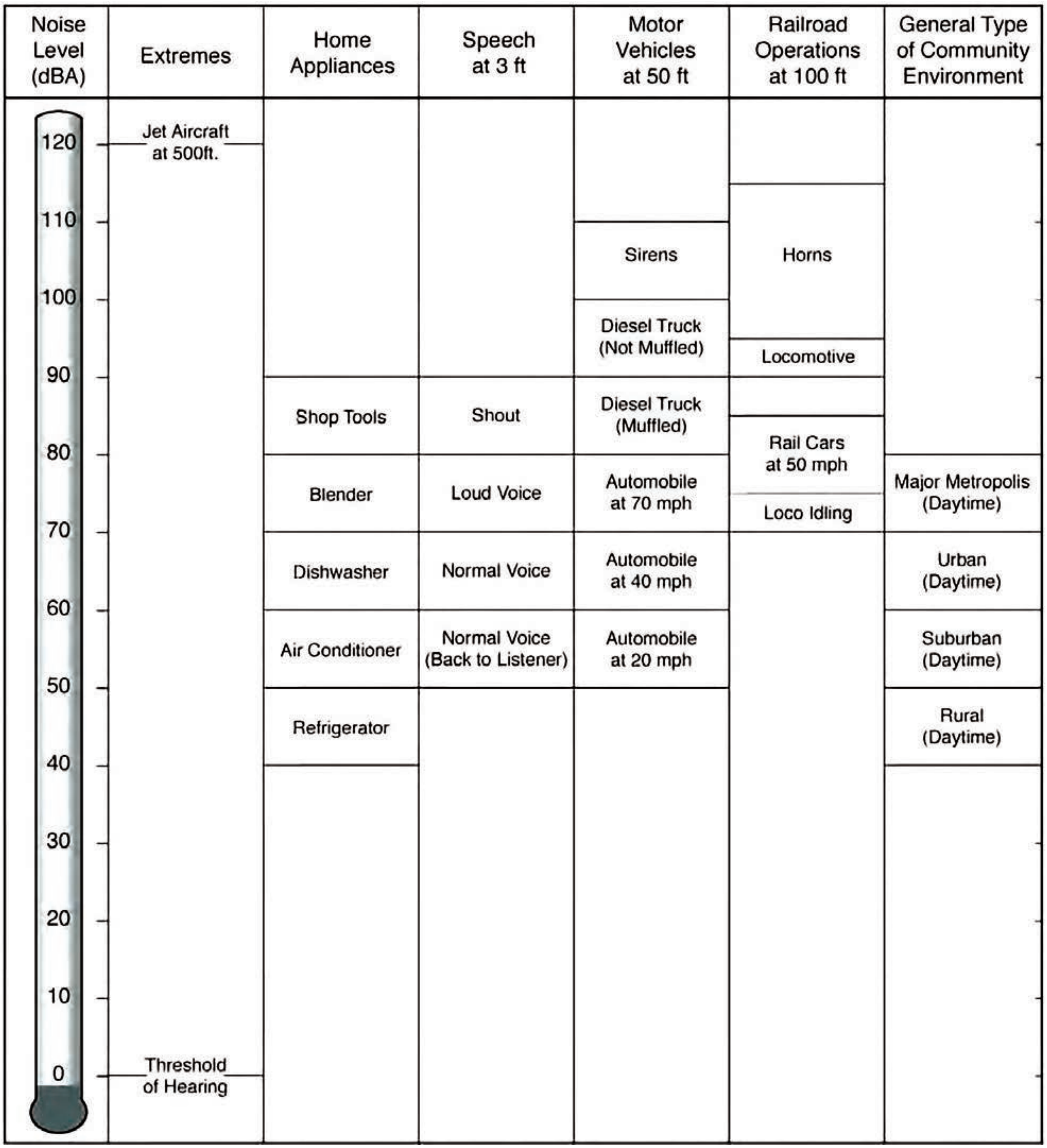
Noise Descriptors

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human subjective response are (1) intensity or level, (2) frequency content, and (3) variation with time. The first parameter is determined by how greatly the sound pressure fluctuates above and below the atmospheric pressure and is expressed on a compressed scale in units of decibels (dB). By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 dB. On a relative basis, a 3 dB change in sound level generally represents a barely noticeable change outside the laboratory, whereas a 10 dB change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

The frequency content of noise is related to the tone or pitch of the sound and is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz [Hz]). The human ear can detect a wide range of frequencies from about 20 to 17,000 Hz. Because the sensitivity of human hearing varies with frequency, the A-weighting system is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called *A-weighted sound levels* and are expressed in decibel notation as dBA. The A-weighted sound level is widely accepted for describing environmental noise. Figure 4.12-1 provides a comparison of representative dBA levels for common noise sources and environments. Although the extremes range from 0 dBA (approximate threshold of hearing) to 120 dBA (jet aircraft at 500 feet), most commonly encountered noise levels fall within the range of 40 to 90 dBA.

Because environmental noise fluctuates from moment to moment, it is common practice to condense all of this information into a single number called the *equivalent sound level* (L_{eq}). L_{eq} is a measure of sound energy over a period of time, typically 1 hour or 24 hours. It is referred to as the equivalent sound level because it is equivalent to the level of a steady sound that, over a referenced duration and location, has the same sound energy as the actual fluctuating sound. Often L_{eq} values over a 24-hour period are used to calculate cumulative noise exposure in terms of the *day-night equivalent sound level* (L_{dn}). L_{dn} is the A-weighted L_{eq} for a 24-hour period with an added 10-dB penalty imposed on noise that occurs during the nighttime hours (between 10 p.m. and 7 a.m.). Many surveys have shown that L_{dn} is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. Figure 4.12-2 provides examples of typical noise environment and criteria in terms of L_{dn}. Although the extremes of L_{dn} range from 35 dBA in a wilderness environment to 85 dBA in noisy urban environments, L_{dn} generally ranges between 55 and 75 dBA in most communities. As shown in Figure 4.12-2, this spans the range between an ideal residential environment and the threshold for an unacceptable residential environment according to the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.

Environmental noise can also be described statistically using percentile sound levels, L_n, which refer to the sound level exceeded "n" percent of the time. For example, the sound level exceeded 90 percent of the time, denoted as L_{90}, represents the "background" noise in a community. Similarly, the sound level exceeded 33 percent of the time (L_{33}) is often used to approximate the L_{eq} in the absence of loud, intermittent sources such as aircraft and trains.



Source: VTA, 2008.

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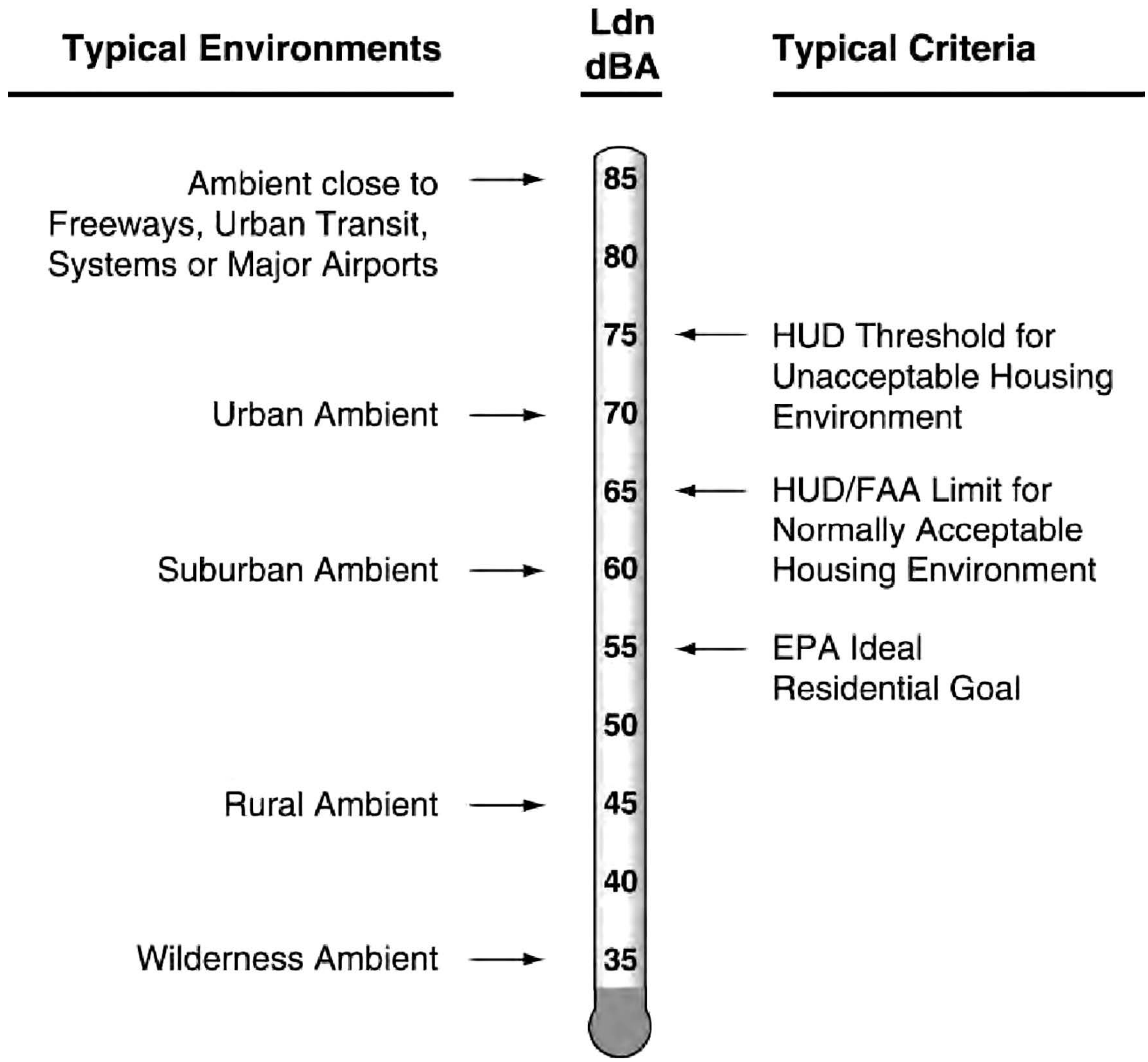
Figure 4.12-1
Comparison of Various Noise Levels
VTA's BART Silicon Valley–Phase II Extension Project



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Source: VTA, 2008.

Figure 4.12-2
Examples of Typical Outdoor Noise Exposure
VTA's BART Silicon Valley–Phase II Extension Project

Groundborne Noise and Vibration Descriptors

Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operating heavy earth-moving equipment. The effects of groundborne vibration include the movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumbling sound caused by the vibration of room surfaces is called groundborne noise.

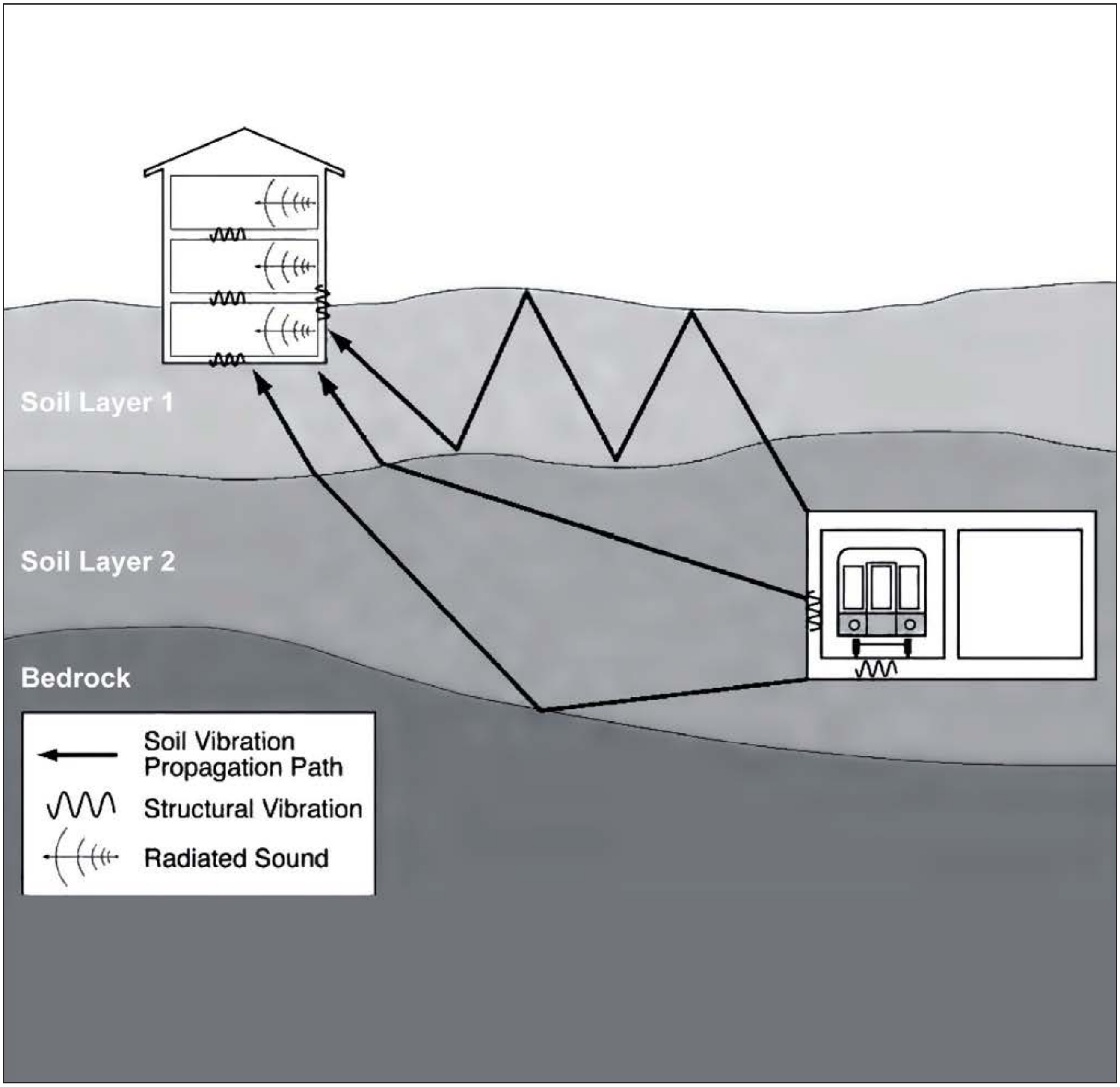
The basic concepts of groundborne vibration and noise are illustrated for a rail system in Figure 4.12-3. The train wheels rolling on the rails create vibration energy that is transmitted through the track support system into the transit structure. The amount of energy that is transmitted into the transit structure is strongly dependent on factors such as how smooth the wheels and rails are and the resonance frequencies of the vehicle suspension system and the track support system. These systems, like all mechanical systems, have resonances that result in increased vibration response at certain frequencies, called *natural frequencies*.

The vibration of the transit structure creates vibration waves that propagate through the various soil and rock strata to the foundations of nearby buildings. The vibration propagates from the foundation throughout the building structure. The maximum vibration amplitudes of the floors and walls of a building often will be at the resonance frequencies of various components of the building.

Groundborne vibration is the oscillatory motion of the ground about an equilibrium position. It can be described in terms of displacement, velocity, or acceleration. *Displacement* refers to the distance an object moves away from its equilibrium position, *velocity* refers to the rate of change in displacement or the speed of this motion, and *acceleration* refers to the time rate of change in the velocity of the object.

Although displacement is easier to understand than velocity or acceleration, it is rarely used for describing groundborne vibration. One reason for this is that most sensors used for measuring groundborne vibration are designed to provide output signals proportional to either velocity or acceleration. Even more important, the response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration. Sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low frequency range of most concern for environmental vibration (roughly 5 to 100 Hz). Therefore, vibration velocity is used in this analysis as the primary measure to evaluate the effects of vibration.

Vibration velocity level can be expressed in terms of decibels (VdB) relative to one micro-inch (μin) per second (1×10^{-6} inch per second). Figure 4.12-4 illustrates typical groundborne vibration levels for common sources, as well as criteria for human and structural response to groundborne vibration.



Source: Wilson Ihrig Associates, 2008.

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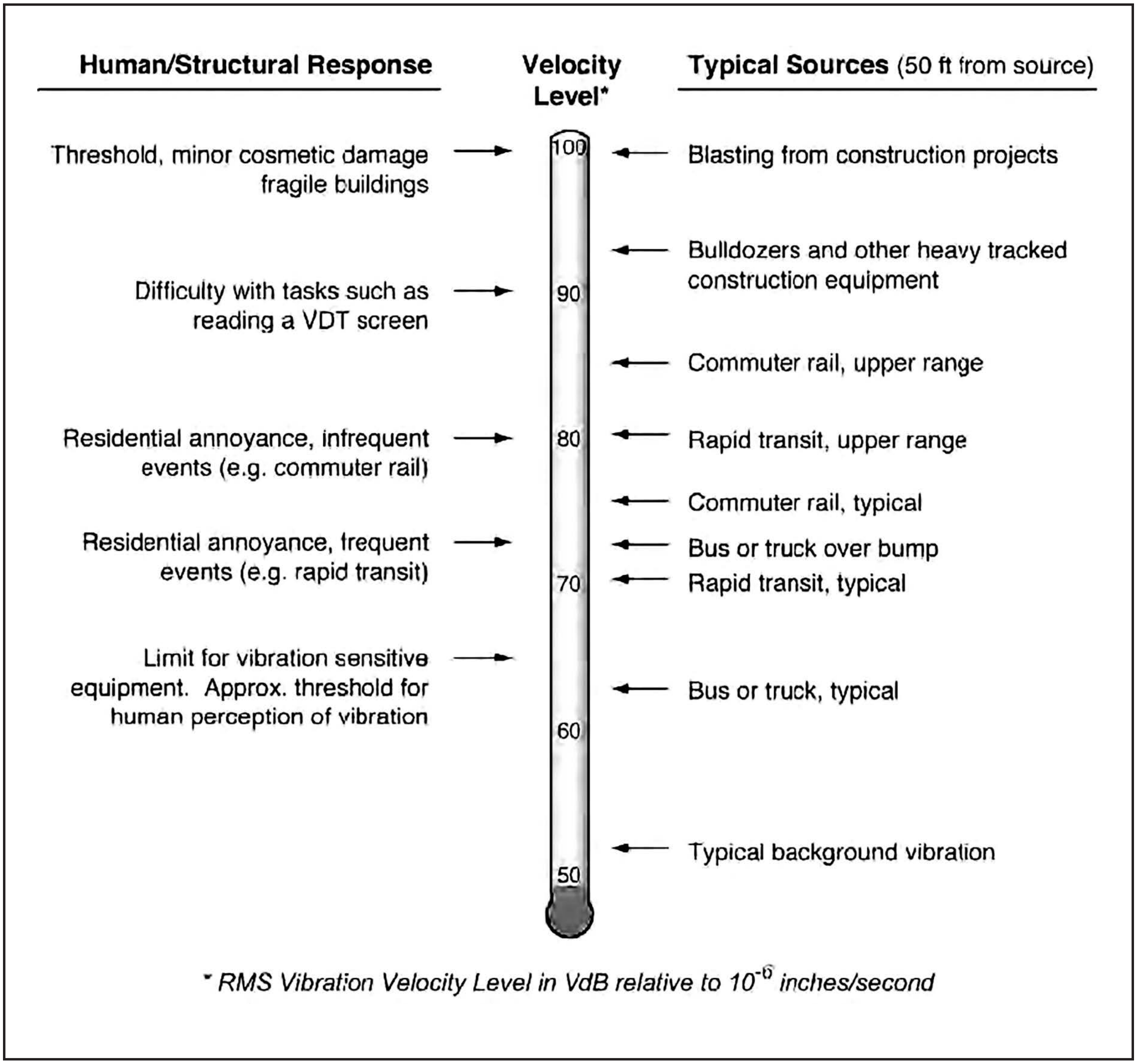
Figure 4.12-3
Propogation of Groundborne Vibration into Buildings
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA, 2008.

Figure 4.12-4
Typical Groundborne Vibration Levels and Criteria
VTA's BART Silicon Valley–Phase II Extension Project

As shown, the range is from approximately 50 to 100 VdB, from imperceptible background vibration to the threshold of damage. Although the threshold of human perception to vibration is approximately 65 VdB, annoyance is not usually substantial unless the vibration exceeds 70 VdB.

4.12.2.2 Environmental Setting

Existing Land Uses

Existing land uses along the BART Extension alignment include residential uses, commercial uses such as offices and warehouses, and industrial uses. Figures 4.11-1 to 4.11-7 in Section 4.11, *Land Use*, show existing land uses at the station sites. No buildings along the alignment have been identified as being highly sensitive to noise and vibration such as vibration-sensitive manufacturing, research, or special medical facilities. The majority of receivers along the alignment are residential land uses and those places where people sleep at night (e.g., hotels and hospitals). There are also institutional land uses that primarily have daytime uses (e.g., schools and churches), along with parks and other outdoor uses. No facilities such as performing arts facilities and recording studios have been identified that could be affected by groundborne noise or vibration.

No buildings along the alignment have been identified that can be classified as Land Use Category 1. Such receivers would include vibration-sensitive manufacturing, research, or special medical facilities. The majority of receivers within the alignment corridor are Land Use Category 2. Category 2 receivers include residential land uses and those where people sleep at night (e.g., hotels and hospitals). As described in Section 4.11, *Land Use*, there are several sensitive receptors that could be affected by groundborne noise or vibration.

Connection to Phase I Berryessa Extension

At the connection to Phase I Berryessa Extension, sensitive receptors include Anne Darling Elementary School south of Coyote Creek, and single-family residences south of McKee Road.

Alum Rock/28th Street Station

Low- and medium-density residential uses are located across U.S. 101 to the north and east of the Alum Rock/28th Street Station, as well as to the west of 28th Street and the former railroad right-of-way. The Portuguese Band and Social Center is located to the west of the station site, and the Five Wounds ~~National~~ Portuguese National Church and associated elementary school are located to the southeast.

Tunnel Alignment near Coyote Creek

There are residential areas to the north and south of Santa Clara Street from 28th to 18th Streets. The East San Jose Carnegie Branch Library is directly south of the alignment at South 23rd Street. Older single-family residential neighborhoods are to the north and south of the alignment. Horace Mann Elementary School is along the north side of the alignment, and San Jose State University and San Jose City Hall are to the south.

Downtown San Jose Station East and West Options

Older residential uses are just beyond the retail corridor along Santa Clara Street. The San Jose State University campus is one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Low- and medium-density residential uses are to the north of Santa Clara Street, just outside of downtown San Jose.

Diridon Station South and North Options

Sensitive land uses near the Diridon Station South and North Options include Guadalupe River Park and Gardens to the north, and low- to medium-density residential uses to the south. There are low- to medium-density residential uses with some park/open space between Diridon Station and Stockton Avenue. Cahill Park is located one block south of the station on West Fernando Street.

Continuation of Tunnel Alignment

Residential uses are along the alignment before reaching Stockton Avenue, and to the southwest side of the alignment.

Newhall Maintenance Facility

Across the existing railroad tracks, there are single-family and multi-story residences to the southwest and west of the alignment leading to the Newhall Maintenance Facility, along with Santa Clara University. Avaya Stadium, home of the Earthquakes soccer team, is on the northeast side of the facility.

Santa Clara Station

The Santa Clara Police Station is along the western boundary of the station site, and Santa Clara University occupies a substantial portion of the land to the southwest of the station area. There are also medium- and low-density residential developments to the south of the Santa Clara Station site. Mineta San Jose International Airport is to the northeast.

Noise

The existing ambient noise conditions along the alignment are primarily affected by local vehicle traffic on nearby roadways, freeways, aircraft overflights, train activities on the existing Caltrain alignment, train activities north of Interstate (I-) 880 and local activities common to a suburban community. Ambient noise conditions were determined from long-term measurements at 13 sites that would be exposed to wayside noise or ancillary facilities from the BART Extension (Wilson, Ihrig & Associates 2017~~6~~). The 13 measurement sites were selected to be representative of the different areas adjacent to the alignment where airborne noise impacts might occur.

For each location, the noise survey was conducted by means of a calibrated sound level meter (data logger) programmed to measure and store hourly average noise levels and statistical levels of environmental noise using a slow meter response and A-weighting. They were left unattended for a period of 2 to 4 full days. These noise-measuring instruments meet ANSI S1.4-193 specifications for Type I Sound Level Meters. Table 4.12-1 summarizes existing ambient noise levels. Figures 4.12-5 through 4.12-7 show the measurement locations.

Table 4.12-1: Existing Ambient Noise Levels

Measurement Location Label	Site Description	Primary Noise Sources	Most Recent Survey Dates	Ambient Used In Analysis (L_{dn})
A	N 13th St north of LT-B	Santa Clara St	03/29/08 to 04/01/08	62
B	N 13th St north of Santa Clara St	Santa Clara St	09/22/14 to 09/24/15	71
C	N 12th St north of Santa Clara St	Santa Clara St	04/03/08 to 04/06/08	63
E	S 13th St south of Santa Clara St	Santa Clara St	09/22/14 to 09/24/15	66
H	S 15th St south of Santa Clara St	Santa Clara St	03/27/08 to 03/30/08	60
I	S 16th St south of Santa Clara St	Santa Clara St	03/27/08 to 03/30/08	63
L	NW Corner of Villa Ave and Stockton Ave	Stockton Ave	01/29/14 to 02/03/14	69
N	Stockton Ave, 94 feet north of Schiele Ave	Stockton Ave	01/13/14 to 01/16/14	70
O	Schiele Ave, 197 feet west of Stockton Ave	Stockton Ave	04/05/08 to 04/08/08	62
P	SW Corner of Harding Ave and Stockton Ave	Stockton Ave	01/29/14 to 02/03/14	69
T	1070 Stockton Ave	Stockton Ave, Newhall St, I-880, Caltrain	01/13/14 to 01/16/14	67
U	Newhall St and Elm St	Newhall St, Elm St, I-880, Caltrain	01/29/14 to 02/03/14	62
V	Dahlia Loop	Caltrain	09/22/15 to 09/25/15	64
Source: Wilson, Ihrig & Associates 2017~~6~~.				

Figure 4.12-5
Long-term Noise Measurement Locations for Wayside Train Noise
VTA's BART Silicon Valley–Phase II Extension Project

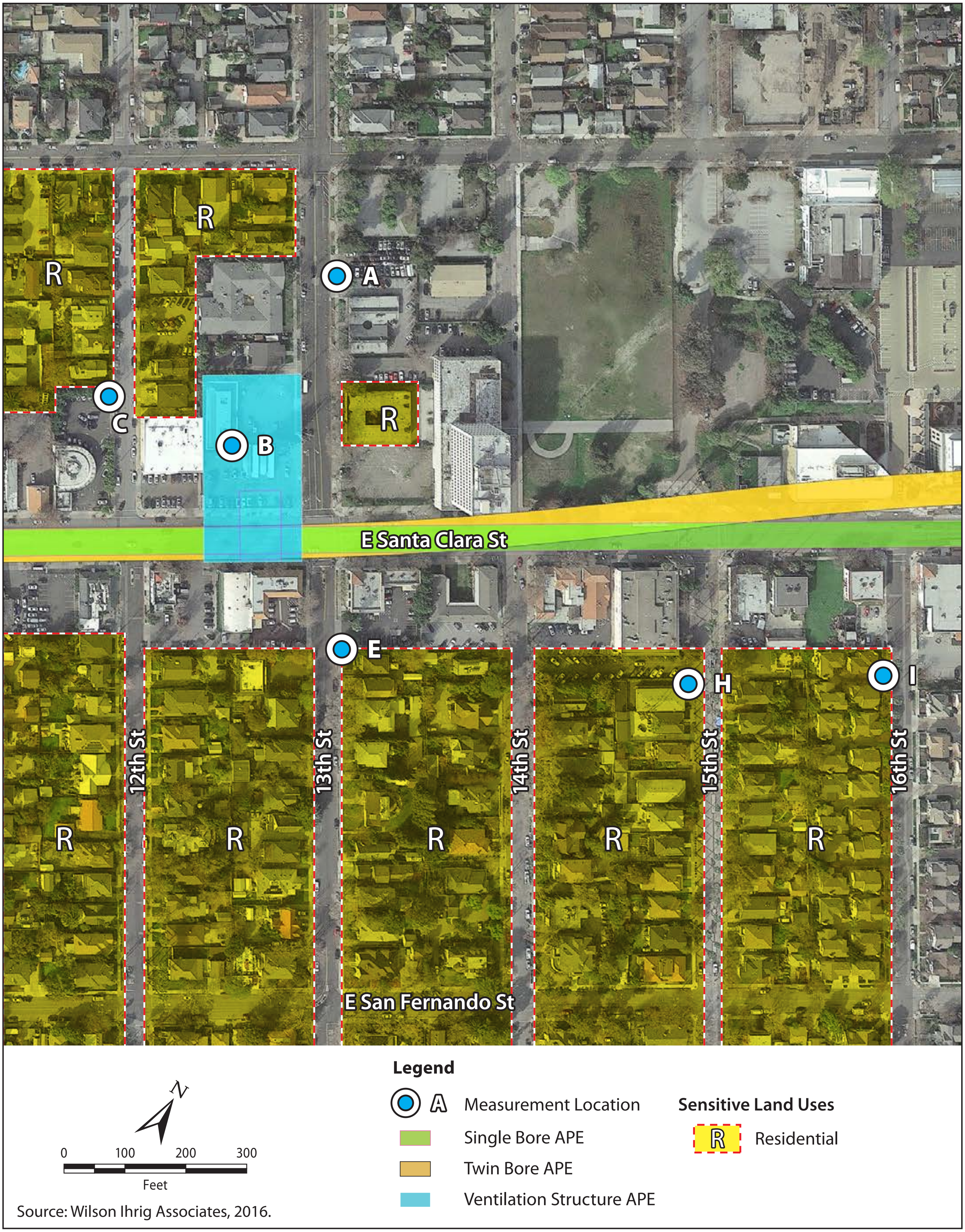


Figure 4.12-6
Long-term Noise Measurement Locations at 13th Street Ventilation Structure
VTA's BART Silicon Valley–Phase II Extension Project

Figure 4.12-7
Long-term Noise Measurement Locations at Stockton Avenue Ventilation Structure
VTA's BART Silicon Valley–Phase II Extension Project

Vibration

Existing ambient vibration conditions along the alignment are consistent with a typical urban environment with vibration typically being imperceptible. Train activities on the existing Caltrain alignment are a source of intermittent perceptible vibration at locations in proximity to the track. Vibration-sensitive land uses within the screening zones for the alignment and stations are the same as for noise-sensitive land uses, which are described under *Existing Land Uses* above.

4.12.2.3 Regulatory Setting

Federal

The environmental noise and vibration impact evaluation for the BART Extension is based on criteria defined in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (2006) also referred to as the FTA Guidance Manual. The FTA Guidance Manual provides criteria to evaluate construction and operational impacts for projects. The noise and vibration criteria are based on studies that examined community reactions to noise and vibration from construction activity and transit operations. Local noise and vibration regulations do not apply to regional transit operations and are therefore not used in the impact assessment.

Airborne Noise Criteria

For transit operations aboveground, the FTA Guidance Manual provides noise criteria that evaluates impacts based on potential changes to the existing ambient noise environment. For higher levels of existing ambient noise, less of a change is needed to cause impacts due to transit operations, which are long-term. Operational noise impacts are classified as No Impact, Moderate Impact, or Severe Impact depending on the amount of change in noise level relative to the existing ambient noise level. These terms only apply to operational train noise and cannot be directly applied to noise from other sources such as vehicle traffic and ancillary facilities.

For both a General Assessment and Detailed Analysis, the FTA provides guidelines to assess project noise levels from mass transit system operations, as well as noise criteria to assess impacts. Table 4.12-2 provides the FTA noise-sensitive land-use categories: Category 1, Category 2, and Category 3. The FTA guidelines specify a particular noise metric to be used depending on the specific land use (e.g., residential). Table 4.12-2 describes the FTA land-use categories, and specifies the noise metric to be used and the criterion for each Category.

Table 4.12-2: FTA Land Use Category and Noise Metric for Transit Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)$	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor L_{eq} (h)	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

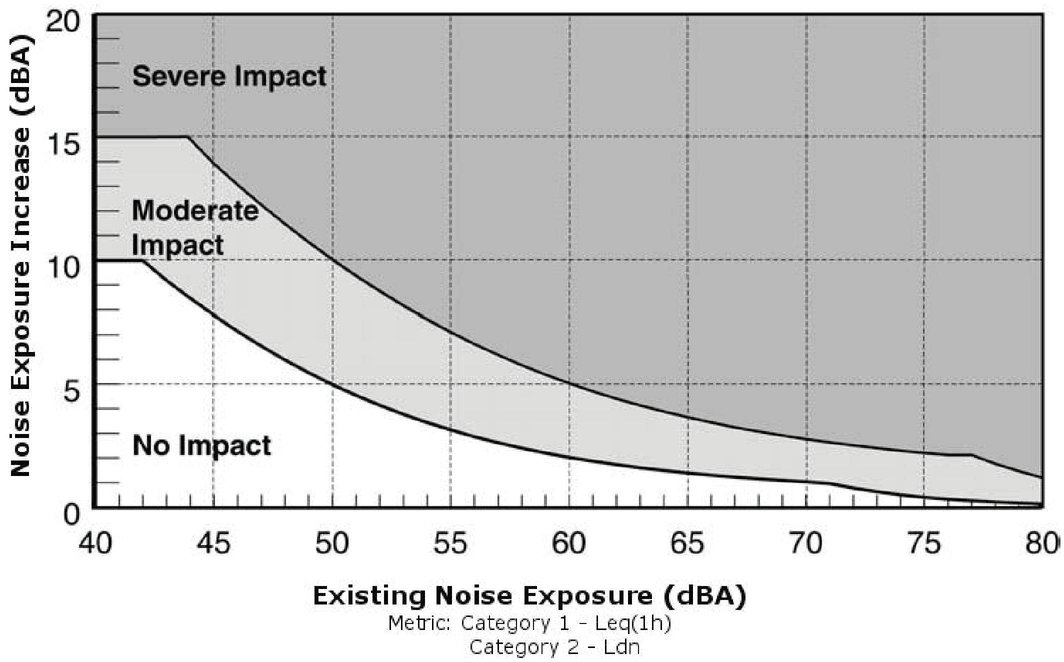
Three levels of noise impact are defined by the FTA guidelines: *No Impact*, *Moderate Impact,* and *Severe Impact*. These levels of impact are shown graphically in Figure 4.12-8 (Land Use Categories 1 and 2) and Figure 4.12-9 (Land Use Category 3).

The FTA noise impact thresholds are presented in Table 4.12-3. They are based on the existing ambient noise exposure level and the projected increase in noise level created by a project or combination of new projects. The noise thresholds in Table 4.12-3 reflect the graphic data presented in Figures 4.12-8 and Figure 4.12-9.

Table 4.12-3: Cumulative Increase Thresholds for Transit Noise Impact

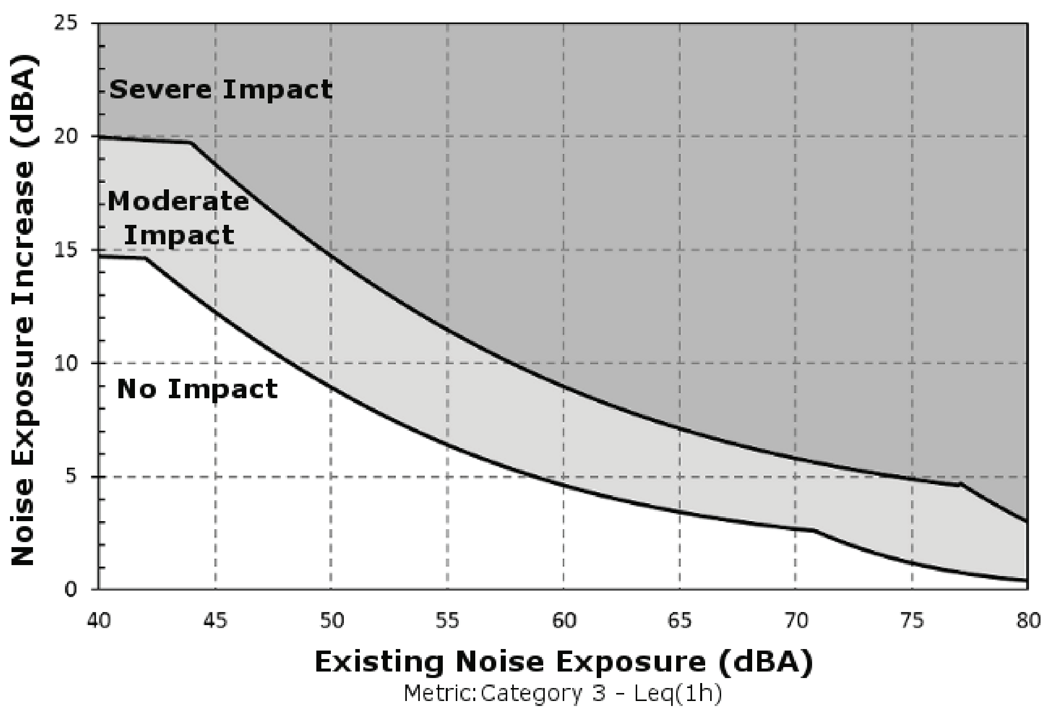
Existing Noise Exposure, L_{eq} or L_{dn}	Impact Threshold for Increase in Cumulative Noise Exposures (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
45	8	14	12	19
46	7	13	12	18
47	7	12	11	17
48	6	11	10	16
49	5	11	10	15
50	5	10	9	15
51	5	9	8	14
52	4	9	8	13
53	4	8	7	13
54	3	8	7	12
55	3	7	6	11
56	3	7	6	11
57	3	6	6	10
58	2	6	5	10
59	2	5	5	9
60	2	5	5	9
61	1.9	5	4	9
62	1.7	4	4	8
63	1.6	4	4	8
64	1.5	4	4	7
65	1.4	4	3	7
66	1.3	3	3	7
67	1.2	3	3	7
68	1.2	3	3	6
69	1.1	3	3	6
70	1.0	3	3	6
71	1.0	3	3	6
72	0.8	3	2	5
73	0.6	2	1.8	5
74	0.5	2	1.5	5
75	0.4	2	1.2	5

Source: Federal Transit Administration Transit Noise and Vibration Impact Assessment, May 2006.
Note: Maximum 1-hour L_{eq} is used for land use involving only daytime activities; L_{dn} is used for land uses where nighttime sensitivity is a factor.



Source: Wilson Ihrig Associates, 2016.

Figure 4.12-8
Increase in Noise Levels Allowed by Criteria (Land Use Categories 1 and 2)
VTA's BART Silicon Valley–Phase II Extension Project



Source: Wilson Ihrig Associates, 2016.

Figure 4.12-9
Increase in Noise Levels Allowed by Criteria (Land Use Category 3)
VTA's BART Silicon Valley–Phase II Extension Project

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Noise generated by a project that falls in the No Impact range requires no mitigation. At the other extreme, noise projections in the Severe Impact range represent the most compelling need for mitigation. Noise generated by a project in the Moderate Impact range will also require consideration and adoption of mitigation measures where considered reasonable. The mitigation policy adopted by VTA for the BART Extension is to mitigate Moderate Impacts when the increase in noise levels is greater than 5 dBA and mitigation is feasible.

The FTA Guidance Manual does not directly address ancillary facilities that do not operate continuously. However, there is a local regulation that can be used to assess infrequently occurring noises. The tunnel ventilation fans (TVF) are the main example of this. TVF are used primarily in emergencies. They also need to be tested occasionally and will occasionally be used to ventilate tunnel sections during nighttime maintenance work. An applicable criterion for this infrequent, operational noise source is provided by a City of San Jose code (2011). Although this code is intended to apply to emergency power, the operation of and need for of TVF are similar in that they are primarily for emergencies, but also need to be operated infrequently for short periods of time. The noise limit for a commercial land use adjacent to a residential land use is 55 dBA (see Table 20-105 in City of San Jose Department of Planning, Building and Code Enforcement [2011]).

Transit Groundborne Noise and Vibration Criteria

Predicted levels of groundborne noise and vibration have been evaluated using the FTA criteria, according to the Land Use Categories defined in Table 4.12-4. The vibration criteria for the three Land Use Categories are also indicated in Table 4.12-4. If the overall vibration level does not exceed the relevant criterion, then neither do any of the 1/3-octave band levels. It is sufficient to evaluate the predicted overall vibration levels, unless the criteria are exceeded, in which case an evaluation of the 1/3-octave band levels is warranted.

The FTA noise and vibration criteria are affected by the number of events, which in this case corresponds to the number of train passbys per day. Because the plan for BART Extension operations calls for more than 70 train movements a day, the *Frequent Events* criteria would apply.

Table 4.12-4: Indoor Groundborne Noise and Vibration Impact Criteria

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch/sec)			GBN Impact Levels (dBA re 20 micro Pascals)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB*	65 VdB*	65 VdB*	N/A[d.e]4,5	N/A[d.e]	N/A[d.e]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

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

[b] *Occasional Events* is defined as 30 to 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

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

[d] 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.

[e] Vibration-sensitive equipment is not sensitive to groundborne noise.

No buildings along the alignment have been identified that can be classified as Land Use Category 1. The FTA noise and vibration criteria for Category 2 receivers are 35 dBA for groundborne noise and 72 VdB (re: 10-6 in/sec) for vibration.

The criteria for Institutional land uses under Category 3 with daytime uses only (e.g., schools and churches) are 40 dBA for groundborne noise and 75 VdB for vibration. The criteria do not apply to most commercial or industrial uses because, in general, the activities within these buildings are compatible with higher noise levels. They do apply to business uses which that depend on quiet as an important part of operations, such as sound and motion picture recording studios. If the buildings or structures are used for commercial or industrial purposes and are located in busy commercial areas, they are not considered noise-sensitive and the noise impact criteria do not apply.

FTA also provides criteria for Special Buildings, which include concert halls, TV studios, recording studios, auditoriums, and theaters. There no facilities along the alignment that have been identified as potentially being affected by groundborne noise or vibration that meet the definition of a Special Building.

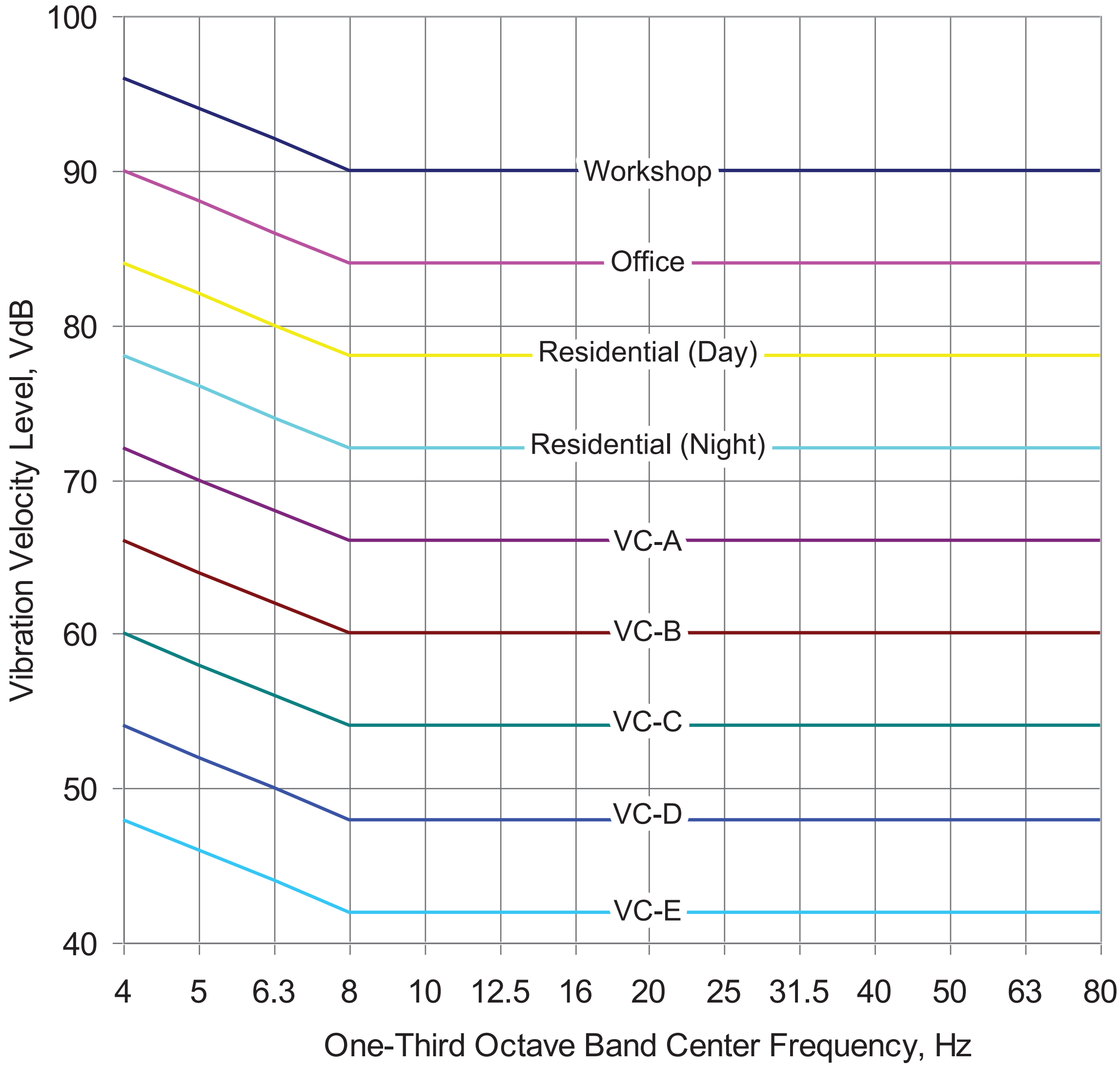
FTA vibration criteria for detailed analysis are presented in terms of 1/3-octave bands as shown in Figure 4.12-10. The projected vibration levels are compared to the spectral criteria curves, and if the applicable curve is not exceeded, then no impact is projected to occur. For example, the criterion curve for residences (night) is 72 VdB above 8 Hz. Below 8 Hz the sensitivity of humans decreases as reflected in the higher threshold, although below 8 Hz transit systems typically produce little vibration.

Interpretation of the various vibration criteria levels shown in Figure 4.12-10 are presented below in Table 4.12-5. Frequency band levels that exceed a particular criterion curve indicate the need for mitigation. The frequency range(s), over which the exceedance occurs, is important for determining the type and extent of mitigation. To be effective, the vibration mitigation must be able to reduce the vibration levels to achieve criteria over the frequency range of exceedance. In general, the lower the frequency at which exceedance occurs, the more difficult it is to mitigate vibration impacts and more substantial are the measures necessary to accomplish the reductions.

Table 4.12-5: Interpretation of Vibration Criteria for Detailed Analysis

Criterion Curve	Max L_v (VdB)[a]	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas.
Residential Day	78	Barely feelable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night, Operating Rooms	72	Vibration not feelable, but groundborne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity.
VC-A	66	Adequate for medium-to high-power optical microscopes (400X), microbalances, optical balances, and similar specialized equipment.
VC-B	60	Adequate for high-power optical microscopes (1000X), inspection and lithography equipment to 3 micron line widths.
VC-C	54	Appropriate for most lithography and inspection equipment to 1 micron detail size.
VC-D	48	Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capability.
VC-E	42	The most demanding criterion for extremely vibration-sensitive equipment.

[a] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 Hz.
L_v = vibration velocity level



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Source: Wilson Ihrig Associates, 2016.

Figure 4.12-10
Criteria for Detailed Vibration Analysis
VTA's BART Silicon Valley–Phase II Extension Project

4.12.3 Methodology

An *adverse effect* would be a change in the cumulative noise level that would cause a substantial percentage of people to be highly annoyed by project-related noise. For train operational noise only, each the levels of effect generally correspond to the impacts levels of *No Impact, Moderate Impact,* and *Severe Impact.* For other noise sources such as surface traffic and ancillary facility, terms such as *no effect*, *no adverse effect*, and *adverse effect* are used.

4.12.3.1 Transit Operations

Transit vehicle operations produce airborne noise that is projected to the wayside when tracks are above grade and can produce groundborne noise and/or vibration inside adjacent buildings for alignment segments that are in a tunnel, if the buildings are close enough and other conditions are conducive to these phenomena. The FTA Guidance Manual provides methodologies for predicting levels of noise and vibration for both configurations. Section 3.3 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the parameters used in the noise analysis (wayside train noise) for above-grade operations. The key parameters for BART train wayside noise analysis are summarized in Table 4.12-6. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model parameters.

Table 4.12-6: Summary of Key Parameters for BART Train Wayside Noise Analysis

Parameter	2035 Forecast Year
Reference Sound Exposure Level (SEL_{ref}) at 50 feet[a]	82 dBA
Number of cars per train (N_{pk}) during peak hours	10
Average number of cars per train (N_d) during the daytime (between 7 a.m. and 10 p.m.)	10
Average number of cars per train (N_n) during the nighttime (between 10 p.m. and 7 a.m.)	10
Peak hour volume of trains (V_{pk}) – one direction	10
Off-peak hour volume of trains (V_{opk}) – one direction	3
Peak hours service	6 a.m.–7:30 p.m.
Off-peak hours of service	4 a.m.–6 a.m. and 7:30 p.m.–1 a.m.
Average hourly daytime volume of trains (V_d) (between 7 a.m. and 10 p.m.) – one direction	8.83
Average hourly nighttime volume of trains (V_n) (between 10 p.m. and 7 a.m.) – one direction	2.78
Maximum train speed (S)	70 mph
Track type (e.g., welded, jointed)	Welded

[a] The FTA Guidance Manual provides a reference Sound Exposure Level (SEL) of 82 dBA for a single transit car traveling at 50 mph on ballast-and-tie track at a distance of 50 feet from the receptor. Specific wayside noise data have been measured for the BART system over the past years and have been used for previous BART extensions and have been found to be consistent with this noise emission level.

Prediction Model for Transit Vehicle Wayside Noise

The FTA Guidance Manual provides a detailed methodology for modeling airborne train noise, which is often referred to as wayside noise. Depending on the adjoining land use, projections of wayside noise are either based on an exposure over one hour (L_{eq}) or a daily exposure (L_{dn}). When evaluating noise effects on institutional land uses, the "peak hour" L_{eq} (hour with the greatest number of trains) is used to compare to the FTA criteria. When evaluating residential land uses, the L_{dn} is used to compare to the FTA criteria. The FTA wayside noise model accounts for several factors, such as the speed and length of each train and any noise shielding topography and sound walls. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

The FTA Guidance Manual provides a reference Sound Exposure Level (SEL) of 82 dBA for a single transit car traveling at 50 mph at a distance of 50 feet from the receptor. Specific wayside noise data have been obtained for the BART system over the past years and have been used for previous BART extensions. The noise emission level for a BART trains is consistent with the emission level suggested in the FTA Guidance Manual.

Prediction Model for Transit Vehicle Groundborne Vibration

The methodology used for predicting interior groundborne vibration and noise levels from future transit train operations was developed during an extensive research project conducted for the United States Department of Transportation. The methodology is discussed in detail in *A Prediction Procedure for Transportation Groundborne Noise and Vibration* (Nelson and Saurenman 1987). The methodology has been used successfully in the United States for over 30 years to evaluate the environmental effects of groundborne noise and vibration for numerous transit projects. This prediction procedure is the basis for the methodology recommended by in the FTA Guidance Manual. Refer to the *Silicon Valley Rapid Transit Project, Tunnel Segment Design Report* (HMM/Bechtel and Wilson, Ihrig & Associates 2005) for BART Extension–specific data related to vibration and used in the groundborne noise and vibration model.

The prediction methodology is based on the fact that vibration is generated by a train's wheels rolling on steel rails. The resulting vibration is caused by the inherent roughness and irregularities in the rail, which forces the wheels to move up and down, thus imparting a force in the rail. The vibration generated by the resulting forces propagates through the underlying structure of the transit system that supports the track and subsequently into the surrounding soil until it encounters nearby buildings, at which point the vibration is transmitted into the building through its foundation. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

Prediction Model for Transit Vehicle Operational Groundborne Noise

Groundborne noise is the noise generated inside a building due to vibration of the building's interior surfaces such as floors, walls, and ceilings. This vibration causes sound to be radiated inside rooms within the buildings. In the case of the BART Extension, the source of groundborne vibration is the transit system operating in a tunnel. Because groundborne noise is generally characterized by low frequency sound, it is commonly described as a rumble such as one might hear from a subway train in a large city. The level of groundborne noise in a particular room is affected by the level of vibration of the room's surfaces and the amount of acoustic absorption in the room. Section 3.3.4 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* provides the derivation of the groundborne noise and vibration prediction model.

4.12.4 Environmental Consequences

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.12.3, *Methodology*.

4.12.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements in the study area (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). There would be a general increase in traffic associated with the No Build Alternative due to increased population and development in the region. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse noise and vibration effects. Several of these projects have already been programmed in the Regional Transportation Plans. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

4.12.4.2 BART Extension Alternative

Wayside Noise Impacts from Train Operations

Airborne noise impacts from train operations can occur where trains are running on track aboveground, at ventilation facilities where train noise is transmitted to the surface from the tunnel below, and from storage yard tracks and maintenance facility activities.

Wayside Train Noise from At-Grade Alignment

The segment of BART track that is aboveground on at-grade track north of I-880 has the potential to affect sensitive receptors. The tunnel portal is approximately 600 feet north of I-880. Beyond the portal, airborne noise from running trains would be emitted to the wayside on both sides of the alignment. The land use in this area is a mixture of residences, offices, and warehouses. The noise-sensitive receivers in this area are residences; and they are shielded by noise walls along the existing railroad right-of-way or are located approximately 220 feet away. The screening distance for a rail rapid transit system is 700 feet. In this particular circumstance the screening distance for BART is 220 feet. The noise walls are estimated to be from 10 to 12 feet high, and provide a substantial amount of noise reduction from existing railroad operations.

Table 4.12-7 presents the projected wayside noise levels for ground-floor receivers. Wayside noise for these receivers is projected to result in *no effect* for all but one receiver (Candlewood Suites). For the others, the projected increase is 0.8 dBA or less and the threshold for Moderate Impact for these receptors is 1.2 or greater based on existing ambient noise ranges from 62 to 67 dBA.

With an existing L_{dn} of 65 dBA at Candlewood Suites, the threshold for Moderate Impact is 1.4 dBA. The increase in noise level for this receptor is projected to be 2 dBA. The mitigation policy adopted for the BART Extension is to mitigate Moderate Impacts only when the increase in noise levels is greater than 5 dBA. Therefore, no mitigation is required for this impact.

Table 4.12-8 presents the projected wayside noise levels for second-story receivers. For second story receivers, wayside noise is projected to impact two receivers (Dahlia Loop SFR complex and Candlewood Suites) with Moderate Impacts. The threshold for Moderate Impact for Dahlia Loop SFR is 1.2 dBA. The increase in noise level at the second story of this receptor is 1.7 dBA. For Candlewood Suites, the increase in noise level is projected to be 2 dBA. Because the mitigation policy adopted for the BART Extension is to mitigate Moderate Impacts only when the increase in noise levels is greater than 5 dBA, no mitigation is proposed.

Table 4.12-7: First-Story, Wayside Noise Impacts from Train Operations

Civil Station	Receiver Location	Track Direction	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Estimated Sound Wall Height (feet)	Existing Ambient L_{dn} (dBA)	Future L_{dn} (dBA)	Increase Level (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type	# of Impacted Receptors
826	697 Hamline S	S1	MFR	67	690	--	67	67.0	0.0	1.2	NI	--
829	Stockton Ave East of Alignment	S1	SFR	67	660	--	67	67.1	0.1	1.2	NI	--
835	Campbell Ave	S2	SFR	67	750	--	62	62.1	0.1	1.7	NI	--
835	Newhall and Elm St SFR	S2	SFR	67	430	--	62	62.2	0.2	1.7	NI	--
834 to 845	De Altura Commons	S2	SFR	67	235	10	64	64.8	0.8	1.5	NI	--
846 to 853	Dahlia Loop SFR	S2	SFR	67	223	12	64	64.5	0.5	1.5	NI	--
855 to 860	1270 Campbell Ave	S2	MFR	45	270	10	64	64.5	0.5	1.5	NI	--
871	Candlewood Suites Hotel	S2	HOTEL	45	290	--	65	67.0	2.0	1.4	MI	1

CL = Center Line
NB = Northbound side of alignment
SB = Southbound side of alignment
MFR = Multifamily residence
SFR = Single family residence
NI = No Impact
MI = Moderate Impact

Table 4.12-8: Second-Story, Wayside Noise Impacts from Train Operations

Civil Station	Receiver Location	Track Direction	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Estimated Sound Wall Height (feet)	Existing Ambient L_{dn} (dBA)	Future L_{dn} (dBA)	Increase Level (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type	# of Impacted Receptors
834 to 845	De Altura Commons, 2nd Floor	S2	SFR	67	235	10	67	68.3	1.3	1.2	MI	26
846 to 853	Dahlia Loop SFR, 2nd Floor	S2	SFR	67	223	12	67	68.7	1.7	1.2	MI	14
855 to 860	1270 Campbell Ave, 2nd Floor	S2	MFR	45	270	10	67	68.2	1.2	1.2	NI	--
871	Candlewood Suites Hotel, 2nd Floor	S2	HOTEL	45	290	--	65	67.0	2.0	1.4	MI	1

CL = Center Line
NB = Northbound side of alignment
SB = Southbound side of alignment
MFR = Multifamily residence
SFR = Single family residence
NI = No Impact
MI = Moderate Impact

Airborne Noise Impacts from Motor Vehicle Traffic

Traffic noise would increase over the existing ambient conditions due to an increase in the volume of traffic. The magnitude of increase in noise is proportional to the increase in traffic as presented in Chapter 7, Section 7.1.4, *Cumulative Environmental Impacts*. For the BART Extension Alternative, traffic associated with BART stations would also contribute to ambient noise in the future. However, the increase in noise both for the No Build Alternative and the BART Extension Alternative is projected to be relatively small and would result in *no adverse effect*, and no mitigation would be required. The increase in noise was quantified on a cumulative basis and is presented in Chapter 7, *Other NEPA and CEQA Considerations*.

Ancillary Facilities

BART ancillary facility noise impacts were analyzed in a memorandum prepared by Wilson, Ihrig & Associates (2006). Additional ambient noise measurements were performed in 2008 and 2014 and confirmed that the background noise level had not changed significantly. Therefore, the analysis from 2006 still was valid. Ancillary facilities include tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators. Analyses for ventilation shafts at the Santa Clara and 13th Street and Stockton Avenue were reevaluated in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report.* The results of these analyses are summarized below and assume all ancillary facilities are above ground for both tunnel options as a worst case for noise impacts. If some of the facilities are located underground, they would be within the Single-Bore tunnel or within the Twin-Bore station box.

Tunnel Ventilation Shafts

Emergency Ventilation Fan Noise

Untreated ventilation shafts and ventilation structures could produce a noise level of 67 to 77 dB at 50 feet. This could result in exceedance of the City of San Jose's noise limit of 55 dBA at residences located within 200 to 630 feet of these facilities. With implementation of Mitigation Measure NV-A the impact would be reduced and there would be *no adverse effect*.

Mitigation Measure NV-A: Implement N~~n~~oise Reduction Treatments at Ancillary Facilities

The contractor will implement n~~N~~oise reduction treatments ~~will be implemented~~ at ancillary facilities such as tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators such that noise levels comply with applicable Cities of San Jose and Santa Clara noise criteria at nearby developed land uses. Treatments that will be implemented, if necessary, include but are not limited to:

- Sound attenuators and acoustical absorptive treatments in ventilation shafts and facilities.

- Sound attenuators for the tunnel emergency ventilation fans.
- ~~p~~Perimeter noise walls (nominally an 8--~~fee~~oot--high wall) placed around emergency generators.

Train Noise

Noise from BART trains operating in the subway tunnels can be transmitted to the surface via the ventilation shafts.

Santa Clara and 13th Streets Ventilation Facility

Long-term ambient noise measurements were conducted near the Santa Clara and 13th Streets Ventilation Facility in 2008. Ambient noise measurements were conducted in 2015 at two of the same locations studied in 2008. Table 4.12-9 summarizes the results of the 2008 and 2015 ambient noise measurements. Measurement locations are depicted in Figure 4.12-6.

Table 4.12-9: Ambient Noise in Santa Clara and 13th Street Neighborhood

Measurement Location Label	Ambient L_{dn} (dBA)				
	2008		2015		Ambient Used in Analysis
	Range	Average	Range	Average	
A	61–62	61.5	--	--	62
B	70–71	70.5	67	67	71
C	62–64	63	62–63	62.5	63
E	64–67	65.5	--	--	66
H	59–60	59.5	--	--	60
I	61–64	62.5	--	--	63

The ambient noise at Location B was measured to be 3.5 dBA lower in 2015 than in 2008. The ambient noise at Location C did not change. Because higher existing ambient noise levels are more critical (more likely to require mitigation) and there is no consistent trend, the greater of the ambient readings from 2008 and 2015 was used in the impact analysis to characterize the ambient noise at the six locations.

There are two noise sources associated with ventilation facilities: noise from trains running in the tunnel and the testing of emergency ventilation fans. Trains run continuously during revenue hours and have potential for impacting ambient noise over the course of a day.

Table 4.12-10 presents the projected noise from train noise exiting the tunnel from the ventilation shaft. The train noise emitted from the Santa Clara/13th Street ventilation shaft is minimal. No noise impacts are projected to occur from this source of operational noise. Therefore, no mitigation is required for train noise that exits the tunnel from the ventilation shaft.

Table 4.12-10: Airborne Train Noise from Santa Clara/13th Street Ventilation Structure

Civil Station	Receiver Location Address	Land Use	Vehicle Speed (mph)	Distance to Vent Structure (feet)	Existing Ambient L_{dn}/L_{eq} (dBA)	Total L_{dn}/L_{eq} (dBA)	Increase over Existing Ambient (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type
657	30 N 13th St	MFR	67	85	67	67.1	0.1	1.2	NI
658	602 Santa Clara St - Indian Health Center of Santa Clara Valley	Institutional	67	145	69	69.0	0.0	1.1	NI
658	28 S 13th St	SFR	67	280	63	63.0	0.0	1.6	NI
660	29 S 13th St - Duong Bich-Hai Thi, DDS	Institutional	67	260	63	63.0	0.0	1.6	NI
660	26 S 12th St	SFR	67	250	63	63.0	0.0	1.6	NI
661	551 Santa Clara St - Holistic Health Care Clinic (Chiropractic)	Institutional	67	80	69	69.1	0.1	1.1	NI
661	32 N 12th St	MFR	67	100	66	66.1	0.1	1.3	NI
662	15 S 12th St	SFR	67	270	64	64.0	0.0	1.5	NI
663	12 S 11th St	MFR	67	395	64	64.0	0.0	1.5	NI
665	32 N 11th St	MFR	67	360	66	66.0	0.0	1.3	NI

MFR = Multifamily residence
SFR = Single family residence
NI = No Impact

Stockton Avenue Ventilation Facility

Long-term ambient measurements were conducted near the site of the Stockton Avenue Ventilation Facility in 2008 to characterize the existing conditions. In 2015, ambient noise measurements were repeated at three of the four locations to determine changes that might have occurred. Table 4.12-11 summarizes the results of the 2008 and 2015 ambient noise measurements. Measurement locations are depicted in Figure 4.12-7.

Table 4.12-11: Ambient Noise in Stockton Avenue Neighborhood

Measurement Location Label	Ambient L_{dn} (dBA)				
	2008		2015		Ambient Used in Analysis
	Range	Average	Range	Average	
L	66–68	67	68–70	69	69
N	64–66	65	69–70	69.5	70
O	60–63	61.5	--	--	62
P	67–70	68.5	68–70	69	69

The ambient noise levels at Location N increased by 4.5 dBA. Because higher existing ambient noise levels are more critical (more likely to require mitigation) and there is no consistent trend, the greater of the ambient readings from 2008 and 2015 was used in the impact analysis to characterize the ambient noise at the four locations.

Table 4.12-12 presents the projected noise from train noise exiting the tunnel from the ventilation shaft. The train noise emitted from the Stockton ventilation shaft is minimal. No noise impacts are projected to occur for this source of operational noise. Therefore, no mitigation is required for train noise that exits the tunnel from the ventilation shaft.

Table 4.12-12: Airborne Train Noise from Stockton Ventilation Shaft

Civil Station	Receiver Location Address	Land Use	Vehicle Speed (mph)	Distance to Vent Structure (feet)	Existing Ambient L_{dn} / L_{eq} (dBA)	Total L_{dn} / L_{eq} (dBA)	Increase over Existing Ambient (dBA)	Moderate Impact Increase Threshold (dBA)	Impact Type
782	701 Harding Ave	SFR	67	345	70	70.0	0.0	1.0	NI
784	551 Stockton Ave	SFR	67	195	70	70.0	0.0	1.0	NI
785	599 Stockton Ave	SFR	67	115	70	70.0	0.0	1.0	NI
787	733 Schiele Ave	SFR	67	250	63	63.0	0.0	1.6	NI
788	623 Stockton Ave	SFR	67	165	69	69.0	0.0	1.1	NI
788	635 Stockton Ave	SFR	67	180	69	69.0	0.0	1.1	NI
789	641 Stockton Ave	SFR	67	140	69	69.0	0.0	1.1	NI
794	647 Stockton Ave	SFR	67	120	69	69.0	0.0	1.1	NI
796	759 Villa St	SFR	67	330	62	62.0	0.0	1.7	NI
796	745 W Taylor St	SFR	67	340	63	63.0	0.0	1.6	NI
797	727 Stockton Ave	SFR	67	400	70	70.0	0.0	1.0	NI

SFR = Single family residence
NI = No Impact

Pressure Relief Shaft

The ventilation shafts act as pressure relief shafts as well. The ventilation shafts will have large emergency ventilation fans. Based on previous BART projects, the sound attenuators that would be required to reduce the noise from tunnel emergency ventilation fans would be more than adequate to reduce the sound of trains. Introducing two silencers in the pressure relief shaft as specified in Mitigation Measure NV-A (one to control noise within the tunnel and station, the other to control noise at the surface) can reduce the train noise by more than 15 dBA. Accordingly, there will be *no adverse effect* from train sound that travels through the shaft.

Traction Power Substations

Based on previous BART projects (e.g., BART SFO) Traction Power Substations (TPSS) that are beyond 250 feet from residences will not require noise mitigation, as they are projected to result in No Impact based on the criteria used. There are TPSS that lie within 250 feet of receptors at the Downtown San Jose West and Diridon Station South and North Options. The TPSS at the Downtown San Jose West Station is on the corner of Santa Clara Street and 3rd Street. There are multi-family residential uses within 250 feet to the north of the TPSS location. At the Diridon Station South Option, the TPSS is on the west side of the station between Autumn Street and Los Gatos Creek. The TPSS is on the southeast corner of the station at the Diridon Station North Option on Autumn Street. There is a single-family residence within 250 feet of both the Diridon Station South and North Options' TPSS. Tables 4.12-13 through 4.12-15 summarize the noise analysis at each location. The FTA Guidance Manual provides a reference L_{max} noise level of 63 dBA for substations with an analysis of the closest receptor at each location. Using a noise level criterion of 55 dBA, there is one projected impact each at the Downtown San Jose West and Diridon Station South and North Options. With implementation of Mitigation Measure NV-A the impact would have *no adverse effect*.

Older residential uses are just behind the retail uses along Santa Clara Street. The San Jose State University campus is one block south of Santa Clara Street between 4th and 10th Streets. The San Jose Civic Plaza, including San Jose City Hall, is south of Santa Clara Street, between 4th and 6th Streets. The Museum of Art, Plaza de Cesar Chavez, St. Joseph's Cathedral, San Pedro Square, and several theaters and major hotels are near the new station locations. Low- and medium-density residential uses are to the north of Santa Clara Street, just outside of downtown San Jose.

Table 4.12-13: Predicted TPSS Noise Levels Near the Downtown San Jose West Station

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
97 Santa Clara St	MFR	20	71.0	55	Impact
101 Santa Clara St	MFR	125	55.0	55	No Impact
60 N 3rd St	MFR	175	52.1	55	No Impact
100 Santa Clara St	MFR	166	52.6	55	No Impact
126 Santa Clara St	MFR	220	50.1	55	No Impact
20 S 2nd St	MFR	210	50.5	55	No Impact
MFR = Multifamily residence					

Table 4.12-14: Predicted TPSS Noise Levels Near the Diridon Station South Option

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
35 S Autumn St	Single-family residence	90	57.9	55	Impact

Table 4.12-15: Predicted TPSS Noise Levels Near the Diridon Station North Option

Receptor	Land Use	Distance to TPSS (feet)	Projected Maximum Noise Level (dBA)	Impact Threshold (dBA)	Impact Type
35 S Autumn St	Single-family residence	90	57.9	55	Impact

Emergency Backup Generators

Emergency backup generators would be located at the Alum Rock/28th Street and Downtown San Jose Stations. Generators for Phase II would be expected to be quieter than existing generators on the BART system and are typically located within enclosures that reduce noise levels.

Alum Rock/28th Street Station Generator

The Alum Rock/28th Street Station generator would be located at grade, within a concrete structure. Although specific details on the size of the generator are not available it is anticipated that noise from operation of the generator could exceed 55 dBA at nearby receptors and result in an adverse effect. With implementation of Mitigation Measure NV-A this impact would have *no adverse effect*.

Downtown San Jose Station Generator

The generator for the Downtown San Jose Station would be fully enclosed by the station structure. Although specific details on the size of the generator are not available, it is anticipated that noise from operation of the generator could exceed 55 dBA at nearby receptors and result in an adverse effect. With implementation of Mitigation Measure NV-A this impact would have *no adverse effect*.

Newhall Maintenance Facility

The Newhall Maintenance Facility were studied in 2006 as part of the preliminary engineering design process. The Newhall Maintenance Facility location and usage have not changed significantly since 2006. Therefore, the previous noise analysis (ATS Consulting 2006a, 2006b) conclusions remain valid, and there would be *no effect* on noise from train activity within the yard or from facility activity. Accordingly, no mitigation would be required.

4.12.4.3 Groundborne Noise and Vibration Impacts from Operations

The groundborne noise and vibration impacts along the tunnel alignment were evaluated using the FTA criteria. All residential land uses identified along the alignment were treated individually in the groundborne noise and vibration prediction model. Institutional land uses (e.g., schools) were also treated individually in the calculations. The Screening Distance for groundborne noise and vibration for a rail rapid transit system such as BART is 200 feet.

At-grade Segment

All sensitive receptors adjacent to the at-grade segment of the alignment, which starts approximately 600 feet north of I-880, would be over 200 feet (i.e., 223 feet and greater) from the nearest track. The Screening Distance for a rail rapid transit system such as BART is 200 feet. Consequently, no groundborne noise and vibration impacts would be expected for the at-grade segment.

Tunnel Segment

The projected levels of groundborne noise and vibration for BART train operations within the tunnel were calculated using the vibration prediction models described in Section 4.12.3.1, *Transit Operations*, and the measured data in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report.*

Groundborne vibration and groundborne noise levels are presented as a range of projected values reflecting the use of a modeling factor, which conservatively accounts for the various uncertainties in the model. The levels at each receptor location are based on distance to and depth of the track, train design speed, wheel/rail interaction forces, dynamic characteristics of rail support system, soil conditions, and the dynamic response of the receptor building. The baseline analysis (i.e., before mitigation) assumes a rail support system that is referred to as a resiliently supported tie (RST) system with a standard pad stiffness similar to the design implemented on the BART Colma Extension. Determinations of noise and vibration impacts are based on the upper value of the predicted range.

Twin-Bore Option

No vibration impacts are projected for the tunnel alignment when the predicted levels of vibration are compared to the FTA 1/3-octave band criteria. Refer to Tables 4.8 through 4.10 in *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report* for the projected levels of groundborne vibration for the Twin-Bore Option. The analysis does indicate that groundborne noise levels are projected to exceed the FTA criteria (35 dBA for residences and 40 dBA for institutional uses) for many receptors, as shown in Tables 4.12-16 through 4.12-20. Groundborne noise mitigation has been evaluated for those receptors indicated as potentially impacted.

Where the unmitigated groundborne noise levels from the prediction model exceed the FTA criteria, the use of an Isolated Slab Track (IST) (Mitigation Measure NV-B) was evaluated. This type of mitigation can be installed at track level to reduce vibration transmitted into the tunnel invert, thereby reducing vibration that would otherwise be emitted from the tunnel structure into the surrounding soil. This method has been used extensively in Europe with various degrees of effectiveness depending on the design to reduce higher frequency vibration and would be effective at reducing groundborne noise from the BART system operations.

An IST can also be used with special trackwork (i.e., crossover). The IST system is constructed with a continuous elastomeric mat instead of discrete elastomeric pads that are typically used for an FST system. An IST can be designed to provide from 10 to 13 dBA of noise reduction.

Tables 4.12-16 through 4.12-20 indicate whether an impact is projected with standard track design (i.e., standard RST) and where an IST would be needed as mitigation. Tables 4.12-21 through 4.12-25 indicate where mitigation is required. Depending on the options selected, 20,600–22,700 linear feet of IST groundborne mitigation would be required.

Table 4.12-16: Groundborne Noise Mitigation -Twin-Bore Option Alignment

S1 Track	S2 Track
617+50 to 638+75	618+00 to 639+50
645+75 to 656+00	646+25 to 656+50
662+25 to 677+50	663+00 to 678+00
For Downtown San Jose Station East and West Options see Tables 4.12-17 and 4.12-18, respectively	
708+00 to 713+00	708+50 to 713+50
For Diridon Station South and North Options see Tables 4.12-19 and 4.12-20, respectively	
782+00 to 802+75	783+00 to 803+75
Total IST: 14,500 feet	
IST = Isolated Slab Track	

Table 4.12-17: Groundborne Noise Mitigation - Twin-Bore, Downtown San Jose Station East Option

S1 Track	S2 Track
682+25 to 695+50	682+75 to 696+00
Total IST: 2,650 feet	
IST = Isolated Slab Track	

Table 4.12-18: Groundborne Noise Mitigation - Twin-Bore, Downtown San Jose Station West Option

S1 Track	S2 Track
692+00 to 697+50	692+50 to 698+00
Total IST: 1,100 feet	
IST = Isolated Slab Track	

Table 4.12-19: Groundborne Noise Mitigation – Twin-Bore, Diridon Station South Option

S1 Track	S2 Track
744+25 to 761+75	744+75 to 763+00
767+25 to 773+25	769+00 to 774+50
777+75 to 782+00	779+00 to 783+00
Total IST: 5,550 feet	
IST = Isolated Slab Track	

Table 4.12-20: Groundborne Noise Mitigation – Twin-Bore, Diridon Station North Option

S1 Track	S2 Track
745+75 to 758+75	746+50 to 760+00
761+50 to 769+25	762+75 to 770+50
773+00 to 777+00	774+00 to 778+00
Total IST: 5,000 feet	
IST = Isolated Slab Track	

With implementation of Mitigation Measure NV-B, impacts would have *no adverse effect.*

Mitigation Measure NV-B: Reduce G~~g~~roundborne N~~n~~oise L~~l~~evels

The contractor will implement an Isolated Slab Track (IST) as ~~T~~the mitigation strategy for groundborne noise ~~is an Isolated Slab Track (IST)~~.~~,~~ An IST is a form of floating slab track (FST). The IST system is constructed with a continuous elastomeric mat instead of discrete elastomeric pads that are typically used for an FST system. An IST can be designed to provide from 10 to 13 dBA of noise reduction. ~~Mitigation Measure NV-B~~This strategy can also be used under a crossover. The locations for implementing this ~~mitigation~~ measure are shown in Tables 4.12-21 through 4.12-25. The project's final design will determine t~~T~~he specific mitigation ~~strategy~~strategy, which ~~will be determined in final design and~~ could include alternative strategies that similarly achieve the FTA groundborne noise criteria.

Table 4.12-21: Projected Levels of Groundborne Noise for Twin-Bore Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
584	433 N 33rd St	MFR	48	156	54	35	20 to 24	--	--
585	1500 Marburg Way	SFR	48	0	52	35	24 to 28	--	--
590	333 N 33rd St - Anne Darling Elementary School	Institutional	48	155	49	40	20 to 24	--	--
593	290 N 31st St	SFR	48	184	50	35	25 to 29	--	--
595	269 N 31st St	SFR	48	53	50	35	29 to 33	--	--
595	263 N 31st St	SFR	48	120	50	35	27 to 31	--	--
595	261 N 31st St	SFR	48	125	50	35	27 to 31	--	--
610	~~5~~ Five Wounds Lane ~~–~~-Five ~~5~~ Wounds School	Institutional	48	280	49	40	21 to 25	--	--
610	Five Wounds Portuguese National Church	Institutional	48	290	49	40	21 to 25		
614	24 N 26th St - SF Nova Alliance Community Center	Institutional	48	0	50	40	35 to 39	--	--
615	26 N 26th St	SFR	48	150	52	35	30 to 34	--	--
617	23 N 26th St	SFR	48	140	52	35	31 to 35	--	--
618	1245 Santa Clara St - Alum Rock Counseling Center	Institutional	48	0	52	40	33 to 37	--	--
618	9 S 26th St	SFR	48	178	52	35	29 to 33	--	--
619	30 N 25th St	SFR	48	200	53	35	28 to 32	--	--
619	20 N 25th St	SFR	48	160	53	35	21 to 25	--	--
619	1236 Santa Clara St	SFR	48	68	53	35	29 to 33	--	--
619	1241 Shortridge Ave	MFR	48	197	53	35	21 to 25	--	--
619	1211 Santa Clara St	MFR	48	21	53	35	35 to 39	4	23 to 27
619	1226 Santa Clara St	SFR	48	68	53	35	36 to 40	1	25 to 29
620	1220 Santa Clara St - Sociedad Filharmonica	Institutional	48	45	53	40	31 to 35	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
620	1210 Santa Clara St	SFR	48	35	53	35	39 to 43	1	28 to 32
622	45 N 25th St	SFR	48	171	55	35	29 to 33	--	--
622	16 S 24th St	SFR	48	114	55	35	32 to 36	1	22 to 26
623	1169 Santa Clara St	SFR	48	60	56	35	37 to 41	1	26 to 30
623	1161 Santa Clara St	SFR	48	70	56	35	29 to 33	--	--
623	16 N 24th St	SFR	48	90	56	35	34 to 38	1	23 to 27
624	11 S 24th St	SFR	48	137	56	35	22 to 26	--	--
625	13 Carnegie Sq	SFR	48	149	56	35	30 to 34	--	--
626	1102 Santa Clara St - East San Jose Carnegie Branch Library	Institutional	48	25	57	40	33 to 37	--	--
627	1115 Santa Clara St - Portuguese Community Center	Institutional	48	45	57	40	31 to 35	--	--
627	11 S 23rd St	MFR	48	132	57	35	23 to 27	--	--
627	15 S 23rd St	SFR	48	163	57	35	30 to 34	--	--
627	9 S 23rd St	MFR	48	103	57	35	24 to 28	--	--
627	1098 Santa Clara St - Casa Do Benfica	Institutional	48	18	57	40	33 to 37	--	--
628	1082 Santa Clara St	MFR	48	19	57	35	35 to 39	5	23 to 27
628	16 S 22nd St	SFR	48	119	57	35	32 to 36	1	22 to 26
628	1072 Santa Clara St	MFR	48	19	57	35	35 to 39	10	23 to 27
629	1075 Santa Clara St - Santa Clara County Multi Service Center	Institutional	48	85	58	40	28 to 32	--	--
630	15 S 22nd St	SFR	48	160	58	35	30 to 34	--	--
630	1050 Santa Clara St - Daniel B Martinez, MD	Institutional	48	37	58	40	39 to 43	1	27 to 31
631	1049 Santa Clara St	SFR	48	72	58	35	36 to 40	1	25 to 29
631	1026 Santa Clara St	SFR	48	45	58	35	38 to 42	1	27 to 31
631	1047 Santa Clara St	SFR	48	70	58	35	36 to 40	1	25 to 29
632	8 S 21st St	SFR	48	140	59	35	31 to 35	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
633	16 N 21st St	SFR	48	135	59	35	31 to 35	--	--
633	19 S 21st St	SFR	48	160	59	35	30 to 34	--	--
633	990 Santa Clara St - Trinh Hung Quoc, MD	Institutional	48	60	59	40	37 to 41	1	26 to 30
634	20 S 20th St	SFR	48	181	60	35	29 to 33	--	--
635	966 Santa Clara St	MFR	48	56	60	35	31 to 35	--	--
636	19 S 20th St	SFR	48	222	61	35	24 to 28	--	--
637	961 Santa Clara St -- Roosevelt Youth Center	Institutional	48	0	62	40	30 to 34	--	--
637	901 Santa Clara St - Roosevelt Youth Center	Institutional	48	0	62	40	30 to 34	--	--
640	896 Santa Clara St	MFR	48	150	67	35	26 to 30	--	--
640	884 Santa Clara St	MFR	48	200	67	35	24 to 28	--	--
644	802 Santa Clara - Fire Station - Battalion 1	MFR	67	110	65	35	31 to 35	--	--
645	90 N 17th St	SFR	67	240	65	35	25 to 29	--	--
647	765 Santa Clara St	Institutional	67	0	65	35	33 to 37	1	22 to 26
648	765 Santa Clara St	Institutional	67	0	63	40	43 to 47	1	30 to 34
648	10 N 16th St	Institutional	67	0	63	40	43 to 47	1	30 to 34
649	675 Santa Clara St	Hospital	67	0	62	35	35 to 39	1	23 to 27
649	748 Santa Clara St	MFR	67	95	62	35	31 to 35	--	--
649	31 S 16th St	SFR	67	236	62	35	18 to 22	--	--
651	22 S 15th St	SFR	67	218	58	35	25 to 29	--	--
651	716 Santa Clara St	MFR	67	100	58	35	31 to 35	--	--
651	675 Santa Clara St	Hospital	67	0	58	35	30 to 34	--	--
652	12 S 15th St #206 - Bay Area College of Nursing: Cagampan Bu	Institutional	67	78	58	40	27 to 31	--	--
654	25 S 15th St - Dr Viet-Hong Bui	Institutional	67	59	57	40	29 to 33	--	--
654	678 Santa Clara St - Buena Vista Eyecare Group	Institutional	67	54	57	40	36 to 40	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
655	652 Santa Clara St - Elite Dental	Institutional	67	48	56	40	37 to 41	1	25 to 29
656	25 N 14th St #Ste 55 - Norcal Care	Institutional	67	19	56	40	30 to 34	--	--
657	30 N 13th St	MFR	67	122	57	35	22 to 26	--	--
658	602 Santa Clara St - Indian Health Center of Santa Clara Vall	Institutional	67	31	57	40	33 to 37	--	--
658	28 S 13th St	SFR	67	171	57	35	26 to 30	--	--
660	55 N 13th St - Ming Li, MD	Institutional	67	119	57	40	29 to 33	--	--
660	26 S 12th St	SFR	67	169	57	35	26 to 30	--	--
660	29 S 13th St - Duong Bich-Hai Thi, DDS	Institutional	67	169	57	40	26 to 30	--	--
661	551 Santa Clara St - Holistic Health Care Clinic (Chiropractic)	Institutional	67	31	57	40	33 to 37	--	--
661	32 N 12th St	MFR	67	196	57	35	18 to 22	--	--
662	15 S 12th St	SFR	67	128	56	35	29 to 33	--	--
663	12 S 11th St	MFR	67	146	56	35	28 to 32	--	--
665	32 N 11th St	MFR	67	182	54	35	19 to 23	--	--
665	478 Santa Clara St - Santa Clara Dental	Institutional	67	29	54	40	41 to 45	1	28 to 32
667	35 N 11th St	MFR	67	180	53	35	25 to 29	--	--
667	23 S 11th St	SFR	67	167	53	35	26 to 30	--	--
668	471 Santa Clara St - Darling & Fischer Garden Chapel Mortuary	Institutional	67	50	54	40	34 to 38	--	--
668	30 N 10th St	MFR	67	167	54	35	26 to 30	--	--
668	22 S 10th St	MFR	67	167	54	35	26 to 30	--	--
669	11 S 10th St	MFR	67	30	55	35	43 to 47	6	30 to 34
669	25 S 10th St	MFR	67	120	55	35	43 to 47	8	30 to 34
670	425 Elizabeth St	SFR	67	121	55	35	30 to 34	--	--
670	425 Santa Clara St - San Jose Fire Fighters Local 230	MFR	67	33	55	35	42 to 46	1	29 to 33
670	39 N 10th St	SFR	67	168	55	35	26 to 30	--	--

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
670	421 Elizabeth St	SFR	67	121	55	35	30 to 34	--	--
671	417 Elizabeth St	SFR	67	121	54	35	30 to 34	--	--
672	401 Santa Clara St	MFR	67	33	53	35	42 to 46	6	29 to 33
672	24 N 9th St	SFR	67	156	53	35	27 to 31	--	--
672	18 S 9th St	SFR	67	135	53	35	29 to 33	--	--
672	23 S 9th St	MFR	67	166	53	35	26 to 30	--	--
673	390 Santa Clara St	MFR	67	31	53	35	43 to 47	4	29 to 33
674	26 S 8th St	MFR	67	166	53	35	26 to 30	--	--
674	389 Santa Clara St - St. Patrick's Proto-Cathedral	Institutional	67	60	53	40	32 to 36	--	--
675	365 Santa Clara St - Our Lady of La Vang Parish	Institutional	67	65	53	40	31 to 35	--	--
676	25 S 8th St	MFR	67	160	52	35	27 to 31	--	--
677	345 Santa Clara St - 420 Medical Doctor	Institutional	67	40	52	40	42 to 46	1	31 to 35
679	24 S 7th St	MFR	48	200	51	35	22 to 26	--	--
680	1295 Santa Clara St - Horace Mann Elementary	Institutional	48	33	50	40	33 to 37	--	--
For Downtown San Jose Station East and West Options, see Tables 4.12-22 and 4.12-23, respectively									
707	101 Santa Clara St - Chamber of Commerce Silicon Valley	Institutional	33	30	50	40	23 to 27	--	--
709	20 N Almaden Ave		33	29	52	35	32 to 36	10	18 to 22
710	161 Santa Clara St - Masson Apartments	MFR	33	29	53	35	32 to 36	16	19 to 23
712	22 Almaden Ave	MFR	33	144	57	35	29 to 33	--	--
715	233 Santa Clara St - Hotel De Anza	Hotel	33	29	60	35	19 to 23	--	--
716	38 N Almaden Blvd - Axis Apartments	MFR	33	112	63	35	27 to 31	--	--
For Diridon Station South and North Alignment Options, see Tables 4.12-24 and 4.12-25, respectively									
782	762 Harding Ave	SFR	67	285	68	35	32 to 36	1	23 to 27
782	750 Harding Ave	SFR	67	240	68	35	32 to 36	1	23 to 27

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
782	714 Harding Ave	SFR	67	95	68	35	36 to 40	1	25 to 29
782	738 Harding Ave	SFR	67	188	68	35	32 to 36	1	23 to 27
782	701 Harding Ave	SFR	67	35	68	35	39 to 43	1	28 to 32
782	726 Harding Ave	SFR	67	135	68	35	34 to 38	1	24 to 28
784	551 Stockton Ave	SFR	67	35	69	35	38 to 42	1	27 to 31
784	713 Harding Ave	SFR	67	85	69	35	35 to 39	1	25 to 29
784	761 Harding Ave	SFR	67	280	69	35	32 to 36	1	23 to 27
784	749 Harding Ave	SFR	67	235	69	35	32 to 36	1	23 to 27
784	737 Harding Ave	SFR	67	185	69	35	32 to 36	1	23 to 27
784	725 Harding Ave	SFR	67	135	69	35	34 to 38	1	24 to 28
785	714 Schiele Ave	SFR	67	85	70	35	36 to 40	1	26 to 30
785	750 Schiele Ave	SFR	67	245	70	35	32 to 36	1	23 to 27
785	738 Schiele Ave	SFR	67	190	70	35	32 to 36	1	23 to 27
785	726 Schiele Ave	SFR	67	145	70	35	26 to 30	--	--
785	599 Stockton Ave	SFR	67	35	70	35	38 to 42	1	27 to 31
786	762 Schiele Ave	SFR	67	275	70	35	32 to 36	1	23 to 27
787	733 Schiele Ave	SFR	67	170	70	35	32 to 36	1	22 to 26
787	745 Schiele Ave	SFR	67	217	70	35	32 to 36	1	23 to 27
787	757 Schiele Ave	SFR	67	265	70	35	32 to 36	1	23 to 27
788	623 Stockton Ave	SFR	67	50	70	35	37 to 41	1	26 to 30
788	766 Villa Ave	SFR	67	290	70	35	32 to 36	1	23 to 27
788	635 Stockton Ave	SFR	67	55	70	35	37 to 41	1	26 to 30
789	641 Stockton Ave	SFR	67	40	69	35	38 to 42	1	27 to 31
789	647 Stockton Ave	SFR	67	55	69	35	37 to 41	1	26 to 30
790	744 Villa Ave	SFR	67	195	68	35	32 to 36	1	23 to 27
790	756 Villa Ave	SFR	67	240	68	35	32 to 36	1	23 to 27
790	732 Villa Ave	SFR	67	155	68	35	33 to 37	1	24 to 28

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
794	759 Villa St	SFR	67	260	64	35	25 to 29	--	--
795	765 W Taylor St	SFR	67	270	65	35	32 to 36	1	23 to 27
795	755 W Taylor St	SFR	67	235	65	35	32 to 36	1	23 to 27
796	745 W Taylor St	SFR	67	185	66	35	32 to 36	1	23 to 27
796	724 Laurel St	SFR	67	290	66	35	32 to 36	1	23 to 27
797	727 Stockton Ave	SFR	67	60	66	35	30 to 34	--	--
797	733 Stockton Ave	SFR	67	35	66	35	39 to 43	1	28 to 32
798	732 Asbury St	SFR	67	160	63	35	33 to 37	1	23 to 27
798	742 Asbury St	SFR	67	200	63	35	32 to 36	1	23 to 27
798	702 Asbury St	SFR	67	35	63	35	39 to 43	1	28 to 32
798	764 Asbury St	SFR	67	260	63	35	24 to 28	--	--
798	722 Asbury St	SFR	67	120	63	35	34 to 38	1	24 to 28
798	712 Asbury St	SFR	67	80	63	35	37 to 41	1	26 to 30
799	755 Asbury St	SFR	67	245	62	35	32 to 36	1	23 to 27
801	779 Stockton Ave	SFR	67	55	60	35	37 to 41	1	26 to 30

Shaded cells indicate impacts.
CL = Center Line; SFR = Single--Family Residential, MFR = Multi--Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-22: Projected Levels of Groundborne Noise for the Twin-Bore Option – Downtown San Jose Station East Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
683	235 Santa Clara St - Vintage Tower (X-Over)	MFR	48	28	50	35	37 to 41	60	26 to 30
684	24 N 5th St - First United Methodist Church (X-Over)	Institutional	48	28	49	40	42 to 46	1	31 to 35
685	200 Santa Clara St - San Jose City Hall (X-Over)	Institutional	48	33	49	40	41 to 45	1	30 to 34
691	148 Santa Clara St	MFR	48	34	49	35	29 to 33	--	--
691	138 Santa Clara St	MFR	48	34	49	35	29 to 33	--	--
692	134 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	118 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	101 Santa Clara St	MFR	48	27	48	35	31 to 35	--	--
693	100 Santa Clara St	MFR	48	34	48	35	29 to 33	--	--
693	60 N 3rd St - Town Park Towers	MFR	48	203	48	35	12 to 16	--	--
694	97 Santa Clara St	MFR	48	31	49	35	36 to 40	4	23 to 27
697	20 S Second St	MFR	48	141	50	35	24 to 28	--	--
701	15 S 1st St - MFR above Commercial	MFR	48	90	51	35	29 to 33	--	--
701	1 N 1st St - Lincoln Law School	Institutional	48	30	51	40	28 to 32	--	--

Shaded cells indicate impacts.
CL = Center Death; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-23: Projected Levels of Groundborne Noise for Twin-Bore Option – Downtown San Jose Station West Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
683	235 Santa Clara St - Vintage Tower	MFR	48	28	50	35	29 to 33	--	--
684	24 N 5th St - First United Methodist Church	Institutional	48	28	49	40	34 to 38	--	--
685	200 Santa Clara St - San Jose City Hall	Institutional	48	33	49	40	33 to 37	--	--
691	148 Santa Clara St	MFR	48	30	49	35	29 to 33	--	--
691	138 Santa Clara St	MFR	48	30	49	35	29 to 33	--	--
692	134 Santa Clara St (X-Over)	MFR	48	30	48	35	31 to 35	--	--
693	118 Santa Clara St (X-Over)	MFR	48	30	48	35	33 to 37	6	22 to 26
693	101 Santa Clara St (X-Over)	MFR	48	27	48	35	40 to 44	4	28 to 32
693	100 Santa Clara St (X-Over)	MFR	48	30	48	35	38 to 42	3	27 to 31
693	60 N 3rd St - Town Park Towers	MFR	48	203	48	35	12 to 16	--	--
694	97 Santa Clara St (X-Over)	MFR	48	31	49	35	44 to 48	4	31 to 35
697	20 S Second St (X-Over)	MFR	48	141	50	35	27 to 31	--	--
701	15 S 1st St - MFR above Commercial	MFR	48	90	51	35	29 to 33	--	--
701	1 N 1st St - Lincoln Law School	Institutional	48	30	51	40	28 to 32	--	--

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-24: Projected Levels of Groundborne Noise for Twin-Bore Option – Diridon Station South Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
736	35 S Autumn St	SFR	33	35	48	35	30 to 34	-	-
737	56 S Montgomery St - Templo La Hermosa	Institutional	48	189	46	40	27 to 31	-	-
745	88 Bush St - Plant 51	MFR	48	0	49	35	32 to 36	265	20 to 24
748	754 The Alameda - Avalon at Cahill Park	MFR	48	0	49	35	32 to 36	218	20 to 24
750	53 Wilson Ave	SFR	48	80	54	35	26 to 30	-	-
750	51 Wilson Ave	SFR	48	35	54	35	33 to 37	1	22 to 26
750	49 Wilson Ave	SFR	48	0	54	35	36 to 40	1	24 to 28
751	40 Sunol St	MFR	48	90	54	35	25 to 29	-	-
752	34 Sunol St	SFR	48	50	54	35	30 to 34	-	-
752	30 Sunol St	SFR	48	0	55	35	36 to 40	1	24 to 28
752	24 Sunol St	SFR	48	0	56	35	36 to 40	1	24 to 28
753	830 The Alameda	MFR	48	38	56	35	28 to 32	-	-
753	20 Sunol St	SFR	48	0	56	35	36 to 40	1	24 to 28
753	33 Sunol St	SFR	48	85	56	35	26 to 30	-	-
753	27 Sunol St	SFR	48	40	56	35	32 to 36	1	21 to 25
754	24 Cleaves Ave	SFR	48	115	57	35	23 to 27	-	-
756	938 The Alameda - Billy Defrank LGBT Community Center	Institutional	48	125	58	40	17 to 21	-	-
758	925 The Alameda - Lofts on The Alameda	MFR	48	0	62	35	33 to 37	40	20 to 24
759	87 Rhodes Ct	SFR	48	115	64	35	24 to 28	-	-
758	128 Rhodes Ct	SFR	48	250	62	35	20 to 24	-	-
759	152 Rhodes Ct	SFR	48	276	64	35	20 to 24	-	-
759	109 Rhodes Ct	SFR	48	130	64	35	23 to 27	-	-
760	133 Rhodes Ct	SFR	48	107	61	35	25 to 29	-	-
760	157 Rhodes Ct	SFR	48	132	61	35	31 to 35	-	-
760	176 Rhodes Ct	SFR	48	0	61	35	30 to 34	-	-
760	179 Rhodes Ct	SFR	48	151	61	35	21 to 25	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
760	200 Rhodes Ct	SFR	48	0	61	35	30 to 34	-	-
761	176 N Morrison Ave	MFR	48	20	62	35	31 to 35	-	-
761	201 Rhodes Ct	SFR	48	169	62	35	30 to 34	-	-
761	229 Rhodes Ct	SFR	48	186	62	35	30 to 34	-	-
761	204 N Morrison Ave	SFR	48	40	62	35	31 to 35	-	-
761	224 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
761	248 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
762	173 N Morrison Ave	Institutional	48	45	62	40	32 to 36	-	-
762	253 Rhodes Ct	SFR	48	200	62	35	30 to 34	-	-
762	197 N Morrison Ave	SFR	48	30	62	35	31 to 35	-	-
762	225 N Morrison Ave	MFR	48	15	62	35	31 to 35	-	-
762	272 Rhodes Ct	0	48	0	62	35	30 to 34	-	-
762	275 Rhodes Ct	SFR	48	213	62	35	30 to 34	-	-
763	800 W Julian St	0	48	0	62	35	30 to 34	-	-
763	264 N Morrison Ave - Support Systems Homes Recovery Center	MFR	48	40	62	35	31 to 35	-	-
763	295 Rhodes Ct	SFR	48	263	62	35	30 to 34	-	-
763	908 W Julian St	SFR	48	224	62	35	30 to 34	-	-
763	920 W Julian St	SFR	48	182	62	35	30 to 34	-	-
763	936 W Julian St	SFR	48	141	62	35	31 to 35	-	-
764	909 W Julian St	SFR	48	246	62	35	30 to 34	-	-
763	950 W Julian St - Family and Children Services San Jose of	MFR	48	0	62	35	24 to 28	-	-
766	379 N Morrison Ave	SFR	48	70	62	35	31 to 35	-	-
766	962 Cinnabar St	SFR	48	175	62	35	30 to 34	-	-
766	956 Cinnabar St	SFR	48	140	62	35	31 to 35	-	-
766	899 Morrison Park Dr - Avalon Morrison Park	MFR	48	0	62	35	24 to 28	-	-
768	910 Cinnabar St	SFR	48	0	63	35	31 to 35	-	-
768	945 Cinnabar St	SFR	48	110	63	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
768	890 Cinnabar St	SFR	48	0	63	35	31 to 35	-	-
768	927 Cinnabar St	SFR	48	75	63	35	32 to 36	1	23 to 27
768	870 Cinnabar St	SFR	48	29	63	35	31 to 35	-	-
769	909 Cinnabar St	SFR	48	45	63	35	32 to 36	1	23 to 27
769	850 Cinnabar St	SFR	48	62	63	35	32 to 36	1	23 to 27
769	875 Cinnabar St - Cinnabar Commons Apartments	MFR	48	0	63	35	25 to 29	-	-
769	434 N Morrison Ave	SFR	48	150	63	35	30 to 34	-	-
771	417 Stockton Ave	SFR	48	41	62	35	32 to 36	1	22 to 26
772	808 Lenzen Ave	MFR	48	240	63	35	32 to 36	5	24 to 28
773	790 Lenzen Ave	MFR	48	20	63	35	25 to 29	-	-
775	777 Lenzen Ave	SFR	67	278	63	35	24 to 28	-	-
776	476 Lenzen Ct	SFR	67	280	63	35	24 to 28	-	-
778	774 Pershing Ave	SFR	67	310	64	35	32 to 36	1	23 to 27
778	762 Pershing Ave	SFR	67	250	64	35	32 to 36	1	23 to 27
778	489 Stockton Ave	SFR	67	10	64	35	39 to 43	1	28 to 32
778	750 Pershing Ave	SFR	67	210	64	35	32 to 36	1	23 to 27
778	738 Pershing Ave	SFR	67	160	64	35	33 to 37	1	23 to 27
779	726 Pershing Ave	SFR	67	115	65	35	35 to 39	1	25 to 29
779	714 Pershing Ave	SFR	67	70	65	35	37 to 41	1	27 to 31
779	495 Stockton Ave	MFR	67	10	65	35	39 to 43	2	28 to 32
780	749 Pershing Ave	SFR	67	220	65	35	32 to 36	1	23 to 27
780	761 Pershing Ave	SFR	67	270	65	35	32 to 36	1	23 to 27
780	737 Pershing Ave	SFR	67	170	65	35	33 to 37	1	23 to 27
780	711 Pershing Ave	SFR	67	70	65	35	37 to 41	1	27 to 31
780	725 Pershing Ave	SFR	67	120	65	35	34 to 38	1	24 to 28
780	501 Stockton Ave	SFR	67	26	65	35	40 to 44	1	28 to 32

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Table 4.12-25: Projected Levels of Groundborne Noise for Twin-Bore Option – Diridon Station North Option

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
734	35 S Autumn St	SFR	33	270	55	35	24 to 28	-	-
735	56 S Montgomery St - Templo La Hermosa	Institutional	48	450	55	40	21 to 25	-	-
745	88 Bush St - Plant 51	MFR	48	210	58	35	13 to 17	-	-
748	754 The Alameda - Avalon At Cahill Park	MFR	48	25	58	35	33 to 37	218	20 to 24
748	53 Wilson Ave	SFR	48	425	60	35	19 to 23	-	-
748	51 Wilson Ave	SFR	48	375	60	35	19 to 23	-	-
749	49 Wilson Ave	SFR	48	325	61	35	19 to 23	-	-
749	40 Sunol St	MFR	48	420	61	35	19 to 23	-	-
749	34 Sunol St	SFR	48	380	61	35	19 to 23	-	-
749	30 Sunol St	SFR	48	330	61	35	19 to 23	-	-
749	24 Sunol St	SFR	48	280	61	35	19 to 23	-	-
750	830 The Alameda	MFR	48	80	61	35	22 to 26	-	-
750	20 Sunol St	SFR	48	245	61	35	19 to 23	-	-
751	33 Sunol St	SFR	48	400	61	35	19 to 23	-	-
751	27 Sunol St	SFR	48	350	61	35	19 to 23	-	-
752	24 Cleaves Ave	SFR	48	420	62	35	19 to 23	-	-
753	938 The Alameda - Billy Defrank LGBT Community Center	Institutional	48	415	64	40	13 to 17	-	-
755	925 The Alameda - Lofts on The Alameda	MFR	48	120	65	35	17 to 21	-	-
754	87 Rhodes Ct	SFR	48	53	64	35	30 to 34	-	-
754	128 Rhodes Ct	SFR	48	40	65	35	32 to 36	1	22 to 26
754	152 Rhodes Ct	SFR	48	60	65	35	30 to 34	-	-
754	109 Rhodes Ct	SFR	48	25	64	35	37 to 41	1	25 to 29
755	133 Rhodes Ct	SFR	48	25	64	35	37 to 41	1	25 to 29
755	157 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
755	176 Rhodes Ct	SFR	48	100	64	35	31 to 35	-	-
755	179 Rhodes Ct	SFR	48	25	64	35	24 to 28	-	-
755	200 Rhodes Ct	SFR	48	130	64	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
756	176 N Morrison Ave	MFR	48	118	64	35	30 to 34	-	-
756	201 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
756	229 Rhodes Ct	SFR	48	25	64	35	31 to 35	-	-
757	204 N Morrison Ave	SFR	48	86	64	35	31 to 35	-	-
755	224 Rhodes Ct	SFR	48	160	64	35	30 to 34	-	-
756	248 Rhodes Ct	SFR	48	180	64	35	30 to 34	-	-
757	173 N Morrison Ave	Institutional	48	292	64	40	30 to 34	-	-
757	253 Rhodes Ct	SFR	48	35	64	35	31 to 35	-	-
757	197 N Morrison Ave	SFR	48	250	64	35	28 to 32	-	-
757	225 N Morrison Ave	MFR	48	235	64	35	28 to 32	-	-
757	272 Rhodes Ct	SFR	48	200	64	35	30 to 34	-	-
757	275 Rhodes Ct	SFR	48	35	64	35	31 to 35	-	-
758	800 W Julian St	SFR	48	240	62	35	30 to 34	-	-
758	264 N Morrison Ave - Support Systems Homes Recovery Center	MFR	48	25	62	35	31 to 35	-	-
758	295 Rhodes Ct	SFR	48	77	62	35	32 to 36	1	23 to 27
758	908 W Julian St	SFR	48	25	62	35	31 to 35	-	-
758	920 W Julian St	SFR	48	25	62	35	31 to 35	-	-
758	936 W Julian St	SFR	48	25	62	35	31 to 35	-	-
764	909 W Julian St	SFR	48	197	63	35	30 to 34	-	-
759	950 W Julian St - Family and Children Services San Jose of	MFR	48	210	63	35	20 to 24	-	-
760	379 N Morrison Ave	SFR	48	250	61	35	28 to 32	-	-
761	962 Cinnabar St	SFR	48	340	61	35	30 to 34	-	-
761	956 Cinnabar St	SFR	48	300	61	35	30 to 34	-	-
759	899 Morrison Park Dr - Avalon Morrison Park	MFR	48	25	63	35	24 to 28	-	-
762	910 Cinnabar St	SFR	48	85	61	35	32 to 36	1	23 to 27
763	945 Cinnabar St	SFR	48	245	60	35	30 to 34	-	-
762	890 Cinnabar St	SFR	48	30	61	35	31 to 35	-	-

Civil Station	Receiver Location	Land Use	SVSX Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with IST Mitigation (dBA)
763	927 Cinnabar St	SFR	48	210	60	35	30 to 34	-	-
763	870 Cinnabar St	SFR	48	30	60	35	31 to 35	-	-
763	909 Cinnabar St	SFR	48	173	60	35	30 to 34	-	-
763	850 Cinnabar St	SFR	48	25	60	35	31 to 35	-	-
764	875 Cinnabar St - Cinnabar Commons Apartments	MFR	48	25	60	35	25 to 29	-	-
764	434 N Morrison Ave	SFR	48	275	60	35	30 to 34	-	-
766	417 Stockton Ave	SFR	48	39	59	35	31 to 35	-	-
768	808 Lenzen Ave	MFR	48	335	61	35	32 to 36	5	24 to 28
767	790 Lenzen Ave	MFR	48	105	61	35	23 to 27	-	-
771	777 Lenzen Ave	SFR	67	300	61	35	24 to 28	-	-
772	476 Lenzen Ct	SFR	67	310	62	35	24 to 28	-	-
774	774 Pershing Ave	SFR	67	320	64	35	32 to 36	1	23 to 27
774	762 Pershing Ave	SFR	67	285	64	35	32 to 36	1	23 to 27
773	489 Stockton Ave	SFR	67	40	63	35	38 to 42	1	27 to 31
774	750 Pershing Ave	SFR	67	240	64	35	32 to 36	1	23 to 27
774	738 Pershing Ave	SFR	67	190	64	35	32 to 36	1	23 to 27
774	726 Pershing Ave	SFR	67	135	64	35	34 to 38	1	24 to 28
774	714 Pershing Ave	SFR	67	92	64	35	36 to 40	1	26 to 30
774	495 Stockton Ave	MFR	67	37	64	35	38 to 42	2	27 to 31
776	749 Pershing Ave	SFR	67	230	65	35	32 to 36	1	23 to 27
776	761 Pershing Ave	SFR	67	280	65	35	32 to 36	1	23 to 27
776	737 Pershing Ave	SFR	67	185	65	35	32 to 36	1	23 to 27
776	711 Pershing Ave	SFR	67	84	65	35	36 to 40	1	26 to 30
776	725 Pershing Ave	SFR	67	133	65	35	34 to 38	1	24 to 28
776	501 Stockton Ave	SFR	67	37	65	35	39 to 43	1	27 to 31

Shaded cells indicate impacts.
CL = Center Line; SFR = Single-Family Residential, MFR = Multi-Family Residential, GBN = Groundborne Noise, IST = Isolated Slab Track

Single-Bore Option

The second tunnel option is a single bore with bi-level tracks. Typically, the single-bore tunnel would be approximately 70 feet below ground compared to 40 feet with the Twin-Bore Option. On the lower level of the single-bore tunnel the tracks would be supported on the tunnel invert similar to twin-bore tunnel. On the upper level the tracks would be supported on a structural concrete slab spanning the width of the tunnel. Based on analyses for a similar bi-level tunnel, groundborne noise from the upper level is projected to be less than for the lower level.

Groundborne noise and vibration level projections were projected for the train operation on the lower track level of the Single-Bore Option for a limited number of receptors and compared to the levels for the Twin-Bore Option. The vibration projection model for the deeper tunnel was somewhat hindered due to the lack of vibration propagation test data at deeper depths since the tests did not, at the time (2004), envision a deeper tunnel.

Due to the greater depth of the single-bore tunnel, the projected groundborne noise levels would be less than those from the twin-bore tunnel. However, the difference is only in the range of 1 to 2 dBA. In the engineering phase of the Phase II Project, vibration propagation test data will be required for tunnel depths of the single-bore tunnel to define the specific mitigation required, if this is the preferred alternative. For purposes of this analysis, where groundborne noise levels in Tables 4.12-16 through 4.12-20 exceed the noise criterion by 1 dBA for the Twin-Bore Option, similar mitigation would be required for the Single-Bore Option.

Tables 4.12-26 through 4.12-28 indicate where mitigation is required. Depending on the options selected, 13,525–16,150 linear feet of IST groundborne mitigation would be required.

Table 4.12-26: Groundborne Noise Mitigation – Single-Bore Alignment

S1 Track	S2 Track
618+00 to 632+50	618+25 to 633+00
645+00 to 653+50	645+75 to 654+00
662+25 to 677+50	663+00 to 678+00
For Downtown San Jose Station East and West Options see Tables 4.12-17 and 4.12-18, respectively	
For Diridon Station South and North Options see Tables 4.12-19 and 4.12-20, respectively	
782+00 to 791+00	783+00 to 792+00
796+00 to 801+00	797+00 to 802+00
Total IST: 10,425 feet	
IST = Isolated Slab Track	

Table 4.12-27: Groundborne Noise Mitigation – Single-Bore, Diridon Station North Option

S1 Track	S2 Track
745+75 to 757+00	746+50 to 758+00
773+00 to 777+00	774+00 to 778+00
Total IST: 3,075 feet	
IST = Isolated Slab Track	

Table 4.12-28: Groundborne Noise Mitigation – Single-Bore, Diridon Station South Option

S1 Track	S2 Track
749+25 to 755+00	750+00 to 756+00
777+75 to 782+00	779+00 to 783+00
Total IST: 2,000 feet	
IST = Isolated Slab Track	

4.12.5 NEPA Conclusion

Aboveground BART Extension Alternative operations on at-grade track north of I-880 would result in a Moderate Impact at one ground-floor receiver and two second-story receivers. However, the increases are 2 dBA or less, which is not a readily perceived amount. Therefore, no mitigation is proposed.

Operation of emergency ventilation fans, piston relief shafts, traction power substations, and emergency backup generators could result in exceedances of Cities of San Jose and Santa Clara noise criteria at nearby residence, which is considered an adverse effect. Implementation of Mitigation Measure NV-A will reduce this impact to *no adverse effect*.

Train operations in the tunnel are predicted to result in exceedances of FTA groundborne noise criteria at many receptor locations. Implementation of Mitigation Measure NV-B would reduce this impact to *no adverse effect*.

All other noise and vibration effects would have *no effect* or *no adverse effect* under NEPA.

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4.13 Security and System Safety

4.13.1 Introduction

This section describes the affected environment and environmental consequences related to security and system safety from operations of the NEPA Alternatives. Information regarding BART security and system safety was obtained from the BART Police Department, *Response to VTA Information Request to BART Police Department* (2015) and Santa Clara County, *Santa Clara County Sheriff* (2015). <u>In addition, Section 4.13.4.2, *BART Extension Alternative,* summarizes subsequent tunnel boring studies, workshops, and the peer review panel.</u>

4.13.2 Environmental and Regulatory Setting

4.13.2.1 Environmental Setting

This section discusses the existing conditions related to security and system safety for the BART Extension, including the entire alignment, stations, maintenance yard, and system facilities, and vicinity.

Security refers to the prevention of unlawful acts resulting in harm to persons or damage to property. In a broader sense, it also implies freedom from threats or uncertainty about the likelihood of threatening acts. Crime and antisocial behavior are potential problems in any public environment.

System safety refers to the prevention of accidents to the riding public, employees, and others present at the BART Extension, which include aerial structures, stations, tracks, pedestrian walkways, parking lots, parking structures, bus transfer center, trains, and the trackway. Accidents may be caused by events such as fires, faulty equipment, faulty software, inadequate procedures or training, improper boarding and alighting of the rail and bus vehicles, and improper passenger drop-off and loading. Fire and life safety considerations involve preventive design criteria and those that provide protection for people and property during an emergency.

VTA and Other Transit Facilities

Security and safety measures are already in place to serve current transit operations and related pedestrian activities near existing transit facilities and bus stops in the area. VTA's Protective Services Division provides security for VTA bus and light rail service and facilities in coordination with the Santa Clara County Sheriff and Allied Barton Security Services LLC., a private security contractor under contract to VTA.

Security

BART Police Department

The BART Police Department has primary jurisdiction for responding to, and investigating, all criminal incidents at facilities owned or operated by the BART District. Members of the BART Police Department are authorized as peace officers with full police powers within the State of California under California Penal Code Section 830.33(a). The BART Police Department's sworn officers are supported by a professional staff consisting of community service officers, communications and 9-1-1 dispatchers, revenue protection guards, police administrative specialists, and civilian supervisors and managers. The department is currently staffed by 208 sworn and 91 civilian employees.

The BART Police Department is responsible for responding to, and emergency management of, security incidents. It maintains the BART District's System Security Plan and provides emergency management in accordance with the BART District's Emergency Plan.

In accordance with national best practices, the BART Police Department maintains an emergency response time standard of 5 minutes to in-progress crimes against persons or property. The department currently meets the emergency response time standard and the department's compliance with the standard is continuously measured and tracked on BART's district-wide Quarterly Performance Report.

Subject to final agreement between BART and VTA, VTA anticipates that BART would be responsible only for policing the BART Operating Corridor, which consists of BART trains, tunnels and operating rights-of-way, and the paid and free station areas. VTA would be responsible for providing police and security for all areas outside the Operating Corridor, although VTA may contract separately with BART to perform these services.

The BART Police Department maintains cooperative agreements with neighboring law enforcement agencies to establish jurisdictional responsibilities to protect life and property. Personnel from the BART Police Department handle various types of incidents from simple infractions to complex felonies, and surrounding police departments provide assistance to BART police personnel as needed. This assistance ranges from providing back-up to BART police officers at major incidents, to providing intelligence information on suspects in ongoing criminal investigations. The department also provides training to first responders in local agencies on specific hazards and problems associated with police operations in the BART operating environment. BART police personnel participate in regional Multi-Agency Mobile Field Force teams for the response to regional incidents requiring mutual aid.

The BART Police Department relies on criminal intelligence information provided by the local fusion center, the Northern California Regional Intelligence Center (NCRIC), and assists NCRIC by providing Suspicious Activity Report (SAR) data to the NCRIC database. The NCRIC then combines the SAR data into an intelligence picture that is shared within the region to spot criminal trends, including terrorist plots. The BART Police Department Policy Manual also provides guidance and policies for suspected terrorist incidents (BART 2017).

Since the September 11, 2001, terrorist attacks, BART has implemented the following security measures (BART 2006):

- Enhancing the presence of uniformed personnel.
- Installing alarms and surveillance systems at key facilities.
- Educating and reminding employees and riders to be more vigilant and aware of their surroundings.
- Conducting background checks on prospective employees, contractors, and vendors.
- Providing extensive training to all BART frontline employees on emergency preparedness and terrorism and providing new information to these employees regularly.
- Working with many outside agencies to perform security drills and identify latest detection devices for various chemical or biological agents.
- Undertaking the "Eyes and Ears" program to involve BART riders in security and anti-terrorism initiatives.

System Safety

BART has a separate System Safety Department, which is responsible for all operational safety related matters. The System Safety Department is primarily responsible for ensuring that operational safety procedures are developed and implemented throughout the BART District. The System Safety Department maintains the District's System Safety Program Plan, which states, "Safety is the major consideration in all [BART] operations including planning, design, construction, testing, and maintenance of the rail transit system." Implementation of the program includes the setting of safety goals and objectives, as well as hazard identification, reduction, and control throughout the system.

The BART System Safety Department is responsible for the monitoring of safety performance to identify any failures and deficiencies in the program, including accidents on BART property and within the BART operating system, and for implementing corrective measures. Where it is determined that unsafe conditions exist, the manager of the System Safety Department has the authority to interrupt or cease BART operations.

The System Safety Department also contributes to the development of BART's Emergency Plan, the authoritative procedure to be used during an emergency. The plan establishes standard policies and procedures for the mobilization of BART and other public safety resources so that fast, controlled, and predictable responses can be made to various types of emergencies. Specific response procedures for a full range of foreseeable types of emergencies are addressed in the plan and include response procedures for train fires, derailments, injuries or deaths on the right-of-way (ROW), ROW intrusions, earthquakes, high winds, flooding, gas leaks and toxic spills, bomb threats, explosions, and hostage situations. In all cases, the Emergency Plan identifies the responsibilities of the involved persons and authorities (e.g., train operators, BART Central Control, BART police, the responding fire departments) and sets forth an operations plan for each type of emergency. The various operations plans address the initial fact finding and reporting procedures, communication requirements, evacuation and rescue procedures, emergency scene boundaries and restrictions, public information procedures, and related factors.

In accordance with BART emergency procedures, local fire departments are the primary responders in the event of a fire within the BART system. Under an agreement with all fire departments for the existing system, the local fire department would assume overall command of any fire emergency scene, in cooperation with BART Central Control. Information on local fire departments within the corridor is provided in Section 4.4, *Community Services and Facilities*.

4.13.2.2 Regulatory Setting

The BART Extension would be required to comply with the following ~~federal codes~~regulations. ~~for tunnel and station ventilation, and for train and station circulation and exiting.~~

- Federal Transit Administration Security Initiatives, including the National Transit Response Model and Security Program Action Items.
- National Fire Protection Association (NFPA) Codes (and local amendments), including the following:
    - 13 – Standard for the Installation of Sprinkler Systems
    - 14 – Standard for the Installation of Standpipe and Hose Systems
    - 20 – Standard for the Installation of Stationary Pumps for Fire Protection
    - 72 – National Fire Alarm and Signaling Code
    - 101 – Life Safety Code
    - 130 – Standard for Fixed Guideway Transit and Passenger Rail Systems
- ~~130 Fixed Guideway Transit Systems.~~
- ~~National Fire Protection Association (NFPA) 101 Life Safety Code.~~
- U.S. Department of Transportation Subway Environmental Design Handbook, Volume 1.
- 28 Code of Federal Regulation (CFR) Part 36, Americans with Disabilities Act, Standards for Accessible Design.
- California Public Utilities Commission (CPUC) General Orders (GO):
    - GO 164 – Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems
    - GO 95 - Overhead Electric Line Construction

  - GO 175 – Rules and Regulations Governing Roadway Protection provided by Rail Transit Agencies and Rail Fixed Guideway Systems
- Current California Building Code at the time of construction.
- Current California Fire Code at the time of construction.
- Adopted local ordinances, as applicable.

4.13.3 Methodology

The BART Extension would have an *adverse effect* on public safety if it would increase risk of accidents on a regional scale. Such an effect would increase the risk of criminal or terrorist acts on a regional scale.

4.13.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA using the criteria identified in Section 4.13.3, *Methodology*. This section also identifies design commitments, best management practices, and other measures to avoid, minimize, or mitigate impacts.

4.13.4.1 No Build Alternative

The No Build Alternative consists of the existing transit, highway, roadway, bicycle, and pedestrian facilities, in addition to planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in the potential for security and safety incidents typically associated with transit, highway, roadway, bicycle, and pedestrian facilities. Typically, a system safety plan and emergency response plan would be developed for each project, and appropriate security and safety systems would be installed in facilities to minimize the potential for harm to persons and damage to property. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect security and system safety, which would include an analysis of mitigation measures to mitigate potential impacts on security and system safety.

4.13.4.2 BART Extension Alternative

The BART Extension Alternative carries the potential for security and safety incidents in the trains, along the rail alignment, and near and within rail stations and entrances, parking lots and structures, and amenities located at street level. Also of concern would be passenger safety onboard trains.

Security

A BART Police Station at the Berryessa/North San Jose Station is being constructed by VTA as part of the Phase I Project and will serve the Phase II Project as well. BART would conduct a needs assessment for any additional staffing and equipment that may be required for the BART Extension. The level of additional need would be partially based on the future negotiations with the BART Police Department regarding their area of responsibility along the extension. Currently, VTA anticipates that the BART Police Department would have primary responsibility within the Operating Corridor, generally defined as consisting of onboard trains, tunnels and operating rights-of-way, and within the paid and free area of stations out to the “dripline” of the stations, subject to final agreement between BART and VTA.

As discussed in Section 4.4, *Community Facilities and Public Services,* VTA would coordinate with the Santa Clara County Sheriff’s Office (SCCSO) to police areas outside the Operating Corridor. VTA and BART would also expand existing mutual-aid agreements with local police providers in the cities of San Jose and Santa Clara.

Fencing would be installed along the at-grade and depressed BART alignments and at tunnel portals. Fencing would separate the BART tracks from the Union Pacific Rail Road (UPRR) tracks to prevent passengers from crossing tracks after disembarking from a train. BART stations and parking areas would be lighted and have designated walkways for pedestrians. Passengers disembarking and walking to their destinations would be clearly directed to use sidewalks and crosswalks. Station platforms, fare gates, and elevators would be monitored by CCTV. BART would ensure that there is adequate police presence, as well as surveillance cameras and emergency call boxes, at all BART stations and parking facilities.

Application of the design requirements discussed in this section would reduce safety and security risks associated with the BART Extension. Implementation of the national, state, and district codes, regulations, and guidelines listed in Section 4.13.2.2, *Regulatory Setting* are designed to provide a safe and secure environment. The BART Police Department, in coordination with local jurisdictions, would implement BART’s System Security Plan and Emergency Plan for their areas of responsibility. BART’s police force staff would be expanded to cover the extension. The existing agreement between VTA and SCCSO would also be expanded to include services for the BART Extension not covered by BART’s police force and safety department staff. In addition, VTA and BART would expand existing mutual aid agreements with the Cities of San Jose and Santa Clara.

System Safety

The BART Extension will follow applicable codes and standards including the California Building Code and BART Facilities Standards Design Criteria as they would operate and maintain the BART Extension operations. The BART Facilities Standards Design Criteria specify design requirements for all new BART projects~~,~~ and have been developed to provide a high level of security and safety in a cost-effective manner. A Safety and Security

Certification Program (SSCP) has been developed for the BART Extension to ensure that it is designed in compliance with the BART Facilities Standards Design Criteria and applicable safety and security design codes. The SSCP requires that compliance be documented and applicable project features and design characteristics itemized. Because the Single-Bore Option tunnel and stations are deeper that the Twin-Bore Option, more extensive measures will be required to ensure compliance with applicable codes and standards.

BART Facilities Standards Design Criteria address the train control system, operating procedures, training of operating and maintenance personnel, and emergency responses. Fire sprinklers, stand pipes, smoke detectors, and alarm systems would be placed throughout the new stations in accordance with fire department jurisdiction requirements, standards set forth by the National Fire Protection Association, California Building and Fire Codes, and BART criteria. BART would coordinate and train its emergency response personnel with fire departments in San Jose and Santa Clara to assure response readiness in the event of an emergency. The provisions of BART's existing System Safety Program Plan require active participation by the BART System Safety Department in the design of system extensions. VTA, working with a BART safety engineer and local fire department personnel, would review contract drawings and specifications for compliance with the previously mentioned codes and criteria. This process is particularly critical for the tunnel segment emergency ventilation structures and emergency egress and ingress. Established emergency station and tunnel egress criteria would be applied to the BART Extension. The System Safety Department would also monitor engineering testing and conduct safety technical audits of all new facilities and equipment to ensure that they meet applicable safety standards prior to passenger operation and that they continue to meet these standards while in operation. Additional supporting documentation is provided in *VTA's BART Silicon Valley Phase II Project: Twin Bore Station Configuration Emergency Egress Review for BART Facility Standards (BFS) and NFPA 130 Compliance* (HNTB, June 13, 2017a).

As a part of the design review process, VTA and BART safety engineers would review the security fencing design along the at-grade alignment train storage areas, and transitions from subways to at-grade alignments. Similarly, VTA and BART safety engineers would review the design of station entrances, exits, platforms, and concourse areas for pedestrian safety. The design of parking lots and loading zones would also be reviewed for pedestrian and vehicular safety and for accessibility by emergency response vehicles. For security purposes, BART Facilities Standards Design Criteria would be implemented as applicable for the BART Extension, including closed-circuit television (CCTV) in stations and along the trackway (at tunnel portals), and access control devices.

In accordance with CPUC General Order 164-D and the BART System Safety Program Plan, VTA would certify the safety and security of the BART Extension to ensure that the design, construction, and installation of equipment are systematically reviewed for compliance with safety and security requirements and BART will validate safety operational readiness of the system prior to the commencement of revenue service. VTA, in coordination with BART, undertook the *BART Silicon Valley, Phase II Single Bore Tunnel Technical Studies* (HNTB

2017b) and prepared the *BART Silicon Valley Extension Phase II Tunneling Alternatives Comparative Analysis, Independent Risk Assessment* (Aldea Service, LLC 2017) to evaluate both Twin-Bore and Single-Bore Options as the tunnel construction methodology. These assessments were presented to VTA's Board of Directors for its consideration at the August 25, 2017, and September 22, 2017, workshops. As explained in Section 2.A.4., *Timeline for Future Option Decisions,* the decision regarding selection of the preferred tunnel construction methodology will be made when the VTA Board of Directors certifies the Final SEIS/SEIR and approves the project in early 2018.

Ventilation and self-evacuation are the most important components to limiting fire hazard exposure. The studies found that the single-bore ventilation design meets current applicable codes and standards. The cross sectional area within the tunnel requiring ventilation is similar to that of twin-bore due to the usage of center walls, slabs, and plenums. Additionally, calculations indicate that the ventilation fans and motors required for the single-bore configuration are comparable in size to those required in the current twin-bore design.

In regard to platform width and capacity, the design for the station platform for the single-bore tunnels would have two 15-foot, 6-inch unobstructed platforms (one per level) equating to approximately 21,700 total square feet of unobstructed area and exceeding current BART passenger-per-square-foot standards. At Diridon Station, post-event surge from SAP Center events may be accommodated via patron staging in entrance facilities and concourse areas of a single-bore option. In addition, the ability to have more crossovers or areas to store trains with the single-bore design allows for flexibility of operations in the extension and potential to clear platforms faster.

The single-bore concept design includes 76 emergency egress passages (51 configured side-by-side and 25 that include a stairwell) for emergency situations within the tunnel. The spacing is 300 feet between passages along most of the alignment. The increase in the number of emergency egress passages decreases the evacuation time.

The single-bore ventilation system provides adequate fire hazard mitigation and meets NFPA 130’s 4-minute and 6-minute evacuation criteria for clearing the platform and arriving to Point(s) of Safety, an area established from the platform edge entering the connection adit (between the platform and the station vertical circulation structure/entrance shaft), and throughout the entrance shaft along egress paths, in this single-bore configuration. The Point(s) of Safety are considered indefinitely tenable due to the configuration of the single bore and the ventilation system design. Egress calculations demonstrate that evacuation flows, including queuing for pedestrian flows at the base of stairs and escalators, comply with design standards for the platform to clear in four minutes and station occupants to reach Point(s) of Safety within six minutes.

VTA and BART jointly conducted a peer review in November 2017 with public transit agencies currently operating heavy rail subway systems. The peer review included panelists from public transit agencies and a facilitator. Two of the key questions posed were whether the single-bore tunnel could be operated safely as an extension of the BART system, and what risks and challenges are associated with the single-bore configuration. The panel concluded that the Single-Bore Option as presented could be operated. However, the panel identified key operational considerations related to fire/life/safety that would need to be addressed in the design. This peer review was not determinative but will help inform VTA's decision-making process for the selection of tunnel construction methodology along with the environmental studies and other factors. Refer to Section 2.A.4. *Timeline for Future Option Decisions,* for more information about the decision-making process for selection of the Twin-Bore Option or Single-Bore Option.

Given the above, the BART Extension would have *no adverse effect* on security and system safety, and no mitigation measures are required.

4.13.5 NEPA Conclusion

The impact on public safety from the BART Extension Alternative would be *no adverse effect*, and no mitigation measures are required.

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4.14 Socioeconomics

4.14.1 Introduction

This section describes the affected environment and environmental consequences related to socioeconomics from operation of the NEPA Alternatives. Sources of information used in this section are as follows:

- *American Community Survey* (U.S. Census Bureau 2010~~9~~–2014).
- *American Fact Finder* (U.S. Census Bureau 2010).
- *Bay Area Plan Projections 2013* (Association of Bay Area Governments 2013).
- *Unemployment Rate and Labor Force* (California Employment Development Department 2014).
- *The Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *The Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan Integrated Final EIR* (City of Santa Clara 2010b).
- *Transportation 2035* (Metropolitan Transportation Commission 2009).
- *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2017~~6~~).

4.14.2 Environmental and Regulatory Setting

4.14.2.1 Environmental Setting

This section describes the existing socioeconomic conditions within the study area. The study area is defined as the block groups within a 0.5-mile buffer of the alignment. The following analysis isolates the study area to represent a subset of the Cities of San Jose and Santa Clara population that would be closest to the BART Extension and most sensitive to localized effects. San Jose and Santa Clara statistics represent a baseline for demographics on a regional scale and a point of comparison for the study area demographic findings. This analysis compares if and how the study area demographics deviate from the regional demographics (i.e., San Jose and Santa Clara).

Population Trends

Table 4.14-1 shows the San Jose and Santa Clara populations. San Jose is the largest city within Santa Clara County with over 945,942 people in 2010. The Association of Bay Area

Governments (ABAG) projects the population to grow to approximately 1,334,100 people by 2040, a 41 percent increase. Santa Clara's population was 116,468 people in 2010. ABAG projections show that Santa Clara will grow to approximately 156,500 people over the next several decades, a 34 percent increase.

The Cities of San Jose and Santa Clara have grown over the past 40 years, largely owing to an increase in job growth associated with the high-technology sector. Accessibility to public transit is a major factor in growth trends moving forward. Caltrain service between San Francisco and San Jose, Amtrak Capital Corridor, and VTA light rail network provide access to San Jose and Santa Clara, which has contributed to development trends and population growth as well.

Table 4.14-1: Population Change 2010–2040

Geographic Area	Population		
	2010	2040	Percent Change
San Jose	945,942	1,334,100	41%
Santa Clara	116,468	156,500	34%
Source: ABAG 2013.			

Housing and Development

The U.S. Census Bureau defines a household as a group of people, related or not, living together in a dwelling unit. Table 4.14-2 shows the average household sizes of San Jose and Santa Clara. The average household size is approximately 2.9 people per household within the Cities of San Jose and Santa Clara.

Table 4.14-2: Average Household Size

Area	People Per Household
San Jose	3.1
Santa Clara	2.7
Average	*2.9*
Source: American Community Survey (ACS) data (U.S. Census 2010–2014).	

The San Jose General Plan indicates it is no longer feasible for the City to accommodate the increasing population through outward expansion. Such development would have negative economic implications for San Jose as a result of diminished municipal service levels. However, cultural values in San Jose are shifting to demonstrate a growing interest in infill and urban environments. The City expects to attract a younger age group between 20 and 34 who are seeking a more urban lifestyle and who want to live closer to their workplace.

Santa Clara expects to see new high-density housing opportunities as well. Such development encourages affordable and accessible homes for the community and assists in maintaining existing character and integrity of established neighborhoods. Much of the areas surrounding the existing Santa Clara Caltrain Station and other transit corridors are considered underutilized and are therefore target focus areas for infill redevelopment.

Infill development trends within established growth and focus areas of San Jose and Santa Clara are becoming more common as local goals and policies focus on opportunities to better utilize existing development (See Section 4.14.2.2, *Regulatory Setting*). Table 4.14-3 summarizes housing growth projections within the Cities of San Jose and Santa Clara. ABAG projects that the number of households in San Jose will increase by 43 percent by 2040. This matches the anticipated San Jose population increase of 41 percent by 2040 identified in Table 4.14-3. Santa Clara also projects housing growth to increase consistent with population, at 33 and 34 percent, respectively—a slightly lower percent change than San Jose.

Table 4.14-3: 2010–2040 Household Growth

Geographic Area	Households		
	2010	**2040**	**Percent Change**
San Jose	301,366	432,030	43%
Santa Clara	43,021	57,260	33%
Source: ABAG 2013			

Jobs and Employment

Table 4.14-4 provides a breakdown of employment industries by sector. Managerial and professional sector jobs are the largest percentage of jobs for San Jose, Santa Clara, and the study area. Such professions include financial, computer, engineering, sciences, education, community service, healthcare, and technical occupations. Approximately 37 percent of the study area works in the management and professional sector, which is lower than the Santa Clara percentage (51 percent) and the San Jose percentage (43 percent). Additionally, the study area has a higher percentage of service-related jobs (19 percent) than the respective City percentages. Service sector jobs include food preparation, law enforcement, and maintenance occupations.

As discussed in Section 4.14.2.2, *Regulatory Setting*, local goals and policies encourage development and employment opportunities in particular areas. The Cities of San Jose and Santa Clara aim to spur economic and job growth through strategic land use planning that increases the job-to-employed ratio.

Table 4.14-4: Employment by Sector

Sector	San Jose		Santa Clara		Study Area	
	Persons	Percent	Persons	Percent	Persons	Percent
Employed civilian population 16 years and over	*512,413*	*100%*	*55,528*	*100%*	*43,258*	*100%*
Management, professional	221,402	43%	28,498	51%	16,322	37%
Service	92,042	18%	5,142	9%	8535	19%
Sales and office	108,264	21%	12,862	23%	9532	22%
Natural resource, construction, maintenance	37,558	7%	3,127	6%	4415	10%
Production, transportation, and material moving	53,147	10%	5,899	11%	4454	10%
Source: ACS data (U.S. Census 2010–2014).						

Table 4.14-5 outlines projected employment growth within San Jose and Santa Clara from 2010 to 2040. San Jose is projected to have a 39 percent increase in employment; Santa Clara is projected to have a 29 percent increase in employment.

Table 4.14-5: 2010–2014 Employment Growth

Geographic Area	Employment (Jobs)		
	2010	2040	Percent Change
San Jose	377,140	524,510	39%
Santa Clara	112,890	146,180	29%

Table 4.14-6 summarizes the employment and unemployment rates for San Jose, Santa Clara, and the study area from the 2014 American Community Survey (ACS) data (U.S. Census 2010–2014). Approximately 12 percent of the study area is unemployed, which is higher than the unemployment rates in San Jose and Santa Clara (6 and 5 percent, respectively).

Table 4.14-6: Employment/Unemployment Rates

Area	Total Labor Force Population	Employed		Unemployed	
		Persons	Percent	Persons	Percent
San Jose	530,500	499,700	94%	30,800	6%
Santa Clara	65,800	62,700	95%	3,100	5%
Study Area	54,646	47,969	88%	6,677	12%
Sources: California Employment Development Department 2014; ACS data (U.S. Census 2010–2014)					

Income

Table 4.14-7 summarizes the median household income for San Jose and Santa Clara from the 2014 ACS estimates (U.S. Census 2010–2014). The median household income is also defined for the study area. The study area median household income is $61,063, which is approximately $33,000 less than the Santa Clara overall average. The study area median household income is approximately $23,000 less than the San Jose overall average.

Table 4.14-7: Median Household Income

Geographic Area	Median Household Income
San Jose	$83,787
Santa Clara	$93,840
Study Area	$61,063
Source: ACS data (U.S. Census 2010–2014)	

Table 4.14-8 summarizes per capita income levels from the 2014 ACS estimates. Individuals within the study area make roughly $5,500 per year less than the overall average in San Jose, and $11,800 per year less than overall average in Santa Clara.

Table 4.14-8: Per Capita Income

Area	Per Capita Income
San Jose	$34,992
Santa Clara	$41,222
Study Area	$29,439
Source: ACS data (U.S. Census 2010–2014)	

4.14.2.2 Regulatory Setting

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

The Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act) provides important protections and assistance for people affected by federally funded projects. The act was passed by Congress to ensure that people whose real property is acquired, or who require relocation as a result of projects receiving federal funds, will be treated fairly and equitably and will receive assistance in moving from the property they occupy. Direct property acquisition under a project requires providing for relocation assistance services to affected homeowners, renters, and tenant businesses. In addition, residential and commercial property owners should be paid fair market value of any property acquired as a result of a project.

Title VI of the Civil Rights Act of 1964

The Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal funding. Direct property acquisition as part of the BART Extension Alternative would require implementation of this act along with the Uniform ~~Relocation Assistance and Real Property Acquisition Policies~~ Act.

California Code of Civil Procedure – Part 3 – Of Special Proceedings of a Civil Nature, Title 7 Eminent Domain Law

Title 7 of the California Code of Civil Procedure authorizes public agencies in California to acquire private property for public uses. Public agencies must establish the following conditions to exercise eminent domain:

(1) The public interest and necessity require the proposed project.

(2) The proposed project is planned or located in the manner that will be most compatible with the greatest public good and the least private injury.

(3) The property described in the resolution is necessary for the proposed project.

Furthermore, the public agency must make a reasonable offer to purchase the subject property based on fair market value (pursuant to California Government Code 7267.2) prior to commencing court proceedings. Public agencies must also provide each person whose property is to be acquired by eminent domain a reasonable opportunity to appear and be heard.

VTA Affordable Housing Policy

The VTA Affordable Housing Policy promotes affordable housing development at VTA joint development sites and on other real estate owned by VTA. VTA's Board of Directors has adopted a policy of providing a 30 percent overall target for affordable housing production in VTA's joint development program with a target of 15 percent affordable housing production for each joint development project with residential uses (VTA 2016). This policy was adopted in order to address regional concerns related to the availability of affordable housing.

San Jose

The majority of San Jose's growth is planned for specifically identified Growth Areas within the City limits. The City supports infill growth to maximize mixed-use development and create new opportunities for jobs. The City promotes growth and development trends that maintain social equity by using community-based planning mechanisms. Focused Growth Areas would strategically place high-density housing options in locations with access to public transportation and are within proximity to retail and other services in the surrounding neighborhoods. Growth Areas are planned to encourage pedestrian and bicycle activity with the hope of fostering community identity, while protecting the quality of existing neighborhood character. Portions of the corridor are located within the Urban Village Plan Area, Downtown Plan Area, and the Transit Employment Center within the Urban Growth Boundary line. Accordingly, the City selected these areas for new growth, fiscal, economic, and transportation growth.

The City supports plans to expand BART service and new stations to San Jose in the *City of San Jose 2040 General Plan* (SJGP). The SJGP indicates that new station service would support new development and employment in concentrated areas surrounding such station locations. San Jose includes goals and policies in the SJGP to support community and economic growth as shown Table 4.14-9.

Table 4.14-9: San Jose General Plan Policies

Number	Policy/Goal
H-2	Preserve and improve San José's existing affordable housing stock and increase its supply such that 15% or more of the new housing stock developed is affordable to low, very low and extremely low income households. Nothing in this language is intended, directly or indirectly, to impose any requirement on any individual housing project to include an amount or percentage of affordable units. Nothing in this language is intended to, directly or indirectly, result in a finding or determination that an individual housing project is inconsistent with the General Plan, if it does not contain any affordable housing units.
H-2.2	Integrate affordable housing in identified growth locations and where other housing opportunities may exist, consistent with the *Envision General Plan*
IE-1.3	As part of the intensification of commercial, Village, Industrial Park and Employment Center job Growth Areas, create complete, mixed-employment areas that include business support uses, public and private amenities, child care, restaurants and retail goods and services that serve employees of these businesses and nearby businesses.
IE-1.4	Manage land uses to enhance employment lands to improve the balance between jobs and workers residing in San José. Strive to achieve a minimum ratio of 1.3 jobs/employed resident to attain fiscal sustainability for the City.
IE-1.5	Promote the intensification of employment activities on sites in close proximity to transit facilities and other existing infrastructure, in particular within the Downtown, North San José, the Berryessa International Business Park and Edenvale.
IE-1.6	Plan land uses, infrastructure development, and other initiatives to maximize utilization of the Mineta San José International Airport, existing and planned transit systems including fixed rail (e.g., High-Speed Rail, BART and Caltrain), Light-Rail and Bus Rapid Transit facilities, and the roadway network. Consistent with other General Plan policies, promote development potential proximate to these transit system investments compatible with their full utilization. Encourage public transit providers to serve employment areas.
IE-1.7	Advance the Diridon Station Area as a world-class transit hub and key transportation center for Northern California.
IE-1.8	Measure and report the number of jobs created in identified Growth Areas during the City Council's periodic review of this General Plan.
IE-1.9	Invest in strategic infrastructure improvements, as appropriate, in order to encourage private investment, reduce new construction costs, increase business efficiency, and in order to support business retention and growth, stimulate economic activity, and employ people.
IE-1.13	Achieve goals related to Quality Neighborhoods, including diverse housing options, a walkable/bikable public street and trail network and compact, mixed-use development where infrastructure exists to distinguish San José as a livable and attractive city, to

Number	Policy/<u>Goal</u>
	promote interaction among community members, and to attract talented workers to the City.
IE-4.5	Continue implementation of improvements to Mineta San José International airport facilities pursuant to the Airport Master Plan to maintain and expand regional, trans-continental, and international Airport operations.
IE-4.7	Support Valley Transportation Authority efforts to extend BART service to Downtown San José and to Diridon Station
IE-6.3	Attract job opportunities accessible to all of San José's residents, particularly residents in low-income neighborhoods.
<u>IP-5.1</u>	<u>7. Affordable Housing: Establish an Urban Village wide goal that, with full build out of the planned housing capacity of the given Village, 25% or more of the units built would be deed restricted affordable housing, with 15% of the units targeting households with income below 30% of Area Median Income. This is a goal, not a requirement to be imposed on individual projects.</u>
LU-1.1	Foster development patterns that will achieve a complete community in San José, particularly with respect to increasing jobs and economic development and increasing the City's jobs-to-employed resident ratio while recognizing the importance of housing and a resident workforce.
LU-1.3	Within Identified Growth Areas, where consolidation of parcels is necessary to achieve viable designated land uses or other objectives of the Envision General Plan, limit residential development of individual parcels that do not conform to approved Village Plans or further other plan objectives.
LU-2.1	Provide significant job and housing growth capacity within strategically identified "Growth Areas" in order to maximize use of existing or planned infrastructure (including fixed transit facilities), minimize the environmental impacts of new development, provide for more efficient delivery of City services, and foster the development of more vibrant, walkable urban settings.
LU-2.2	Downtown – The City's Downtown Strategy plans for ambitious job and housing growth capacity in the Downtown area to reinforce its role as San Jose's civic, cultural and symbolic center and to support key infrastructure investments, including the planned BART and High-Speed Rail systems. Employment Lands – The Plan supports significant intensification of employment activity within each of the City's major employment districts (North San José, Monterey Corridor, Edenvale, Berryessa/International Business Park, Mabury, East Gish and Senter Road and North Coyote Valley). Within the North San José, Berryessa / International Business Park and Old Edenvale areas, a centralized sub-area with strong transit access has been designated as an Employment Center to support mid-rise or high-rise employment development. The Employment Center in the northeast corner of the Berryessa / International Business Park area is also classified as a BART station area due to its proximity to the planned Milpitas BART station and existing Capitol Avenue Light Rail stations. Urban Villages: BART/Caltrain Station Areas – To maximize utilization of the Caltrain and BART systems, support regional commuting and foster the City's growth as a regional job center, significant new job growth capacity is planned for the each of the BART / Caltrain Urban Villages. Significant job and housing growth capacity is planned for the Berrryessa BART station area in order to support intensification of the station area as a regional employment destination and to achieve a level of density consistent with that planned for other BART and Light Rail station areas.

Number	Policy/Goal
TR-1.1	Accommodate and encourage use of non-automobile transportation modes to achieve San José's mobility goals and reduce vehicle trip generation and vehicle miles traveled (VMT).
TR-1.2	Update the City's engineering standards for public and private streets based on the new street typologies that incorporate the concept of "complete streets."
TR-3.7	Regularly collaborate with BART to coordinate planning efforts for the proposed Silicon Valley Rapid Transit Corridor Project (SVRTC Project) to San José/Santa Clara with appropriate land use designations and transportation connections.

Santa Clara

Santa Clara encourages new development to meet the needs of projected population growth and to ensure new development is accommodated and supported with the appropriate infrastructure and economic services. Such growth is focused to particular areas, as discussed in the *City of Santa Clara 2010-2035 General Plan* (SCGP). The BART Extension would be within the Santa Clara Station Focus Area. Santa Clara projects future development in this area to include extended BART service. The Santa Clara Station Area is currently served by Caltrain, Altamont Commuter Express, and VTA bus lines and is consistent with designated land uses and SCGP policies. The Santa Clara Station Focus Area would provide opportunities for new development of housing, offices, retail, hotels, restaurants, and parks within its geographic area with an assumed development of 1,490,000 square feet for commercial development, 550,000 square feet for office development, and 1,663 additional dwelling units. Santa Clara includes goals and policies in the SCGP to support community and economic growth as shown Table 4.14-10.

Table 4.14-10: Santa Clara General Plan Policies

Number	Policy
5.8-3-P1	Support a coordinated regional transit system that circles the South Bay and the Peninsula, including existing and planned Bay Area Rapid Transit, Amtrak, Altamont Commuter Express, Caltrain, Valley Transportation Authority and High Speed Rail facilities.
5.8.3-P3	Support transit priority for designated Bus Rapid Transit, or similar transit services, through traffic signal priority, bus queue jump lanes, exclusive transit lanes and other appropriate techniques.
5.8.3-P4	Encourage the continued efforts by other agencies to provide transit services that are accessible and meet the needs of all segments of the population, including youth, seniors, persons with disabilities and low-income households
5.8.3-P5	Facilitate implementation of the transit system defined in the transit network classifications and illustrated on the Transit Network Diagram in Figure 5.7-2.
5.8-3-P6	Encourage additional multimodal transit centers and stops in order to provide convenient access to commuter rail, buses, shuttle and taxi services.

Number	Policy
5.8.3-P7	Provide transit stops at safe, efficient and convenient locations to maximize ridership, including near employment centers, higher-density residential developments and Downtown.
5.8.3-P9	Require new development to incorporate reduced onsite parking and provide enhanced amenities, such as pedestrian links, benches and lighting, in order to encourage transit use and increase access to transit services.
5.8.4-P4	Facilitate implementation of the bicycle and pedestrian classifications as illustrated on the Bicycle and Pedestrian Network Diagram in Figure 5.7-3.
5.3.1-P5	Implement a range of development densities and intensities within General Plan land use classification requirements to provide diversity, use land efficiently and meet population and employment growth.
5.4.3-G3	A link between the Santa Clara Station and a variety of transit options that offer viable transportation alternatives throughout the City and the region.

4.14.3 Methodology

An *adverse effect* would occur if the BART Extension Alternative would influence socioeconomic trends (e.g., population, housing, employment, income) to be inconsistent with existing local general plans.

4.14.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to NEPA, using the criteria noted in Section 4.14.3, *Methodology* (i.e., context and intensity). This section also identifies measures to avoid, minimize, or mitigate impacts.

4.14.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in effects on socioeconomics typically associated with transit, highway, bicycle, and pedestrian facilities and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect socioeconomics, which would include an analysis of mitigation measures to mitigate potential impacts on socioeconomics. With the No Build Alternative, land uses along the alignment would be built out in accordance with the Cities of San Jose and Santa Clara General Plans. This would include residential, commercial, and industrial projects.

4.14.4.2 BART Extension Alternative

Population

Implementation of the BART Extension Alternative would expand BART service to the greater San Jose and Santa Clara communities, thereby increasing connectivity in the regional San Francisco Bay Area. Accordingly, implementation of the BART Extension Alternative would accommodate growth on a regional level.

By increasing connectivity and access to BART service, the BART Extension would indirectly result in the development and intensification of land uses in cities surrounding the study area. However, indirect growth potentially resulting from the BART Extension is already planned for and forecasted in land use regulating documents (i.e., SJGP and SCGP) and is discussed in Section 4.14.2.2, *Regulatory Setting*. Such infill-type development intensification would most likely occur in areas already planned for growth by the surrounding cities. Therefore, *no adverse impacts* related to population would occur.

Employment

As further described below, above-ground BART Extension features would require displacement and relocation of some businesses, which would potentially result in some job loss; however, VTA will work with the business owners to relocate businesses to eliminate long-term impacts on employees or owners. The BART Extension Alternative would generate some direct employment associated with operation and maintenance of BART service. Once in operation, the BART Extension would also indirectly facilitate residential and employment growth planned for the regional area, particularly around station areas, consistent with the general plans. Expanded BART service would improve transit reliability and services throughout the corridor and provide new stations that would improve regional access to downtown employment opportunities. As indicated, approximately 12 percent of the study area population is unemployed. Thus, such opportunities would be a beneficial impact, particularly in the immediate areas surrounding the alignment. Additionally, enhanced access to public transit would likely increase the ability for residents to travel to other cities in the Bay Area for other available employment opportunities. Therefore, *no adverse impacts* related to employment would occur.

Displacements and Acquisitions

The BART Extension would require property acquisitions and resultant displacements from acquiring the underlying property in whole or in part. Property acquisition and resultant displacements would occur prior to the start of construction. The types of displacements associated with the BART Extension are described below. Table 4.14-11 shows the number and type of displacement that would occur from implementing the BART Extension. *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2017~~6~~) includes acquisitions by type and assessor parcel number (APN).

Table 4.14-11: BART Extension Alternative – Summary of Displacements

Location	Residences	Businesses	RV Storage Spaces	Advertising Signs	Cell Tower
CSAs near East Tunnel Portal	0	7	250	2	0
Alum Rock/28th Street Station	0	4	0	2	0
13th Street Ventilation Structure	0	1	0	2	0
Downtown San Jose Station	-	-	-	-	-
East Option	0	10	0	0	0
West Option (Twin-Bore Only)	0	~~6~~ 7	0	0	0
West Option (Single-Bore Only)	0	11	0	0	0
Diridon Station	-	-	-	-	-
South Option	1	3	0	0	0
North Option	1	3	0	0	0
Stockton Ave Ventilation Structure[a]	0	1-8	0	0	0
Santa Clara Maintenance Facility	0	0	0	0	1
Santa Clara Station	0	1	0	0	0
Range of Total Displacements	**1**	**~~23-34~~24-35**	**250**	**6**	**1**

[a] The Stockton Avenue ventilation structure includes displacements presented as a range because three properties are being considered for the four optional locations. The final decision will depend on the environmental analysis conclusions and property negotiations and will be made during ~~Final Design~~the engineering phase.

Approximately 1 residence, 23 to 34 businesses, 250 recreational vehicle (RV) storage tenants, 6 advertising signs, and one cell tower (relocated within the same parcel to avoid conflict with the alignment) would be displaced by the BART Extension. The estimate of permanent displacements herein is based on property utilization in the winter of 2016. Estimates presented here are based on Appendix B, *Project Plans and Profiles*, and Appendix C, *BART Station Site Plans*.

Additionally, tunnel easements would be obtained from private properties, but would not require property acquisitions or other associated surface impacts because they would be entirely underground. Approximately 110 tunnel easements under private properties and 26 tunnel easements under public rights-of-way (ROW) (City streets, highways, Caltrain, City parks, and waterways) would be required to construct the tunnel alignment. These tunnel easements would not cause the displacement of any businesses or residences.

VTA will adhere to the Uniform ~~Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform~~ Act~~)~~ and FTA guidelines in acquiring real estate and relocating occupants, in addition to applicable state laws and regulations. During ~~final design~~the engineering phase, the ROW drawings, which will identify all permanent and temporary property acquisitions for the BART Extension, will be finalized. VTA will prepare a Real Estate Acquisition Management Plan (RAMP) and Relocation Assistance Plan (RAP), as required by the FTA, based on those parcels identified in the final ROW plans. Therefore, *no adverse socioeconomic effects* related to displacement and relocation would occur.

Connection to Phase I/East Tunnel Portal

Several construction staging areas would be required to construct the BART Extension and are considered to be temporary property acquisitions. Although use of these properties would only be temporary during construction, all existing businesses would be relocated, and all existing structures would be demolished and removed to allow for the use of these sites for storage of construction equipment and materials. Acquisition of these staging areas would displace 6 industrial businesses, 1 non-profit business, and approximately 250 RV storage tenant spaces. These RV spaces are used for parking and storage, not for residential purposes. The businesses that would be displaced in this area are mostly industrial or commercial warehouse types of establishments within an entirely industrial area. These establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition. VTA will work with the business owners to relocate businesses with no anticipated long-term impacts on employees or owners. No residential properties would be acquired in this segment of the alignment.

<u>Construction of the East Tunnel Portal would require preconstruction and cut-and-cover construction activities within the ROW of North Marburg Way between Las Plumas Avenue and Lower Silver Creek. This would result in the closure of North Marburg Way south of Las Plumas Avenue during preconstruction and cut-and-cover construction activities for up to 2.5 years. There are two businesses located adjacent to Lower Silver Creek and east of North Marburg Way, whose primary access is this portion of North Marburg Way that would be temporarily closed. In order to avoid long-term access restrictions to these two businesses, VTA would negotiate with these properties to provide access via Nipper Avenue while North Marburg Way is closed during construction. This would avoid the displacement of these businesses. In addition, the Santa Clara Valley Water District (SCVWD) has access to Lower Silver Creek via North Marburg Way. VTA would acquire a temporary access easement for SCVWD from their existing gate to Lower Silver Creek via Nipper Avenue while North Marburg Way is closed during construction. Permanent access to these three properties would be restored from North Marburg Way once construction within this roadway is complete. Acquisitions of easements would be conducted in conformance with all applicable laws and regulations.</u>

Tunnel Easements

Tunnel easements would be obtained from approximately 40 private properties for the tunnel alignment from the East Tunnel Portal to US 101. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Alum Rock/28th Street Station

Construction of Alum Rock/28th Street Station would cause the displacement of four light industrial businesses and one billboard structure with double-facing advertising signs. The businesses that would be displaced in this area are mostly industrial warehouse types of establishments within an entirely industrial area. These establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition. The BART Extension would not displace the Five Wounds ~~National~~ Portuguese National Church and associated facilities or the Cristo Rey San Jose Jesuit High School.

Tunnel Easements

Tunnel easements would be obtained from an estimated 12 private properties for the tunnel alignment from 28th to 24th Streets. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Tunnel Alignment near Coyote Creek

Construction of the 13th Street Ventilation Structure would cause the displacement of one medical office business and one billboard structure with double-facing advertising signs. This business is not likely to be a large source of employment within the local community. No residential properties would be acquired in this segment of the alignment.

Tunnel Easements

Near Coyote Creek, tunnel easements would be obtained from an estimated 13 private properties between 22nd and 12th Streets. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Downtown San Jose Station

Downtown San Jose Station East Option

Construction of the East Option would displace nine businesses. The businesses include one discount grocery store, one hair salon, two bars, one bakery, one check cashing store, three restaurants, and one gas station. These establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. Additionally, residents and employees that work in the downtown area access these businesses regularly for errands or during the work day. Community members and consumers would be able to access similar types of business establishments that offer comparable services within the nearby area. No residential properties would be acquired for the Downtown San Jose Station East Option.

Downtown San Jose Station West Option

Construction of the Downtown San Jose Station West Option would displace ~~six~~ up to eleven businesses. ~~These businesses include two bars, one bakery, one check-cashing store, one~~

~~restaurant, and one gas station~~. Under the Single-Bore Option, the eleven displaced businesses include one nightclub, one bakery, one check-cashing store, two restaurants, four retail, one gas station, and one bank. Under the Twin-Bore Option, seven displaced businesses include one bakery, one check-cashing store, one retail, two restaurant, one gas station, and one bank. The establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. Additionally, residents and employees who work in the downtown area access these businesses regularly for errands or during the work day. Community members and consumers would be able to access similar types of business establishments that offer comparable services within the nearby area. No residential properties would be acquired for the Downtown San Jose Station West Option.

Diridon Station

Diridon Station South and North Options

The Diridon Station South and North Options would cause the same displacements: two industrial businesses and one residence. These establishments may be an employment source for the local and regional community; thus relocation would have a temporary effect on employees during the transition. VTA will work with the business owners to relocate businesses with no anticipated long-term impacts on employees or owners.

There would be one displacement of a single-family residence on South Autumn Street; however, the property owner would be compensated in compliance with all the requirements of the Uniform Act and state regulations—Relocation Assistance and Real Property Acquisition Guidelines (Title 25, California Administrative Code Ch. 6, Art 1, Section 6000 et seq.). The residence is surrounded by industrial and commercial uses; only one other residence is located on Autumn Street between Santa Clara and San Fernando Streets. The removal of this residence would not cause or contribute to the physical division of a community.

Tunnel Easements

Tunnel easements would be obtained for an estimated 9 private properties for the alignment from Almaden Boulevard to Diridon Station and from approximately 33 private properties for the alignment from Diridon Station to just north of Pershing Avenue. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

Continuation of Tunnel Alignment

Of the three alternate locations for a mid-tunnel ventilation facility between Diridon Station and Santa Clara Station, the most southern alternate location would cause the displacement of one industrial business; the second alternate location would cause the displacement of eight industrial businesses; the third and most northern alternate location would cause the displacement of two industrial businesses.

The businesses that would be displaced in this area are mostly industrial warehouse establishments. As a result, local residents of the community likely do not visit these establishments on a regular daily basis. However, these establishments may be an employment source for the local and regional community; thus, relocation would have a temporary effect on employees during the transition.

Tunnel Easements

An estimated five tunnel easements would be obtained from private properties between Emory Street and the Newhall Maintenance Facility. Tunnel easements would not require property acquisitions or other associated surface impacts because they would be entirely underground.

End-of-the-Line Newhall Maintenance Facility

The Newhall Maintenance Facility would be constructed on the former UPRR Newhall Yard. No residential or business displacements would be required; however, one cellular tower located just south of De La Cruz Boulevard would need to be relocated within the same parcel to avoid conflict with the alignment. The property is owned by the City of Santa Clara and leased to a private company. Relocation of the cellular tower would require a building permit from the City of Santa Clara and new lease agreement.

Santa Clara Station

Construction of Santa Clara Station ~~may~~ would cause the displacement of a business. Apple Inc. operates a research and development facility on site, which represents an employment source for the local and regional community. Apple Inc. is not a disadvantaged or minority-owned business that would face undue hardship due to relocation and is not a business that would result in impacts on the surrounding community if displaced. Thus, relocation would have a temporary effect on employees during the transition. VTA will work with the tenant and owner to relocate the business with no anticipated long-term impacts on employees or owner. No residences would be affected.

Relocation Programs/Requirements

All displacement and relocation activities would be conducted in accordance with the Uniform Act, which ensures the fair and equitable treatment of persons and businesses whose real property is acquired or who are displaced as a result of a federal or federally assisted project. Government-wide regulations provide procedural and other requirements (appraisals, payment of fair market value, notice to owners, etc.) in the acquisition of real property and provide for relocation payments and advisory assistance in the relocation of persons and businesses.

VTA's Relocation Program, which complies with federal relocation requirements, provides assistance to affected residence and business owners. This assistance, which varies on a case-by-case basis, can be both financial (e.g., moving costs, rent subsidies, relocation costs, personal property losses, reestablishment expenses, etc.) and technical (e.g., providing information regarding suitable replacement sites, providing referrals, assisting with lease negotiations, assisting with moving logistics, etc.). Business owners also have the option of receiving a fixed payment in lieu of the payments for actual moving and related expenses and actual reasonable reestablishment expenses.

When acquisition occurs, properties would be appraised at fair market value and offers would be based on just compensation. For relocation, the availability of alternate sites would vary; however, the economy is characterized by a comfortable vacancy rate in the BART Extension area, which could easily accommodate the need for relocation space in a similar price range.

During ~~final design and~~ the engineering phase, VTA may determine that some parcels can be temporarily leased prior to being needed for construction. Also, the number of displacements, property acquisitions, and related relocations and easements required could change during ~~final design and~~ the engineering phase, as could the amount of land required from individual parcels.

Federal and state laws require consistent and fair treatment of owners of property to be acquired, including just compensation for their property. These laws also require uniform and equitable treatment of displaced persons or businesses. The provisions of VTA's Relocation Program will mitigate any adverse effects of the business and residential displacements.

4.14.5 NEPA Conclusion

Most of the property acquisitions required for the BART Extension Alternative would displace industrial and commercial types of businesses. VTA will work with the business owners to relocate businesses or access to minimize long-term impacts on employees and owners. VTA will prepare a RAMP and RAP, as required by FTA, addressing all of the parcels identified in the final ROW plans. VTA will adhere to the Uniform Act and FTA guidelines in acquiring real estate and relocating occupants, in addition to applicable state laws and regulations.

The final property acquisitions required to construct the BART Extension Alternative may change (i.e., increase or decrease in size, change type, and/or change from permanent to temporary, etc.) during ~~final design~~the engineering phase and construction. Also, during ~~final design~~the engineering phase and construction, additional easements may be identified such as temporary construction easements, temporary access easements, and long-term maintenance and access easements. It is the intent of this and previous environmental documents to disclose the potential environmental impacts of acquisitions known at the time the environmental document is prepared while recognizing that some adjustments may be necessary based on final design and/or working with individual property owners during the acquisition process or during construction. Should additional modifications beyond the scope of this environmental document trigger the need for additional environmental review, the necessary additional environmental analyses will be prepared.

Implementation of the BART Extension Alternative would accommodate growth on a regional level. By increasing connectivity and access to BART service, the BART Extension Alternative would indirectly result in the development and intensification of land uses in cities surrounding the study area. However, such population is anticipated in San Jose and Santa Clara land use planning documents. Once in operation, the BART Extension Alternative would also indirectly facilitate residential and employment growth planned for the regional area, particularly around station areas, consistent with the general plans. As a result, the BART Extension Alternative would have *no adverse effect* on socioeconomics.

4.15 Utilities

4.15.1 Introduction

This section describes the affected environment and environmental consequences related to utilities ~~water supply, wastewater treatment, solid waste disposal, and stormwater facilities~~ from operation of the NEPA Alternatives. The utilities within the BART Extension Alternative include water, wastewater, solid waste, stormwater, gas and electric lines, and communication facilities. Construction impacts are discussed in Chapter 5, Section 5.5.16, *Utilities*. For information regarding new electrical facilities and communication equipment for the BART Extension Alternative, refer to Chapter 2, *Alternatives*.

Information regarding utilities was determined through site assessment, potholing, and reviewing utility/public works documentation. The following sources of information were used to prepare the analysis in this section.

- *2010 Urban Water Management Plan* (San Jose Water Company 2011).
- *2010 Urban Water Management Plan* (City of Santa Clara Water and Sewer Utility 2011).
- *City of San Jose Storm Sewer and Sanitary Sewer Annual Reports* (City of San Jose 2013)
- *City of Santa Clara 2010–2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010–2035 General Plan EIR* (City of Santa Clara 2010b).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011).
- *Facility/Site Summary Details: Newby Island Sanitary Landfill (43-AN-003)* (California Department of Resources Recycling and Recovery 2015).
- *Industrial Sector: Estimated Solid Waste Generation Rates* (California Department of Resources Recycling and Recovery 2013).
- Personal Communication with representatives of the Newby Island Landfill.
- *Newby Island Sanitary Landfill and The Recyclery Rezoning Project* (City of San Jose 2009).
- *Sanitary Sewer Master Plan Initial Study/Addendum to General Plan EIR* (City of San Jose 2012).
- *VTA's BART Silicon Valley Phase II Extension Water Supply Assessment* (San Jose Water Company 2015).
- *BART Santa Clara Station and Joint Development [Water Supply Assessment]* (City of Santa Clara Water and Sewer Utility 2016).

4.15.2 Environmental and Regulatory Setting

4.15.2.1 Environmental Setting

Water Supply

San Jose

Water to the San Jose portions of the BART Extension would be provided by San Jose Water Company (SJWC), which provides water to over 219,000 accounts in Santa Clara County, including most of San Jose. In 2011, SJWC's Board of Directors adopted an Urban Water Management Plan (UWMP) in accordance with California's Urban Water Management Planning Act. This document provides an overview of SJWC's water supply sources and usage, recycled water, and conservation programs.

According to the UWMP, SJWC has three sources of potable water supply.

- Groundwater comprises approximately 40 percent of SJWC's water supply. SJWC has 91 active, 5 standby, and 16 inactive wells to draw water from major aquifers within the 225 square-mile Santa Clara Valley subbasin. These aquifers are recharged naturally by rainfall and artificially by recharge ponds operated by Santa Clara Valley Water District (SCVWD).
- Imported surface water provides 50 percent of SJWC's water supply. SJWC is under contract with SCVWD to purchase water originating primarily from the State Water Project and the Central Valley Project. The water is treated at a SCVWD water treatment plant before entering the SJWC system. Some of this imported water is also supplied by local reservoirs.
- Local surface water provides 5 to 10 percent of the SJWC's supply, depending on the amount of rainfall. A series of dams and intakes collect water released from SJWC's lakes and sends it to the Montevina Water Treatment Plant for treatment prior to entering the distribution system.

The UWMP concluded that SJWC has adequate water supplies to meet demand in its service area through 2035, but may encounter system-wide shortages during prolonged periods of drought.

Santa Clara

The City of Santa Clara Water and Sewer Utility (SCWSU) serves as the water retailer for all water users in Santa Clara, and had approximately ~~25,600~~25,715 water service connections in ~~2010~~2015. SCWSU's distribution system consists of ~~334~~335 miles of distribution mains, 33 miles of recycled water pipelines, and 7 storage tanks totaling 28.8 million gallons of storage capacity~~, and has a maximum supply capacity of 88 million gallons per day (mgd) of potable water and 18 mgd of recycled water~~. Average demand in 2015 was 16.8 ~~consumption is 20.9~~

million gallons per day (mgd) of potable water and ~~2.5~~3.2 mgd of recycled water (SCWSU 2016).

Santa Clara operates ~~28~~26 wells within an extensive local underground aquifer that provides about ~~68~~54 percent of the City's water supply. Approximately ~~21~~35 percent of the water supply is provided by two wholesale water agencies: SCVWD and San Francisco Public Utilities Commission. The remainder ~~remaining 11 percent~~ of Santa Clara's water supply is provided by recycled water from the San Jose/Santa Clara Regional Wastewater Facility (RWF)~~Water Pollution Control Plant's (WPCP)~~ under the South Bay Recycled Water program~~facility~~, and is used exclusively for irrigation.

Santa Clara's City Council in ~~2011~~2016 approved and adopted an UWMP, which concluded that the SCWSU has adequate water supplies to meet demand in its service area~~ through 2021~~, but may encounter system-wide shortages during prolonged periods of drought in future years.

Wastewater

San Jose/Santa Clara Regional Wastewater Facility~~Water Pollution Control Plant~~

The RWF~~WPCP~~ treats wastewater from San Jose and Santa Clara. The RWF~~WPCP~~ is a regional wastewater treatment facility serving eight tributary sewage collection agencies and is operated by the City of San Jose's Department of Environmental Services. The RWF~~WPCP~~ provides primary, secondary, and tertiary treatment of wastewater and has capacity to treat 167 mgd of wastewater under dry weather conditions. The design peak wet-weather flow is 271 mgd (~~City of Santa Clara~~ SCWSU 201~~5~~6). The RWF~~WPCP~~ currently operates at an average dry weather flow (ADWF) of 109 mgd, or 65 percent of its 167 mgd treatment capacity.

The RWF~~WPCP~~ is currently operating under a 120 mgd dry weather effluent flow constraint. This constraint is based upon regulatory concerns over the effects of additional freshwater discharges from the RWF~~WPCP~~ on the saltwater marsh habitat and pollutant loading in the San Francisco Bay (City of San Jose 2011).

San Jose's average dry weather flow is 69.8 mgd, or 64 percent of the City's total allocated 108.6 mgd of wastewater flow to the RWF~~WPCP~~ (City of San Jose 2011). Santa Clara's average dry weather flow is 13.3 mgd, or 59 percent of the Santa Clara's total allocated 22.585 mgd of wastewater flow to the RWF~~WPCP~~ (City of Santa Clara 2010b).

San Jose

The San Jose sanitary sewer system includes approximately 2,200 miles of sewer pipelines. In addition, 16 sewer pump stations move wastewater through the system where local topography inhibits gravity flow. Sewage from the West Valley Sanitation District, County Sanitation District 3, and portions of the Cupertino Sanitary District and SCWSU also flow through San Jose's wastewater collection system. Sewer lines are inspected and maintained by the San Jose Department of Transportation, and are rehabilitated or replaced by the San Jose Department of Public Works (SJPW).

The majority of domestic water used in San Jose becomes wastewater. Average wastewater flow rates are approximately 70 to 80 percent of domestic water use. For industries without internal recycling or reuse programs, approximately 85 to 95 percent of water used becomes wastewater.

San Jose's Sanitary Sewer Level of Service Policy seeks to ensure adequate capacity in existing sewer mains before development occurs that could compromise the ability of the system. There are six levels of service (LOS) that are used to determine under what conditions new developments are allowed to connect to the existing sewer system. The LOS are defined based on comparison of flows to existing sewer capacity. The *Sanitary Sewer Master Plan Initial Study/Addendum to General Plan Environmental Impact Report* identified approximately 200,000 feet of sewer pipeline that operates below the level of service target. These deficiencies will be addressed through ongoing implementation of the City's Sanitary Sewer Capital Program. New development in San Jose that would increase wastewater flow to capacity-deficient areas of the sanitary sewer system must contribute to system improvements.

Santa Clara

Santa Clara's wastewater collection system includes approximately 270 miles of sewer pipelines ranging from ~~4~~ 6 to 48 inches in diameter, and ~~61~~7 sewage pump stations. This system is owned and operated by the SCWSU. In addition to conveying Santa Clara's wastewater flows to the RWF~~WPCP~~, Santa Clara's wastewater system must provide conveyance capacity for up to 13.8 mgd from the City of Cupertino. Based on hydraulic modeling of the system, several sewer mains and collector lines are at or near capacity (City of Santa Clara 2010b). Much of the insufficient capacity exists in the northwestern portion of Santa Clara. New development in Santa Clara that would increase wastewater flow to capacity-deficient areas of the sanitary sewer system must contribute to system improvements.

Solid Waste

San Jose

San Jose generates approximately 1.7 million tons of solid waste annually (City of San Jose 2011). In 2008, approximately 60 percent of solid waste was recycled and 40 percent was landfilled. Of the amount landfilled, approximately 36 percent originated from residential sources, 36 percent originated from commercial, industrial and institutional sources, and 28 percent originated from construction and demolition sources. Solid waste and recycling collection services for San Jose businesses are provided by various franchised waste and recycling haulers.

San Jose is served by the Newby Island Landfill, located at 1601 Dixon Landing Road, Milpitas. The Newby Island Landfill has remaining capacity for approximately 21.2 million tons of solid waste and is expected to reach permitted capacity in 2041 (California Department of Resources Recycling and Recovery 2015). San Jose has an arrangement with the owners of the Newby Island Landfill to provide disposal capacity for the City through 2024.

Santa Clara

Solid waste collection in the City of Santa Clara is provided by Mission Trail Waste Systems through a contract with the City. In 2013, Santa Clara disposed of 120,563 tons of solid waste (Local Agency Formation Commission of Santa Clara County 2015). Mission Trail Waste Systems also has a contract to implement the Clean Green portion of the City's recycling plan by collecting yard waste. Recology Silicon Valley provides supplementary recycling services.

Santa Clara has an arrangement with the Newby Island Landfill to provide disposal capacity for the City through 2024 (City of Santa Clara 2010b).

Stormwater

San Jose

The San Jose stormwater system is designed to convey stormwater away from urban areas to local creeks and rivers, and ultimately to the San Francisco Bay. This system consists of approximately 1,150 miles of stormwater pipe, 29,900 storm drain inlets, 4,500 miles of curb and gutter, 1,500 outfalls, and 29 pump stations. These facilities are maintained by the San Jose Department of Transportation and upgraded by the SJPW (City of San Jose 2013).

Since the mid-1980s, San Jose has required that storm sewer systems be designed to convey stormwater from a 10-year storm event (a storm large enough to have a 10 percent chance of occurring in any year). However, over 93 percent of the existing stormwater system is designed to an older 3-year storm event standard. While new development is required to design their onsite storm system to accommodate a 10-year event, they are not required to address deficiencies of the downstream system to which they connect.

San Jose is currently preparing a Storm Drain Master Plan to meet long-term system capacity and water quality objectives. This document is anticipated in 2017.

Santa Clara

Santa Clara's storm drain system consists of curb inlets that collect and channel surface water, from rainfall and other sources, into a series of pipelines beneath city roadways. Stormwater is conveyed through these underground pipelines to the channelized creeks <u>and rivers</u> within Santa Clara, which then direct flow into the San Francisco Bay (City of Santa Clara 2010b).

Gas and Electricity

San Jose

Pacific Gas and Electric Company (PG&E) controls the gas and electric lines in San Jose.

Santa Clara

PG&E controls the gas lines in Santa Clara. Silicon Valley Power provides electrical service.

Communications

The communication facilities, including fiber optic and telephone lines, are owned by a variety of companies. Communication companies with facilities in San Jose and Santa Clara include Sprint, Verizon (formerly MCI/MFS), Level 3, XO Communications, City of San Jose, AT&T (formerly SBC), Qwest, and Comcast.

4.15.2.2 Regulatory Setting

There are no federal regulations regarding utilities that would be applicable to the BART Extension under NEPA. However, there are several state and local land use regulations applicable to the BART Extension. Please refer to Chapter 6, Section 6.13, *Utilities*, for a summary of state and local land use policies applicable to the BART Extension**.**

4.15.3 Methodology

In the following section, the BART Extension's potential impacts on utilities are measured by intensity using the terms *no effect*, *no adverse effect*, and *adverse effect*, which are defined as follows.

- *No effect* on utilities would mean no measurable increase in use of utilities.
- *No adverse effect* on utilities is defined as an impact that would increase use of utilities but that would not result in substantial degradation in service, violate a regulatory standard, or conflict with or exceed the capacity of existing utilities.
- An *adverse effect* on utilities is defined as an impact that would contribute to a violation of regulatory standards or would exceed the capacity of existing utilities.

Adverse effects on water utilities would result if the BART Extension operations exceeded existing water entitlements or required the construction of new or expanded water infrastructure. Adverse impacts on wastewater utilities would result if the BART Extension operations exceeded existing wastewater infrastructure capacity and directly required the construction of new or expanded wastewater infrastructure. Adverse impacts on solid waste services would result if landfills serving the BART Extension lacked adequate capacity to accommodate the BART Extension solid waste disposal needs. Adverse impacts on stormwater systems would result if the BART Extension operations exceeded existing stormwater infrastructure capacity and directly required the construction of new or expanded wastewater infrastructure.

4.15.4 Environmental Consequences and Mitigation Measures

This section identifies impacts on utilities and evaluates whether they would be adverse according to NEPA, using the criteria (i.e., context and intensity) identified in Section 4.15.3, *Methodology*, and in Section 4.1, *Introduction*.

4.15.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for lists of these projects). These projects would likely result in effects on utilities typically associated with transit, highway, bicycle, pedestrian facility and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect utilities, which would include an analysis of mitigation measures to mitigate potential impacts on utilities.

4.15.4.2 BART Extension Alternative

The BART Extension consists of an approximately 6-mile extension of the BART system and includes the construction and operation of four new BART stations, two ventilation facilities, and the Newhall Maintenance Facility. Other features include electrical facilities, power stations, and pump stations, and communication equipment.

Water Supply

San Jose

The Alum Rock/28th Street, Downtown San Jose, and Diridon BART Stations would require water supply for operational purposes, including restrooms and custodial needs. The portion of the Newhall Maintenance Facility located in San Jose would also require water supply, mostly related to the train car washer. According to SJWC calculations based on information provided by VTA, daily water usage for the stations and maintenance facilities in San Jose would be approximately 0.04 acre-feet (AF[1]), which would be provided by SJWC (SJWC 2015).

SJWC prepared a Water Supply Assessment (WSA) for the BART Extension, which was approved by the City of San Jose on January 27, 2016. According to this WSA, SJWC supplied customers with 336 AF of water per day in 2010 (SJWC 2015). The BART Extension Alternative's daily water demand in San Jose represents a 0.01 percent increase in SJWC's 2010 water demand.[2] SJWC concluded that there are sufficient water supplies to provide service to the BART station and facilities in San Jose. Therefore, the BART

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[1] 1 acre-foot is approximately 325,851 gallons.

[2] 0.04 AF (estimated daily water usage at BART Extension in San Jose) divided by 336 AF (daily water supplied by SJWC in 2010) = 0.0001.

Extension Alternative would have *no adverse effect* on SJWC's water supply, and no mitigation would be required.

Santa Clara

The Santa Clara BART station would require water supply for operational purposes, including restrooms and custodial needs. The portion of the Newhall Maintenance Facility located in Santa Clara would also require water supply, mostly related to the blowdown facility. According to SCWSU's calculations based on information provided by VTA, daily water usage at the BART station and Newhall Maintenance Facility in Santa Clara would be approximately 0.02 AF, which would be provided by SCWSU (2016).

SCWSU prepared a WSA for the BART Extension, which was approved by the City of Santa Clara on April 5, 2016. According to this WSA, SCWSU supplied customers with 63.6 AF per day in 2010 (SCWSU 2016). Therefore, the BART Extension's water demands in Santa Clara would represent a 0.03 percent increase in SCWSU's 2010 water demand.[3] SCWSU concluded that there are sufficient water supplies to service to the BART station and facilities in Santa Clara. Therefore, the BART Extension Alternative would have *no adverse effect* on SCWSU's water supply, and no mitigation would be required.

Water Conveyance Infrastructure

SJWC owns and operates the water conveyance system that would serve the BART Extension Alternative in San Jose. SCWSU owns and operates the water conveyance system that would serve the BART Extension Alternative in Santa Clara. SJWC and SCWSU would be responsible for providing onsite water infrastructure to connect BART stations and facilities to the existing water supply system.

Water supply at the BART stations and facilities may contribute to capacity deficiencies within offsite supply networks, which represents a potential impact to utility systems. With implementation of Mitigation Measures UTIL-A and UTIL-B as revised, as a building permit is not required for the BART Extension Alternative, this impact would have *no adverse effect*.

Mitigation Measure UTIL-A: Prepare a San Jose Water Supply Infrastructure Capacity Assessment and Participate in the Improvements

~~Prior to the issuance of a building permit,~~ VTA will coordinate with SJWC and prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite water supply infrastructure. The SJWC may conduct a detailed engineering study and flow analysis to determine the extent of these impacts.

[3] 0.02 AF (estimated daily water usage at BART Extension Alternative in Santa Clara) divided by 63.6 AF (daily water supplied by SCWSU in 2010) = 0.0003.

The contractor will implement c~~C~~apacity-relief upgrades ~~will occur~~ during the utility relocation phase of construction ~~and will be implemented~~ in accordance with SJWC requirements. The contractor will ensure that all c~~C~~onstruction activities follow ~~will be subject to~~ the provisions outlined in this environmental document, including implementation of Mitigation Measure TRA-CNST-A: Develop and Implement a Construction Education and Outreach Plan~~the construction education and outreach plan~~, to reduce potential impacts and increase participation.

Mitigation Measure UTIL-B: Prepare a Santa Clara Water Supply Infrastructure Capacity Assessment and Participate in the Improvements

~~Prior to the issuance of a building permit,~~ VTA will coordinate with SCWSU and prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite water supply infrastructure. The SCWSU may conduct a detailed engineering study and flow analysis to determine the extent of these impacts and participation.

The contractor will implement c~~C~~apacity-relief upgrades ~~will occur~~ during the utility relocation phase of construction~~,~~ ~~and will be implemented~~ in accordance with Chapter 17.15.210 of the Santa Clara City Code. The contractor will ensure that all c~~C~~onstruction activities ~~will be subject to~~ follow the provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Wastewater Treatment

Wastewater would be generated at the BART stations and Newhall Maintenance Facility. The total amount of wastewater generated by the BART Extension Alternative is not anticipated to exceed the amount of water supplied to the BART Extension. The RWF~~WPCP~~ treats wastewater from both San Jose and Santa Clara, and has the capacity to treat 167 mgd (ADWF). The RWF~~WPCP~~ presently operates at an ADWF of 109 mgd, or 65 percent of its 167 mgd treatment capacity. In addition, BART recycles (treats and reuses) its train wash water through onsite treatment systems at all of its existing yards. The feasibility of implementing a water recycling system, which would reduce wastewater generation at the Newhall Maintenance Facility, also would be evaluated during the engineering phase~~final design~~.

San Jose's current ADWF is 69.8 mgd, or 64 percent of San Jose's allocated 108.6 mgd of wastewater flow to the RWF~~WPCP~~. According to the SJWC WSA, the BART Extension Alternative within San Jose would increase the amount of wastewater flowing to the RWF~~WPCP~~ by approximately 8,000 gpd. This represents 0.02 percent of San Jose's remaining allocated capacity at the RWF~~WPCP~~.[4] Santa Clara's current ADWF is 13.3 mgd,

[4] 8,000 gallons (daily water requirements for San Jose's portions of the BART Extension Alternative) divided by 38,800,000 gallons (San Jose's remaining capacity at the RWF~~WPCP~~) = 0.0002.

or 59 percent of Santa Clara's allocated 22.585 mgd of wastewater flow to the RWF~~WPCP~~. According to SCWSU's WSA, the BART Extension Alternative within Santa Clara would increase the amount of water flowing to the RWF~~WPCP~~ by 4,841.8 gpd. This represents 0.05 percent Santa Clara's remaining allocated capacity at the RWF~~WPCP~~.[5]

The BART Extension Alternative would incrementally increase wastewater flowing to RWF~~WPCP~~, but is not likely to trigger the need for new or expanded wastewater treatment facilities. There would be *no adverse effect* on the RWF~~WPCP~~, and no mitigation would be required.

Wastewater Conveyance Infrastructure

Wastewater generated by operation of the BART Extension Alternative in San Jose would be conveyed to the RWF~~WPCP~~ through the San Jose sanitary sewer system. Wastewater generated by operation of the BART Extension Alternative in Santa Clara would be conveyed to the RWF~~WPCP~~ through the Santa Clara sanitary sewer system.

The BART Extension Alternative would be responsible for providing onsite sewer infrastructure, such as laterals and extensions, connecting BART stations and facilities to the existing sewer system. New sewer infrastructure would be designed in accordance with applicable LOS guidelines and installed during BART Extension construction.

Wastewater generated at the BART stations and facilities may contribute to capacity deficiencies within offsite sewer systems. This represents a potential impact on utility systems; however, with implementation of Mitigation Measures UTIL-C and UTIL-D, as revised, as a building permit is not required for the BART Extension Alternative, this impact would have *no adverse effect*.

Mitigation Measure UTIL-C: Prepare a San Jose Sewer Capacity Assessment and Participate in the Improvements

~~Prior to zoning approval,~~ VTA will coordinate with SJPW to prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite sanitary sewer capacity deficiencies. SJPW may conduct a detailed engineering study and hydraulic analysis to determine the extent of these impacts.

VTA will mitigate impacts on downstream sewer systems in San Jose through payment of the Sanitary Sewer Connection Fee, as required, which is used to rehabilitate and enhance sewer capacity through San Jose's Sanitary Sewer Capital Improvement Program. If payment to the Sanitary Sewer Connection Fee does not adequately mitigate potential offsite sewer capacity impacts related to the BART Extension, VTA will be responsible for direct upgrades to the sewer system ~~will be required~~. If sewer system overcapacity is a result of projected cumulative development, San Jose and VTA ~~shall~~

[5] 4,841.8 gallons (daily water requirements for Santa Clara's portions of the BART Extension Alternative) divided by 9,285,000 gallons (Santa Clara's remaining capacity at the RWF~~WPCP~~) = 0.0005.

will develop a Cooperative Agreement to determine the BART Extension Alternative's participation in upgrades to the current system.

The contractor will implement c~~C~~apacity-relief upgrades ~~will occur~~ during the BART Extension's construction phase~~, and will be conducted~~ in accordance with applicable San Jose standards regarding sewer infrastructure improvements. Generally, the contractor will locate sewer infrastructure improvements ~~will be located~~ within the existing public right-of-way, with minimal potential to impact sensitive environmental resources. The contractor will ensure that c~~C~~onstruction activities follow~~will be subject to~~ the provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Mitigation Measure UTIL-D: Prepare a Santa Clara Sewer Capacity Assessment and Participate in the Improvements

~~Prior to zoning approval,~~ VTA will coordinate with SCWSU to prepare a Cooperative Agreement to establish the BART Extension Alternative's participation in improvements to offsite sanitary sewer capacity deficiencies. SCWSU may conduct a detailed engineering study and hydraulic analysis to determine the extent of these impacts.

VTA will mitigate impacts on downstream sewer systems in Santa Clara through payment of the Sanitary Sewer Connection Charge, as required, which is used to rehabilitate and enhance sewer capacity through Santa Clara's Capital Improvement Program. If payment to the Sanitary Sewer Connection Charge does not adequately mitigate potential offsite sewer capacity impacts related to the BART Extension, VTA will be responsible for direct upgrades to the sewer system~~ may be required~~. If sewer system overcapacity is a result of cumulative development, Santa Clara and VTA ~~shall~~ will develop a Cooperative Agreement to determine the BART Extension Alternative's proportional participation to the upgrades to current system capacity.

The contractor will implement ~~C~~capacity-relief upgrades improvements ~~would occur~~ during the BART Extension's construction phase~~, and will be implemented~~ in accordance with Chapter 17.15.210-280 of the Santa Clara City Code. Generally, the contractor will locate sewer infrastructure improvements ~~will be located~~ within the existing public right-of-way, with minimal potential to impact sensitive environmental resources. The contractor will ensure that c~~C~~onstruction activities ~~will be subject~~ follow~~to~~ the provisions outlined in this environmental document, including implementation of the construction education and outreach plan, to reduce potential impacts.

Solid Waste

BART facilities would generate solid waste at the Newhall Maintenance Facility and the stations. The Newhall Maintenance Facility would generate approximately 0.8 tons per day (tpd) of solid waste in San Jose, and 0.7 tpd in Santa Clara. Users of the three stations in San Jose would generate approximately 3.3 tpd of solid waste, and users of the Santa Clara station would generate approximately 1.1 tpd of solid waste. In total, 5.9 tpd of solid waste would be generated by the BART Extension. Track corridors along the BART alignment would not generate solid waste. Daily maintenance of right-of-way might be required to dispose of waste items that stray onto tracks, but this amount of waste is expected to be negligible.

The Newby Island Landfill has a maximum permitted throughput of 4,000 tpd of solid waste, and currently receives an average of 2,600 tpd of solid waste (Boccaleoni pers. comm.). Annual solid waste generated by the BART facilities would represent 0.4 percent of Newby Island Landfill's remaining daily capacity.[6]

The BART Extension Alternative is scheduled for operation beginning in 2026, and therefore extends beyond currents contracts between Newby Island Landfill and San Jose and Santa Clara. These contracts were based Newby Island Landfill's original 2025 closure date. In 2014, the state granted an expansion of the Newby Island Landfill and extended the landfill's estimated closure date from 2024 to 2041. Though it is uncertain whether San Jose and Santa Clara will continue to dispose of solid waste at the Newby Island Landfill beyond 2024, this facility has sufficient capacity to accept solid waste generated by the BART Extension Alternative. Therefore, solid waste generated by the BART Extension Alternative would not exceed the collective capacity of regional landfills that may serve the project beyond 2024, and *no adverse effect* would occur.

Stormwater

New and renovated facilities would be drained by a combination of existing, new, and modified stormwater infrastructure throughout San Jose and Santa Clara. As discussed in Section 6.15, *Water Resources, Water Quality, and Floodplains*, the BART Extension would increase the total amount of impervious surfaces relative to existing conditions, thus resulting in higher stormwater volumes and velocities into the stormwater system. However, new drainage improvements would be implemented to ensure that runoff does not exceed the capacity of existing or planned stormwater infrastructure.

After designs are finalized, a Stormwater Management Report will be prepared to document the final design for stormwater management and ensure sufficient storm drain capacity. The storm drainage infrastructure would be operated in accordance with the Phase II MS4 NPDES Permits within BART fenced areas and VTA-owned right-of-way. New drainage systems within VTA managed areas would be designed in accordance with the post-construction stormwater treatment measures included in VTA's Stormwater and Landscaping Design Criteria Manual, which includes the requirements of the Phase II MS4 NPDES Permit. Other applicable NPDES requirements will be applied when facilities are built within other agencies' fee owned right-of-way (for example, City streets and/or Caltrans jurisdiction) and when constructing facilities that will be subject to the Industrial General

[6] 5.9 tons (daily solid waste generated by BART Extension Alternative) divided by 1,400 tons (daily input capacity remaining at Newby Island Landfill) = 0.004

Permit (for example, the Newhall Maintenance Facility). Therefore, operation of the BART Extension would have *no adverse effect* on stormwater infrastructure, and no mitigation is required.

Gas and Electricity

As described in Section 2.2.2.1, a high-voltage substation, TPSS, and TCCR would be located at a systems facility site above the West Tunnel Portal and near PG&E's FMC Substation in the City of San Jose. PG&E will be requested to provide power connection to serve the high-voltage substation. Section 4.7.4, *Energy,* evaluates energy consumption of BART vehicle propulsion and station operations. Additionally, a master agreement established with PG&E for the Phase I BART Extension Project may be amended for the Phase II Project.

4.15.5 NEPA Conclusion

With implementation of Mitigation Measures UTIL-A through UTIL-D, the BART Extension Alternative would result in *no adverse effects* on utility systems.

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4.16 Visual Quality and Aesthetics

4.16.1 Introduction

This section describes the affected environment and environmental consequences related to visual quality and aesthetics from operations of the NEPA Alternatives. Information regarding visual quality and aesthetics in the City of San Jose and the City of Santa Clara was obtained from:

- *Envision San Jose 2040 General Plan* (City of San Jose 2011a).
- *Envision San Jose 2040 General Plan EIR* (City of San Jose 2011b).
- *City of Santa Clara 2010-2035 General Plan* (City of Santa Clara 2010a).
- *City of Santa Clara 2010-2035 General Plan EIR* (City of Santa Clara 2010b).

4.16.2 Environmental and Regulatory Setting

4.16.2.1 Environmental Setting

The BART Extension would be generally located in an urbanized portion of central San Jose and the southeast portion of Santa Clara, approximately 45 miles southeast of San Francisco and within the Santa Clara Valley. The Santa Clara Valley is bounded on the west by the Santa Cruz Mountains and on the east by the Diablo Range and runs south–southeast from the southern end of the San Francisco Bay. Visual quality, prominent features, and scenic resources within San Jose and Santa Clara are described below.

Visual Study Area

The visual study area for the BART Extension is the area visible from the alignment and from which the BART Extension features can be seen. The visual study area includes the alignment, which is relatively flat and extends approximately 6 miles from just east of U.S. Highway 101 (U.S. 101) and south of Mabury Road in San Jose to approximately the Santa Clara Caltrain Station. The visual study area also includes the available offsite views from within the alignment. Given that the majority of the BART Extension is underground and thus would not be visible, this analysis focuses on aboveground features. Viewer groups within the visual study area consist of existing residents; workers at office or industrial sites; and pedestrians, bicyclists, and drivers using roadways in the vicinity of the aboveground features, namely station areas, parking structures, ventilation facilities, systems facility sites, and at-grade portions of the alignment.

City of San Jose

The visual study area for San Jose extends from Mabury Road to just north of Interstate (I-) 880. The surrounding land uses adjacent to the alignment from Mabury Road to Santa Clara

Street are characterized primarily by industrial uses, composed of large, boxed-shaped industrial buildings painted in neutral colors and associated surface parking lots. The alignment along Santa Clara Street from U.S. 101 to South 7th Street transitions to a mixture of low-rise industrial and commercial buildings, with intermittent single-family and multiple-unit housing on small lots. Santa Clara Street is lined with various types of mature trees with intermittent large, commercial billboards. West of South 7th Street, mid-rise commercial buildings and high-rise contemporary-style office buildings in the downtown San Jose area dominate the visual character. There are a few open-space areas along the alignment, including Roosevelt Park adjacent to Coyote Creek and the Guadalupe River Park and Gardens recreational area near the Diridon Station South and North Options.

Panoramic views of hillside areas, including the foothills of the Diablo Range, Silver Creek Hills, Santa Teresa Hills, and Santa Cruz Mountains, are key scenic features in the San Jose area. Intermittent views of the eastern foothills are available from Mabury Road and North 28th Street between Julian Street and Santa Clara Street, and there are also views of the Santa Cruz Mountains from Santa Clara Street at Cahill Street. There are no scenic byways or highways within the San Jose visual study area. Overall, the views are typical of an urban area, and no memorable views of natural features exist, with the exception of the distant hillsides.

In the vicinity of the Alum Rock/28th Street Station, the Five Wounds ~~National~~ Portuguese <u>National</u> Church and School (Five Wounds Church), which is an ornate, sixteenth-century style church built in 1919, is located on Santa Clara Street west of U.S. 101 immediately adjacent to the Alum Rock/28th Street Station, and is considered a landmark and architectural resource by the San Jose general plan within the San Jose visual study area. The primary viewer groups would be workers in nearby industrial and commercial buildings; visitors of the Five Wounds Church; residents in the Roosevelt Park neighborhood west of 28th Street between Julian Street and Santa Clara Street; and motorists, pedestrians, and cyclists in the area, particularly those traveling along Santa Clara Street and 28th Street. Views primarily consist of industrial buildings and the visually prominent Five Wounds Church near 28th and Santa Clara Streets. The eastern foothills are located approximately 4 miles northeast of the study area and can be seen intermittently from 28th Street looking east.

In the vicinity of the 13th Street Ventilation Structure, there are primarily one- and two-story neutral colored commercial buildings and street trees, with distant views of large-scale buildings associated with downtown San Jose. Single-family residential homes are located north of the ventilation structure on either side of 13th Street within the Julian/St. James and Horace Mann neighborhoods.

In the vicinity of the Downtown Station options, the San Jose Downtown Historic District is located along Santa Clara Street between 4th Street and 1st Street and also contains several historic buildings listed in the City's Historic Resources Inventory (refer to Section 4.5, *Cultural Resources*, for details related to historic buildings in the area). These are located immediately adjacent to components of the BART Extension Alternative such as new station portals, and are considered visual resources within the San Jose study area for the Downtown Station options. One- to two-story commercial uses transition to large-scale institutional and office buildings with tree-lined streets traveling west along Santa Clara Street toward downtown San Jose.

The historic Diridon Station is located immediately adjacent to the existing Diridon Station on Cahill Street. Near the existing Diridon Station, views are dominated by the visually prominent SAP Center, paved parking areas, transportation amenities, and light industrial uses. Intermittent views of the distant Santa Cruz Mountains are available from Santa Clara Street at Cahill Street looking south. The Santa Cruz Mountains are located over 8 miles south of the study area.

One-story neutral colored industrial uses are located on the Stockton Avenue Ventilation Structure site. Intermittent street trees line Stockton Avenue, and several overhead power lines are visible. Across Stockton Avenue to the west is the Garden Alameda neighborhood, which consists of mostly one- and two-story single-family residences.

City of Santa Clara

The City of Santa Clara visual study area extends from north of I-880 to the existing Santa Clara Caltrain Station and north of Benton Street. The study area is characterized primarily by industrial and commercial uses along the alignment. New single-family multi-story residences are located on the west side of the study area north of I-880, and have neutral coloring with 10- to 14-foot-high walls separating the residences from the existing Caltrain tracks. The industrial areas are dominated by large, neutral-colored buildings with parking lots surrounding the buildings containing sparse landscaping. The built-up, industrial landscape continues on the east side of the alignment. Small commercial, single-story strip malls, institutional buildings such as the Santa Clara Police Department, and the historic Santa Clara Caltrain Station are located near the northern terminus of the study area on the west side of the existing Caltrain tracks that traverse Santa Clara east to west in this location. Santa Clara University is located less than 0.25 mile southwest of the Santa Clara Caltrain Station across El Camino Real. Several trees are along the perimeter of the Santa Clara Caltrain Station and line the El Camino Real corridor. Elements of the historic Santa Clara Caltrain Station/Station Depot (historic Depot) are visual resources, which is located less than 0.10 mile west of the proposed Santa Clara Station platform.

The primary viewer groups are workers in nearby industrial and commercial buildings and passengers at the Santa Clara Caltrain Station; visitors and staff of the Santa Clara Police Department; and motorists, pedestrians, and cyclists in the area. Additional viewers include residents in the surrounding neighborhoods, north of Campbell Avenue and west of Newhall Street, and southwest of El Camino Real between De La Cruz Boulevard and Franklin Street. Views primarily consist of a mix of industrial uses, multi-story homes, strip mall–style commercial complexes, and the existing Santa Clara Caltrain Station. Intermittent views of the eastern foothills are available from El Camino Real and within the existing Santa Clara

Caltrain Station; however, there are no high quality views of any scenic vistas or mountain ranges within the study area.

4.16.2.2 Regulatory Setting

There are no federal laws that specifically define or protect visual resources; however, state and local regulations provide protection for scenic views and other visual resources. Most local jurisdictions have provisions for design review of all commercial, industrial, or public buildings, facilities, or other major infrastructure. Refer to Chapter 6, Section 6.14, *Visual Quality and Aesthetics*, for a description of relevant state and local regulations.

4.16.3 Methodology

Pursuant to the National Environmental Policy Act (NEPA), impacts were assessed through evaluation of the degree to which the BART Extension would change the existing visual quality of the study area and consideration of viewer sensitivity. Analysis of visual effects under NEPA considers context for both the existing visual quality *category* of a viewed landscape (high, moderately high, moderate, moderately low, or low) and the viewer sensitivity (high, moderate, or low).

An *adverse effect* on visual quality and aesthetics would involve a negative change of two or more visual categories (e.g., from high to moderate) where viewer groups of high or moderate sensitivity would see it.

The method used to evaluate visual effects is based upon accepted visual analysis techniques, such as those employed by the Federal Highway Administration (FHWA) (1988). The FHWA approach provides both a framework and methodology for assessing the potential impacts associated with highway projects. These methods have been adapted to address the BART Extension and include systematic inventory of existing visual conditions, documentation of visual change, and evaluation of viewer response to change.

The evaluation of visual change considers several factors:

- The extent of visibility and the degree to which the various BART Extension elements would contrast with or be integrated into the existing urban landscape.
- The extent of change in the affected view's composition and character.
- The relative number and sensitivity of viewers.

Areas possessing sensitive viewer groups or offering scenic views were identified for the purpose of evaluating the visual effects of the BART Extension, and 10 important viewpoint locations were selected within the vicinity. Visual simulations were prepared using computer-generated information overlaid on the photo images of the selected viewpoints to show height and massing of the structural elements that would be seen from each viewpoint. Architectural features were included to make the features appear realistic; however, the simulations are not intended to represent the final design or architectural expression of the

BART Extension. Their purpose is to depict the general mass of key station elements as they relate to the surrounding areas. Architecture for the stations would be developed with the City partners and with community input and would be defined in subsequent design phases. Figure 4.16-1 shows the locations of ~~10~~ 17 viewpoint locations.

4.16.4 Environmental Consequences and Mitigation Measures

This section identifies impacts within the visual study area and evaluates whether they would be adverse according to NEPA.

4.16.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements along the alignment (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these features). The No Build Alternative would likely result in visual effects typically associated with transit, highway, bicycle, and pedestrian, facilities, and roadway projects. These projects are not anticipated to adversely affect the visual character or scenic views in the area. Projects planned under the No Build Alternative would, however, undergo separate environmental review to determine whether the projects would result in adverse visual effects. Review would include an analysis of impacts and identification of mitigation measures to mitigate potential project impacts.

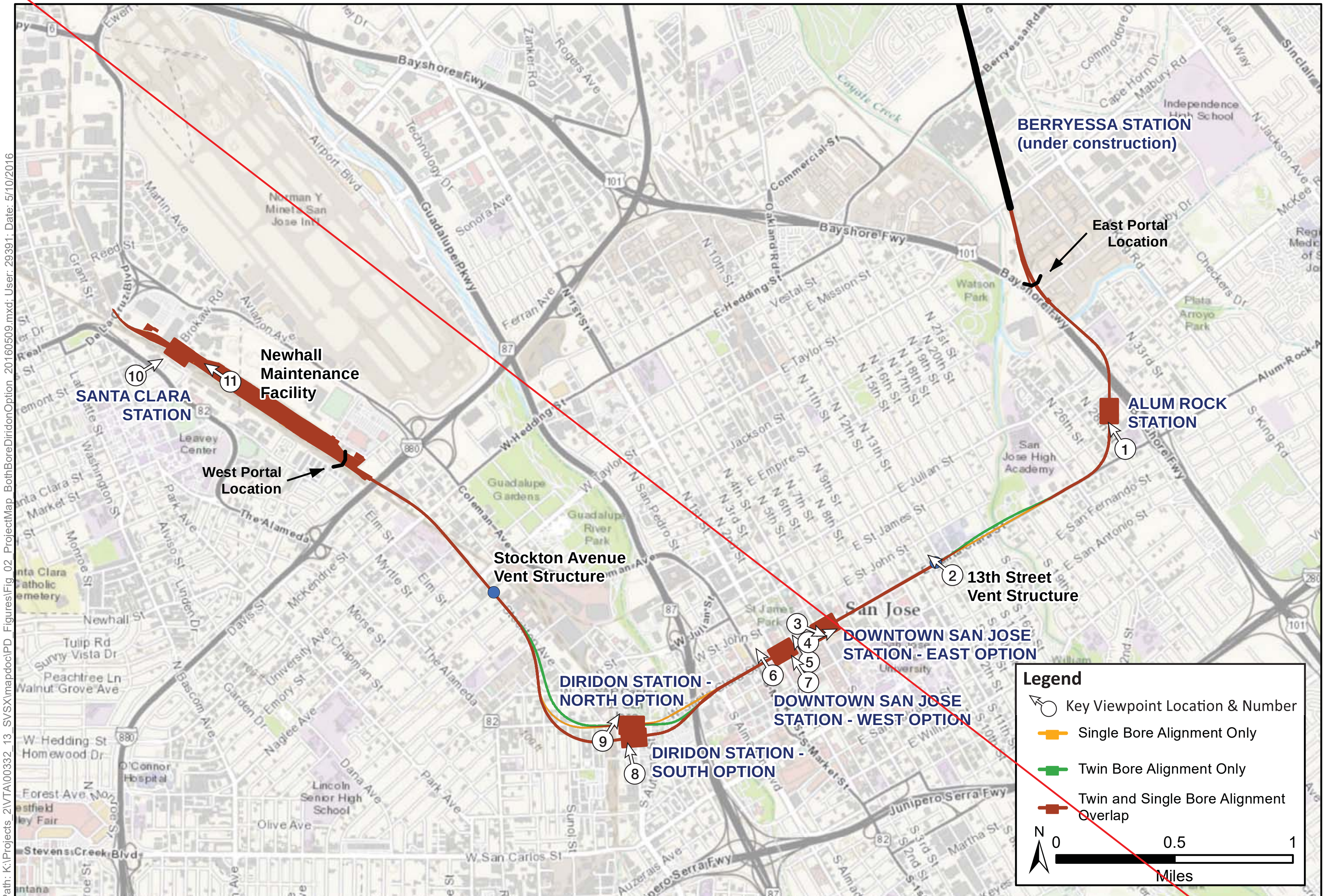
4.16.4.2 BART Extension Alternative

City of San Jose Visual Study Area

Connection to Phase I Berryessa Extension

The BART Extension would reconfigure the tail tracks south of Mabury Road in San Jose. Aboveground features in this area include a small portion of the tracks before they descend into a tunnel portal just north of Las Plumas Avenue, and an aboveground structure at the tunnel portal. Currently this area is occupied by an open, flat dirt lot and old railroad tracks. East of the site, land uses are predominantly industrial between Mabury Road and Coyote Creek. West and north of the site is mostly industrial, and the U.S. 101 corridor travels along the southwest side of the alignment.

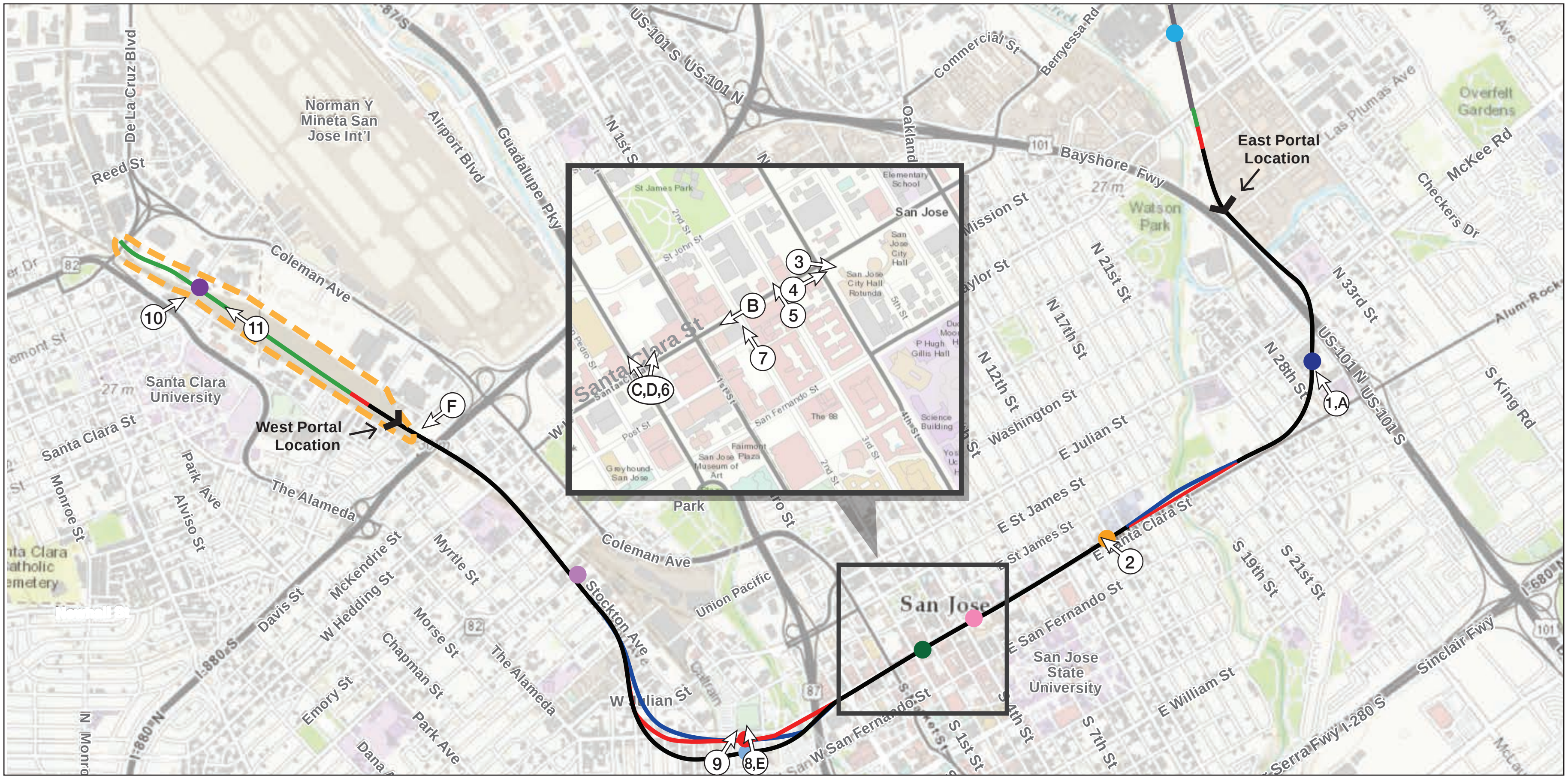
The visual character in this area is defined by one- and two-story, neutral-toned industrial buildings, as well as vehicles traveling along U.S. 101. Single-family residential neighborhoods and street trees are located farther southeast beyond the immediate industrial landscape. Given that the majority of the surrounding visual landscape is dominated by industrial and transportation uses, the visual quality of this area is low. There are no high quality scenic views or vistas within this area.



Path: K:\Projects_2\VTA\00332_13_SVSX\mapdoc\PD_Figures\Fig_02_ProjectMap_BothBoreDiridonOption_20160509.mxd; User: 29391; Date: 5/10/2016

Source: Station and Track, VTA 2014; Basemap, ESRI 2015

Figure 4.16-1
Viewpoints Map for Visual Simulations
VTA's BART Silicon Valley–Phase II Extension Project



Legend

- Double Bore Tunnel
- Single Bore Tunnel
- Tunnel Overlap
- Above-ground Alignment
- Berryessa Extension (under construction)
- Newhall Maintenance Facility
- Key Viewpoint Location
- ~~Berryessa Station (under construction)~~
- Berryessa/North San Jose Station (Future)
- Alum Rock/28th Street Station
- Downtown San Jose Station - East Option
- Downtown San Jose Station - West Option
- Diridon Station - North Option
- Diridon Station - South Option
- Santa Clara Station
- ~~Joint Development Area~~
- Stockton Avenue Ventilation Structure
- 13th Street Ventilation Structure

Graphics ... 00332.13 (11-6-2017)

Figure 4.16-1
Viewpoints Map for Visual Simulations (Revised)
VTA's BART Silicon Valley–Phase II Extension Project

Existing lighting in the area is minimal as the majority of land uses are industrial. Streetlights are intermittingly dispersed along the surrounding roadways, and additional lighting is provided by the industrial facilities in the area.

Viewers in this area primarily consist of motorists traveling on U.S. 101 and employees working at the industrial sites. Motorists and employees have low viewer sensitivity because motorist views are short in duration, and employees likely spend most of their time indoors focused on their work. Residents typically have moderate to high viewer sensitivity depending on the quality of view. At this location, the quality of views for residents is low, as the nearest residences are over 0.3 mile north of the aboveground features. Given the distance of the BART Extension features from sensitive viewers, and the existing surrounding industrial and transportation uses, moderate viewer sensitivity is assumed.

Lighting at the tunnel portal would be directed downward and would not spillover to any residences. The BART Extension would be consistent with the existing industrial and transportation uses in the vicinity of the site. The portal structure would be small and consistent with surrounding structures. The BART Extension would not substantially degrade the existing visual character or quality of the site. Therefore, there would be *no adverse effects* on visual quality and aesthetics. No mitigation would be required.

Alum Rock/28^{th} Street Station

The alignment would continue in a tunnel and transition into Alum Rock/28^{th} Street Station just east of 28^{th} Street and north of Santa Clara Street. Aboveground features would include up to a seven-story parking structure, which would be located in the west corner of the station area, as well as a small area of system facilities at the north corner of the parking structure. Industrial uses such as Monarch Truck Dealership, SCS Contractor Service, Mission Concrete, and Granite Counters are currently located onsite.

The surrounding visual character is characterized by industrial buildings, warehouses, and storage yards, immediately adjacent to the station site. Low- and medium-density residential uses are located across U.S. 101 to the north and east of the station site, as well as to the west of 28^{th} Street and the existing out-of-service railroad tracks. The Portuguese Band and Social Center is located to the west of the station site, and the visually prominent Five Wounds Church and Cristo Rey San Jose Jesuit High School~~associated elementary school~~ are to the southeast. Given the mix of industrial and residential uses, the visual quality of the area is considered moderate. Figure 4.16-~~1~~2 shows the corner of Santa Clara Street and 28^{th} Street looking north toward the historic Five Wounds Church, the Alum Rock/28^{th} Street Station site, and associated parking structure.

Viewers in this area primarily consist of church attendees~~,~~; store patrons,;~~,~~ passing motorists~~,~~; residents in the Roosevelt Park neighborhood~~,~~; students, parents, faculty, and staff of Cristo Rey San Jose Jesuit High School; pedestrians~~,~~; and bicyclists. Given the predominately industrial character of the landscape, viewer sensitivity of these groups would be low to moderate.

Existing lighting in the immediate area consists of overhead street lights on the surrounding roadways, as well as some lighting associated with the existing industrial uses.

As shown on Figure 4.16-2, the parking structure would be visible to pedestrians and motorists on surrounding roadways, including Santa Clara and 28th streets. The multi-level parking structure would be taller than the surrounding one- to three-story industrial warehouses. A pedestrian connection along the south side of the station area at North 28th Street from Santa Clara Street would be designed as a pedestrian/bicycle/transit gateway into the station area with amenities such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting. Station entrances and signage for the Alum Rock/28th Street Station Twin Bore Scenario would be slightly visible from Santa Clara Street at 28th Street (Figure 4.16-2). Signage for the Alum Rock/28th Street Station Single-Bore Scenario may be slightly visible from Santa Clara Street at 28th Street, but the Single-Bore Scenario would not require aboveground station facilities outside of the multi-level parking structure footprint (Figure 4.16-A).

The Five Wounds Church is a key visual resource in the area; however, the rest of the surrounding area has low visual quality. The BART Extension components would be of comparable height and mass to other buildings currently on and surrounding the site, and would improve the visual quality of the area by providing a community-oriented and pedestrian friendly streetscape.

The historic Five Wounds Church, at the southeast corner of Santa Clara Street and 28th Street, is just south of the Alum Rock/28th Street Station and is considered a City Landmark and architectural resource by the general plan. Because this station would be underground, the parking structure would be the only structure of notable height and mass added to the viewshed. The parking structure would likely partially disrupt existing views of the Five Wounds Church for anyone traveling southbound along North 28th Street as relatively uninterrupted views of the top half of the Five Wounds Church are visible from the roadway. However, these viewers do not currently have high sensitivity to changes in views and they do not have full views of the church under existing conditions. For pedestrians and motorists on Santa Clara Street and 28th Street, the area in the immediate vicinity of the church would not be dominated by the parking garage. The station entrances would be closer to the church structure, but are anticipated to be no more than one-story high. Furthermore, the parking structure would be set back at least 200 feet from the church building. The Five Wounds Church fronts Santa Clara Street, and the existing view available from the back of the church is dominated by the existing industrial uses. As a result, the BART Extension would not cause substantial visual degradation to the Five Wounds Church because it would not substantially block views of or from the church for viewers with high sensitivity relative to existing conditions. See Section 4.5, *Cultural Resources*, for further discussion of the effects of the BART Extension on the Five Wounds Church.

Existing view of Five Wounds Church (view to the northwest from the intersection of East Santa Clara Street and North 28th Street)

Alum Rock/28th Street Station - BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design<u>, including architectural details,</u> and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-2
Key Viewpoint 1: Alum Rock/28th Street Station –
Santa Clara <u>Street/</u> ~~and~~ North 28th Street <u>(Twin Bore)</u>
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of Five Wounds Church (view to the northwest from the intersection of East Santa Clara Street and North 28th Street)

Alum Rock/28th Street Station - BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Figure 4.16-A
Key Viewpoint A: Alum Rock/28th Street Station – Santa Clara Street/North 28th Street (Single Bore)

Nighttime lighting from the parking structure would be visible to the immediately surrounding areas, which consists of industrial uses, storage yards, parking areas, and the Five Wounds Church. Roosevelt Park is the closest residential neighborhood, approximately 500 feet west of 28th Street between Julian Street and Santa Clara Street, and is separated from the station area by a block of light industrial uses. It is unlikely that the lighting would be noticeable to residents in the surrounding neighborhoods due to the intervening industrial and commercial buildings between the residences and the new BART station and parking structure. The lighting would, however, be designed to focus on BART Extension facilities and minimize spillover of light and glare into adjacent areas. There are no sensitive viewers in the immediate vicinity that would be adversely affected by spillover lighting.

There are no identified scenic vistas in the vicinity of the station site. Additionally, the Alum Rock/28th Street Station area would incorporate design features such as street trees, wide sidewalks, bicycle facilities, and pedestrian-scaled lighting, which would improve the visual quality of the area. With the incorporation of lighting design to minimize the spillover of light and glare into adjacent areas, no substantial effects would be expected. Therefore, the visual impact would be *no adverse effect*. No mitigation would be required.

13th Street Ventilation Structure

A ventilation structure would be located at the northwest corner of Santa Clara and 13th Streets and housed in one building approximately 12 feet high. Currently the site is occupied by a paved parking lot. One- and two-story commercial and commercial/industrial land uses are located adjacent to the site and dominate the visual character of the area. There are some street trees present, as well as overhead billboards and signage for the commercial uses. The visual quality in this area is low.

Viewers in this area would primarily consist of motorists and pedestrians traveling on Santa Clara Street and employees/visitors of the commercial establishments. The nearest residences are immediately north of the site along North 13th Street; however, views of the site are limited due to intervening trees. Given the land uses in the area and types of viewers, viewer sensitivity is low to moderate.

The ventilation structure would be consistent with the mass and scale of the surrounding one- and two-story commercial land uses, and would blend visually with the industrial/commercial character of the surrounding environment, as shown in Figure 4.16-3. Thus, the 13th Street Ventilation Structure would not substantially degrade visual quality in the area. Additionally there are no scenic vistas identified in this area, and no major sources of light or glare would be introduced. Therefore, the visual impact would be *no adverse effect*. No mitigation would be required.

Downtown San Jose Station

Downtown San Jose Station East Option

Aboveground components of the Downtown San Jose Station East Option include street-level portal station entrances, ~~an~~ emergency exhaust generators, and emergency ventilation structures. ~~near the east end of the station, and one emergency ventilation structure, which would be approximately 12 feet high. The station portal entrance locations are being evaluated in sidewalks along Santa Clara Street and near 6th, 4th, and 3rd Streets (see Figures 4.16-4 through 4.16-6). The exhaust generator and ventilation structure would be in vacant areas, commercial parking lots, sidewalks, and landscaped areas along Santa Clara Street.~~ For the Twin-Bore Option, several station portal entrance location options in sidewalks along Santa Clara Street between 2nd and 7th Streets are being evaluated. For the Single-Bore Option, one entrance would be located at the southeast corner of Santa Clara and 4th Streets and would include an underground concourse; a second entrance would be located at the southeast corner of 6th and Santa Clara Streets. Other BART facilities, including fresh air intakes, emergency exhaust generators, tunnel ventilation shafts, elevators, TPSS, and emergency exits, may also be located aboveground in this area.

Heading west on Santa Clara Street from 5th Street, street trees line the sidewalks and views include large institutional and commercial buildings toward downtown San Jose. West of 4th Street, the density of buildings increases and the styles transition to an old town historic brick façade. Several street trees line both sides of Santa Clara Street, and businesses in this area include restaurants, bars, retailers, and a gas station. Given the more unified nature of the downtown district and the presence of street trees, the visual quality in this area is moderate to high. The primary viewer groups in this location are motorists, pedestrians, bicyclists, restaurant and store patrons, workers, transit riders (bus and light rail), and San Jose State University students and staff. Given the visual appeal of this portion of the station site and types of visitors, viewer sensitivity is moderate to high.

Figure 4.16-4 depicts the view looking east down Santa Clara Street near its intersection with 4th Street and shows Twin-Bore station portal entrances in the vicinity of City Hall. Figure 4.16-5 shows Twin-Bore station portal entrances along Santa Clara Street from 4th Street looking east. As shown, station entrances and signage would be visible aboveground elements. However, the station entrances and signage would not dominate the visual character of the area over the existing business-oriented streetscape and density of the surrounding buildings. The design of the station entrances would be utilitarian and would not distract from the surrounding architecture, or disrupt the area's intact nature or unity.

Ventilation structures would be enclosed, and the size and mass of the ventilation structures and station portals would be designed to be unified with the surrounding urban environment so they would not visibly conflict with the urban setting or substantially degrade the existing visual character of the surrounding area (see Figure 4.16-6). Furthermore, VTA will continue to encourage public input throughout the design process to further ensure the visual character is not adversely affected.

Existing View of vacant site near Coyote Creek (view to the northwest from the East Santa Clara Street and North 13th Street intersection)

13th Street Ventilation Structure - BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-28-2017)

Figure 4.16-3
Key Viewpoint 2: 13th Street Ventilation Structure (Single and Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of City Hall (view to the east from the intersection of East Santa Clara Street and North 4th Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Figure 4.16-4
Key Viewpoint 3: Downtown San Jose ~~East~~ Station East Option – City Hall Looking East (Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down East Santa Clara Street (view to the northeast near the intersection of East Santa Clara Street and 4th Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-5
Key Viewpoint 4: Downtown San Jose ~~East~~ Station East Option – Santa Clara Street/~~and~~ 4th Streets (Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down 3rd Street (view to the northwest at the intersection of East Santa Clara Street and 3rd Street)

Downtown San Jose East Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-6
Key Viewpoint 5: Downtown San Jose ~~East~~ Station East Option – Santa Clara Street/~~and~~ 3rd Streets (Single and Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Light and glare from the station entrances would be minimal, and would be designed to reduce spillover of light, thereby minimizing any adverse effects of light and glare. Additionally, streetlights and lighting associated with the commercial and local bus and light rail facilities currently exist along the alignment; thus, lighting associated with the station entrances would be consistent with the surrounding lighting landscape, particularly with local transit facilities.

The station portals and ventilation facilities would not have an adverse effect on a scenic vista as no scenic vistas exist in the vicinity nor would the BART Extension components be of a size that could substantially block views.

Streetscape improvements would be provided along Santa Clara Street between 7th Street and 1st Street to create a pedestrian corridor connecting San Jose City Hall and San Jose State University with the Downtown Commercial District. Streetscape improvements would enhance the visual quality of the area for pedestrian and motorists and would be guided by San Jose's *Downtown Master Streetscape Plan*. See Section 4.5, *Cultural Resources*, for a discussion of the effects of this design change on historic architectural resources in the San Jose Downtown Commercial Historic District. Additionally, VTA operates light rail throughout downtown San Jose, including along portions of Santa Clara Street; thus, new aboveground BART components would be consistent with the existing transportation uses in the area. As such, the visual impact would be *no adverse effect*. No mitigation would be required.

Downtown San Jose Station West Option

Aboveground features associated with the Downtown San Jose Station West Option would be similar to those for the Downtown San Jose Station East Option. ~~Several station entrance locations are being evaluated at 2nd Street and 3rd Street, Market Street, along Fountain Alley close to 2nd Street, and between mid-block buildings on 1st Street and Market Street (see Figures 4.16-7 and 4.16-8).~~ For the Twin-Bore Option, several station entrance location options within sidewalks along Santa Clara Street and cross streets between Market and 3rd Streets are being evaluated. For the Single-Bore Option, one entrance would be located north of Santa Clara Street between 2nd and 1st Streets, and a second entrance would be located north of Santa Clara Street between 1st and Market Streets. Other BART facilities, including fresh air intakes, emergency exhaust generators, tunnel ventilation shafts, elevators, TPSS, and emergency exits, may also be located aboveground in this area.

~~An emergency exhaust generator would be located above grade near the northwest corner of Santa Clara Street and 4th Street. One emergency ventilation facility would be located at each end of the station with a ventilation structure aboveground adjacent to Santa Clara Street.~~ The BART Extension components and existing visual character and quality of the area would be visually identical to that described for the Downtown San Jose Station East Option, with the exception that the mass and scale of buildings increases substantially around 1st Street and Market Street, and building density decreases. Viewer groups and viewer sensitivity for this portion of the alignment would be similar to those described for the Downtown San Jose Station East Option.

As described under the Downtown San Jose Station East Option, station entrances, ventilation structures, ~~and~~ signage, and other BART facilities would be visible aboveground elements. Figure 4.~~14~~16-7 shows a Twin-Bore station entrance/system facility site along Santa Clara Street across from ~~near~~ Lightson Alley. Figure 4.16-8 illustrates the view looking north along 2nd Street near Twin-Bore station entrances on the east side of 2nd Street. Such BART Extension elements would be designed to maintain consistency with the mass and scale of the surrounding architecture and would not block any views as they would be smaller than the surrounding buildings in the area.

Figure 4.16-B depicts the view looking west down Santa Clara Street near its intersection with 2nd Street and shows the Single-Bore station entrances located within two new structures along Santa Clara Street: one between 1st Street and 2nd Street, and another between 1st Street and Market Street. Figure 4.16-C shows Single-Bore station entrances along Market Street looking north from Santa Clara Street. Figure 4.16-D shows Single-Bore station entrances along Santa Clara Street looking east from the intersection of Lightson Alley and Santa Clara Street. As shown, station buildings would be visible aboveground elements. However, this facility would not dominate the visual character of the area over the existing business-oriented streetscape and density of the surrounding buildings. The design of the station entrances would be utilitarian and would not distract from the surrounding architecture, or disrupt the area's urban nature.

Lighting at the station entrances would blend with the existing street lighting in the area and would have minimal effects. Such lighting would be designed to reduce spillover of light during the night, thereby minimizing any adverse effects of light and subsequent glare to adjacent buildings.

Streetscape improvements would be provided along Santa Clara Street between 4th Street and San Pedro and would be guided by San Jose's *Downtown Master Streetscape Plan*, improving the visual quality of the area for pedestrian and motorists. See Section 4.5, *Cultural Resources*, for a discussion of the effects of this design change on historic architectural resources in the San Jose Downtown Commercial Historic District. As such, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

Existing view of Lightson Alley (view to the northeast from Santa Clara Street)

Downtown San Jose West Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-7
Key Viewpoint 6: Downtown San Jose ~~West~~ Station West Option – Santa Clara Street/Lightson Alley (Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view down 2nd Street near Fountain Alley (view to the northwest from 2nd Street)

Downtown San Jose West Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-8
Key Viewpoint 7: Downtown San Jose ~~West~~ Station West Option – 2nd Street/Fountain Alley (Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view southwest from the intersection of East Santa Clara Street and 2nd Street

Downtown San Jose West Station Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (11-15-2017)

Figure 4.16-B
Key Viewpoint B: Downtown San Jose Station West Option – Santa Clara Street/2nd Street (Single Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view northeast from the intersection of Market Street and Santa Clara Street

Downtown San Jose West Station Option- BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.

Source: Circlepoint, 2017.

Graphics … 00332.13 (11-15-2017)

Figure 4.16-C

Key Viewpoint C: Downtown San Jose Station West Option – Santa Clara Street/Market Street (Single Bore)

VTA's BART Silicon Valley–Phase II Extension Project

Existing view of Lightston Alley northeast from Santa Clara Street

Downtown San Jose West Station Option- BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (11-15-2017)

Figure 4.16-D
Key Viewpoint D: Downtown San Jose Station West Option – Santa Clara Street/Lightson Alley (Single Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Diridon Station

Diridon Station South Option

~~The aboveground components at Diridon Station South Option are the same as under the Diridon Station North Option below; however, the locations of systems facilities would be located south and slightly east.~~ System facilities would be located in the same general area for both the Twin-~~-~~Bore and Single-Bore Options~~, and the alignments would be the same under the Diridon Station South Option~~. The systems facility site for a ~~traction power substation (~~TPSS~~)~~, auxiliary power substation, emergency generator, and ventilation structures would be located at the east end of the station between Autumn Street and Los Gatos Creek. The westernmost fresh air intake and tunnel ventilation shaft would be located just north of the existing Caltrain Station.

System facilities sites would also be approximately 12 feet high and surrounded by an approximately 9-foot-high concrete block (CMU) wall. This area currently contains paved parking lots and the existing Diridon Caltrain Station. One station entrance would be located on the west side of Autumn Street south of the intersection between Autumn Street and West Santa Clara Street. A second station entrance would be located west of Cahill Street and north of the Diridon Station building.

The visual character along Santa Clara Street in this area is dominated by street trees, the SAP Center building, which is large in mass and scale in comparison with the adjacent historic, large brick Diridon Station, and associated paved parking lots. Autumn Street is defined by low-density industrial-style buildings and few street trees; power lines dominate the sky in this area. Several mature street trees line both sides of Cahill Street and, given that no tall buildings are within this viewshed, views of the open sky and distant hillsides are available. The City has also constructed a green median to serve as a pedestrian linkage for transit riders from Cahill Street to Montgomery Street, along the south side of Stover Street. Given the mix of landscaping, distant views, large buildings, and transportation infrastructure, the visual quality is moderate in this area. The primary viewers are Caltrain train passengers, motorists, SAP event goers, residents, pedestrians, and bicyclists. The nearest residential units are multi-story condominiums approximately 0.10 mile west of the station area along Bush Street on the far side of the existing Caltrain tracks. It is likely that residents dwelling in top floor units immediately adjacent to the Caltrain tracks have views of the station area. Given the mix of transient and resident viewers in this area, viewer sensitivity is moderate.

Existing lighting onsite consists of street lights, lighting in the paved parking areas, Caltrain station lighting, and the more substantial lighting associated with the SAP Center, particularly during nighttime public events.

Station entrances and signage would be visible to pedestrians and motorists along Cahill Street, Montgomery Street, and Autumn Street under both the Diridon Station South and

North Options, as shown on Figure 4.16-9a~~.~~[1] for the Twin-Bore Option and Figure 4.16-E for the Single-Bore Option. Under the Diridon Station North Option (below), station above-ground facilities would also be visible from Santa Clara and White Streets (see Figure 4.16-9b). The surrounding area is urbanized, and station entrances and signage would be small and designed to be consistent with the mass and scale of the surrounding urban setting and historic Diridon Station. As such, the station entrances would not substantially disrupt views of the existing historic station or of distant hillsides.

The system facilities would be enclosed, but visible to motorists, pedestrians, and bicyclists traveling along Santa Clara Street between Los Gatos Creek and the existing Caltrain corridor. They may also be visible from the existing top-story condominiums located on Bush Street. The surrounding environment in this area is urbanized, and the system facility site would be located within an existing parking lot and shielded from public view by a 9-foot-high CMU wall if publicly visible. It would be designed in mass and scale to maintain consistency with the surrounding environment and would be visually consistent with the surrounding built environment.

There are no scenic vistas close to the station site. The visual changes caused by the aboveground station amenities and system facility sites would not substantially degrade the existing visual character or quality of the surrounding area as they would be designed for consistency and unity with surrounding visual character (mass and scale) of the area. Furthermore, transportation amenities, including the San Jose Diridon Transit Center already exist onsite; thus, the addition of new station portals would not introduce substantial sources of new light or glare to the area. Therefore, the impact on visual quality and aesthetics would be *no adverse effect.* No mitigation would be required.

[1] The Diridon Station North Option would be visually similar to the Diridon Station South Option from Cahill Street; thus, there is no separate visual simulation for the Diridon Station North Option in this location.

Existing view of the Diridon Caltrain Station (view to the northwest from Cahill Street)

Diridon Station South Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Figure 4.16-9a
Key Viewpoint 8: Diridon Station South Option – Cahill Street Looking Northwest (Twin Bore)

Existing view of the Diridon Caltrain Station northwest from Cahill Street

Diridon Station South Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Figure 4.16-E
Key Viewpoint E: Diridon Station South Option – Cahill Street Looking Northwest (Single Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of the intersection of Santa Clara and White Street (looking northeast)

Diridon Station North Option – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics ... 00332.13 (8-28-2017)

Figure 4.16-9b
Key Viewpoint 9: Diridon Station North Option – Santa Clara Street/White Street ~~Looking Northeast~~ (Single and Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Diridon Station North Option

The aboveground components at the Diridon Station North Option include two station entrances, at-grade emergency exhaust ventilation hatches at each end of the station with ventilation shafts extending 12 feet above ground, and a systems facility site for a TPSS, auxiliary power substation, emergency generator, and ventilation structures at the east end of the station between Autumn Street and Montgomery Street. ~~Under the Single-Bore Option, t~~The westernmost fresh air intake and tunnel ventilation shaft would be located on the west side of the Caltrain tracks, adjacent to White Street. ~~Under the Twin-Bore Option, these facilities would be located east and immediately adjacent to the existing Caltrain tracks.~~ Refer to Figure 4.16-9b for a visual simulation of the above-ground systems facility. The easternmost fresh air intake and ventilation system would be located between Montgomery Street and Autumn Street. Single-Bore station entrances would be located along the south side of Santa Clara Street; one on the southeast corner of Santa Clara Street and Montgomery Street, and a second between Cahill Street and the Caltrain tracks. Twin-Bore station entrances would be located along the south side of Santa Clara Street; one between Montgomery Street and Cahill Street, and a second between Cahill Street and the Caltrain tracks.

System facilities sites would be approximately 12 feet high and surrounded by an approximately 9-foot-high CMU wall. This area currently contains paved parking lots and the existing Diridon Caltrain Station.

Continuation of Tunnel Alignment

On the east side of Stockton Avenue between Schiele Avenue and West Taylor Street, there are three alternate locations for a systems facility site that would house a tunnel ventilation facility, auxiliary power substation, and a gap breaker station. This system facilities site would be similar in size to that described for the 13th Street Ventilation Structure. The area is currently occupied by industrial uses and consists primarily of surface parking lots.

Heading north on Stockton Avenue from Schiele Avenue, several street trees and utility power lines are visible. Single-story industrial buildings are dispersed along the northeast side of Stockton Avenue, and mostly small, single-family residences are visible along the southwest side of Stockton Avenue. Approaching West Taylor Street, billboards and large towers associated with a concrete company are visible. Given the predominately industrial uses in this area, the visual quality is low to moderate.

Viewer groups in this area include residents, motorists, workers, and pedestrians and bicyclists. The nearest residents to the system facilities site are directly across Stockton Avenue; therefore, viewer sensitivity is moderate to high.

There are no scenic vistas in the vicinity. All three alternate ventilation structure locations would be in the existing industrial area. The surrounding area is urbanized, and the size and mass of the ventilation structure would be designed to be consistent and unified with the surrounding urban environment and would be screened from public view by a CMU wall.

Thus, the ventilation structure would not substantially degrade the existing visual quality of the area. Furthermore, the visible structures would be screened from public view, and no substantial light or glare impacts would result. ~~Therefore, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.~~

A high-voltage substation, TPSS, and Train Control Communications Room, would be located at a systems facility site above the West Tunnel Portal and near Pacific Gas & Electric Company's (PG&E's) FMC Substation as described in Section 2.2.2.2. A 115-kilovolt (kV) line from PG&E's existing FMC substation would serve the high-voltage substation. The 115-kV line would require approximately 80- to 115-foot-high galvanized tapered tubular steel poles or wood poles spaced approximately every 150 to 300 feet (see Figure 4.16-F).

There are no scenic vistas in the vicinity. Viewer groups in this area include residents, motorists, workers, and pedestrians and bicyclists. The nearest residents to the PG&E FMC Substation are directly across Stockton Avenue; therefore, viewer sensitivity is moderate to high. The substation, TPSS, and Train Control Communications Room would be located within the PG&E FMC Substation, which is an electrical infrastructure site occupied by power transmission equipment and enclosed by a concrete barrier. The 80- to 115-foot-high utility poles would be highly visible to nearby residents, workers, and travelers in the area. Though these utility poles would exceed the height of nearby structures, they would be compatible with the overall urban characteristic of the surrounding area, which is composed of electrical infrastructure and utility poles associated with the PG&E substation, commercial warehouses, I-880 sound walls, and single-family homes. Therefore, the visual quality and aesthetics of the BART Extension would result in *no adverse effect*. No mitigation would be required.

City of Santa Clara Visual Study Area

Newhall Maintenance Facility

The Newhall Maintenance Facility would be constructed on the former Union Pacific Railroad (UPRR) Newhall Yard. The Newhall Maintenance Facility would include maintenance and engineering offices and a yard control tower (up to three stories high). To provide for these functions, several buildings and numerous transfer and storage tracks would be constructed onsite. An onsite system facility would house a TPSS and other required facilities.

The visual character in the southwest quadrant adjacent to the Newhall Maintenance Facility site is dominated by modern style multi-story condominiums. Past Campbell Avenue in the northwest quadrant, El Camino Real is a six-lane street separated by a small, landscaped median. There are several street trees lining both sides of El Camino Real, and residential uses transition to large-scale, modern offices, and commercial uses line the north side of the street. Buildings of large mass and scale are also located along the south side of El Camino Real; however, they are set back, which provides an open visual environment.

Existing view down Stockton Avenue (from the intersection of Hamline Street and Stockton Avenue)

PG&E Substation Connection- Bart Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (11-15-2017)

Figure 4.16-F
Key Viewpoint F: PG&E Substation Connection
VTA's BART Silicon Valley–Phase II Extension Project

On the northeast side of the Newhall Maintenance Facility in the northeast quadrant, the visual character is defined by overhead power lines, and one- and two-story industrial and commercial buildings. The southeast quadrant is defined by the large Avaya Stadium and some light industrial uses. Viewer groups in this area include motorists, train passengers, residents, students, bicyclists, pedestrians, and workers. Viewer sensitivity along the southwest side of the Newhall Maintenance Facility site is moderate given the residential and commercial uses, and is low to the northeast given the dominance of industrial uses.

There are no scenic vistas in the vicinity of the Newhall Maintenance Facility. The Newhall Maintenance Facility would be designed to be consistent with the existing mass and scale of the surrounding areas. Additionally, the facilities would be located within the existing UPRR Newhall Yard and thus would blend with the existing visual character of the area. Therefore, the Newhall Maintenance Facility would not substantially degrade the existing visual character or quality of the surrounding area. The yard control tower would be up to three stories tall and would be the most visible facility to offsite viewers. However, given the urban/industrial landscape in the area, no substantial adverse visual effects would be expected. Additionally, the only buildings that are directly adjacent to the Newhall Maintenance Facility are the multi-story condominiums, along the southwest side of the facilities. Given that these are shielded from the system facilities site by a large retaining wall, no substantial light or glare impacts are anticipated. Therefore, the impact on visual quality and aesthetics would be *no adverse effects*. No mitigation would be required.

Santa Clara Station

The Santa Clara Station would be at grade, centered at the west end of Brokaw Road, and would contain a boarding platform with a ~~mezzanine level~~ concourse one level below grade. The systems facility at the Santa Clara Station would be no more than 20 feet high. Figures 4.16-10 and 4.16-11 represent typical views of the Santa Clara Station area.

A parking structure with up to five levels would be located north of Brokaw Road and east of the Caltrain tracks and would accommodate approximately 500 BART park-and-ride parking spaces. The area was formerly occupied by a FedEx shipping and receiving facility but is currently ~~vacant~~leased to a research and development tenant, and a large retail center is immediately adjacent to the northwest. Industrial buildings and Mineta San Jose International Airport are located to the north and northeast. The existing Caltrain tracks and station are located to the south. The parking structure would be constructed in a primarily industrial area, and the bulk and height of the structures would be similar to those of the existing industrial buildings.

Given that the uses currently onsite and immediately adjacent to the new station and parking structure are primarily commercial and industrial, visual quality in the area is low to moderate. Viewer groups in this area primarily consist of motorists, train passengers, pedestrians, bicyclists, and workers and visitors to the police station and the commercial/industrial areas. Given the transient nature of viewer groups, viewer sensitivity is low to moderate.

The BART station and new parking structure would be a dominant visual feature in this area. The surrounding area is developed with existing institutional and industrial uses, roadways, railroad right-of-way, and other transportation-related infrastructure. The addition of the station and parking structure would be visually compatible with the surrounding land uses, and would not substantially degrade the existing visual character or quality of the surrounding area. The station would strengthen the railroad/transportation aesthetic of the immediate area. The BART station and associated components would create a denser urban aesthetic environment, and the facilities would not block any scenic views as none have been identified in the vicinity.

At night, lighting from the BART station and parking structure would be designed to maintain consistency with the existing Santa Clara Caltrain Station lighting and would help to create a safe environment. There are no light-sensitive land uses (i.e., residences) in the immediate vicinity of the new facilities, and design measures would be implemented to reduce spillover of light. Furthermore, the area already has existing lighting associated with the Santa Clara Police Station and streetlights along roadways and sidewalks. Therefore, the impact on visual quality and aesthetics would be *no adverse effect*. No mitigation would be required.

Tree Removal

As described in detail in Section 5.5.4, *Biological Resources and Wetlands*, construction would include removing street- and other trees to accommodate BART Extension features and clear construction staging areas. Existing tree species occur within or in the vicinity of the Alum Rock/28th Street, Downtown San Jose, Diridon, and Santa Clara Station areas are predominantly landscaping trees and would be removed during construction. As described in Mitigation Measure AES~~BIO~~-CNST-A~~H~~ (see Chapter 5, Section 5.5.17~~4~~), tree removal would comply with the overall intent of local tree ordinances, and therefore replacement trees would be planted or in lieu fees paid to mitigate the effects. Therefore, there would be *no adverse effect*.

Existing view of the Santa Clara Caltrain Station (view to the northeast from El Camino Real)

Santa Clara Station – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-29-2017)

Figure 4.16-10
Key Viewpoint 10: Santa Clara Station –
Benton Street/~~and~~ El Camino Real (Single and Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

Existing view of the Santa Clara Caltrain Station and Platform (view to the northwest from the Santa Clara Caltrain Station platform)

Santa Clara Station – BART Extension Alternative

Note: These are intended to be preliminary conceptual representations of the project. Final design, including architectural details, and landscaping will be determined in coordination with local cities.
Source: Circlepoint, 2017.

Graphics … 00332.13 (8-28-2017)

Figure 4.16-11
Key Viewpoint 11: Santa Clara Station Platform (Single and Twin Bore)
VTA's BART Silicon Valley–Phase II Extension Project

4.16.5 NEPA Conclusion

The BART Extension Alternative impact on aesthetics and visual quality would result in *no adverse effect*. Trees that would be removed due to construction activities would be inventoried and noted on construction plans before construction begins. Any trees that are removed will be compensated for accordance ~~ing~~with the overall intent and spirit of ~~to~~ local tree ordinances (refer to Mitigation Measure ~~BIO~~AES-CNST-~~1~~A); no additional mitigation would be required. VTA would continue to work with city, community, and business groups in developing a BART Extension Alternative that would be integrated into the surrounding streetscape.

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4.17 Water Resources, Water Quality, and Floodplains

4.17.1 Introduction

This section describes the affected environment and environmental consequences related to water resources, water quality, and floodplains from operation of the NEPA Alternatives. The discussion of existing conditions below is based on information from *VTA's BART Silicon Valley—Phase II Extension Project Hydrology and Water Quality Technical Report* (WRECO 2017~~6~~a) and *VTA's BART Silicon Valley—Phase II Extension Project Location Hydraulic Study* (WRECO 2017~~6~~b).

4.17.2 Existing Conditions and Regulatory Setting

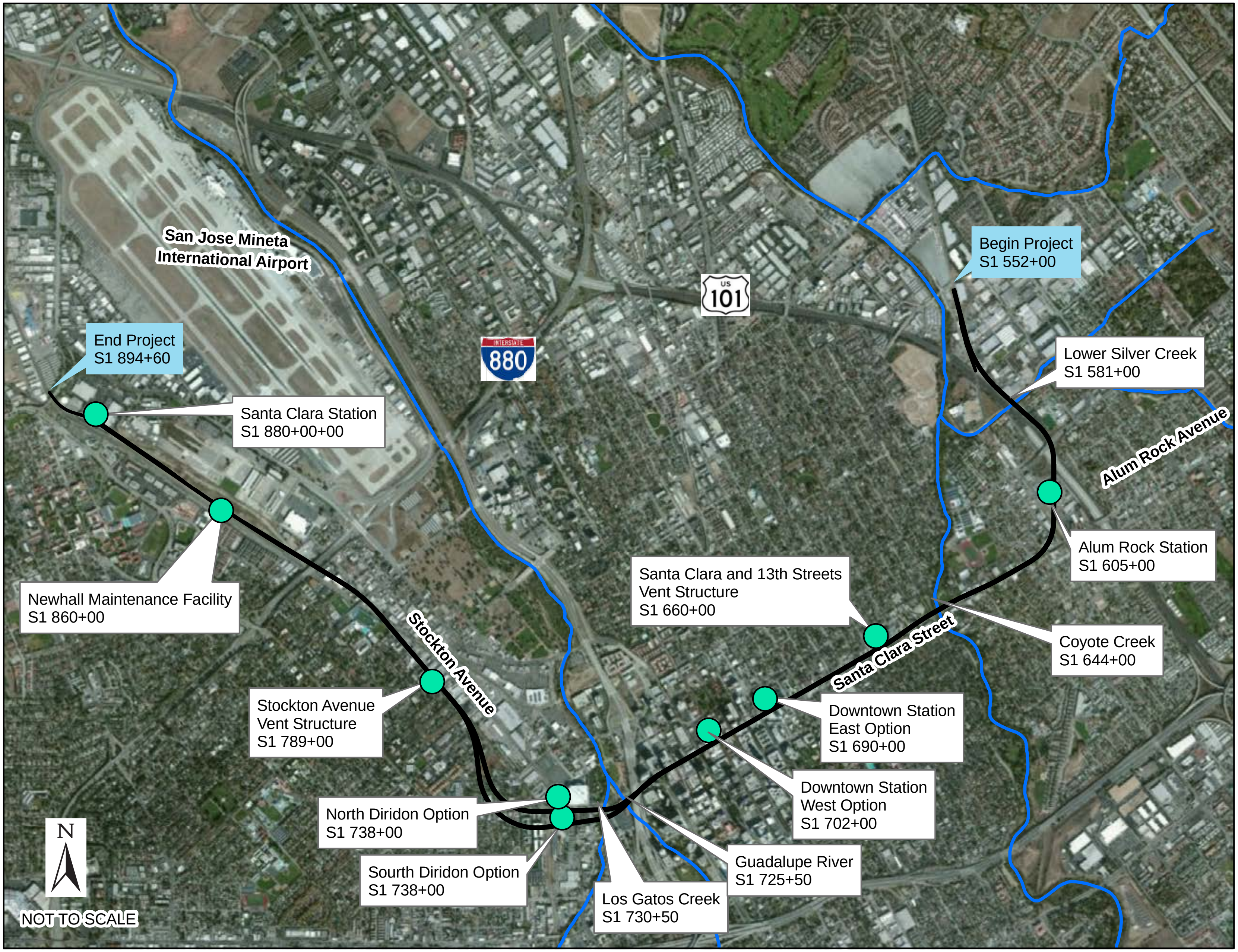
4.17.2.1 Environmental Setting

This section discusses existing conditions related to water resources, water quality, and floodplains in the study area.

Surface Water Hydrology

Creek and River Crossings

The BART Extension is within four watersheds: Lower Silver Creek, Coyote Creek, Guadalupe River, and Los Gatos Creek. All four watersheds within the study area limits ultimately discharge to South San Francisco Bay. The alignment would cross four water bodies: Lower Silver Creek, Coyote Creek, Los Gatos Creek, and the Guadalupe River (receiving water bodies for the stations) (Figure 4.17-1, Table 4.17-1) (WRECO 2017~~6~~b).



Graphics ... 00332.13 (10-13-2016)

Figure 4.17-1
Waterways Crossing the Study Area
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.17-1: Creek and River Crossings

Approximate Creek Crossing Station	Waterway	Drainage Area		1% Flood Discharge[a] (cubic feet per second)
		(square miles)	(acres)	
S1 581+00	Lower Silver Creek	44	28,160	2,670
S1 644+00	Coyote Creek	247	158,080	12,500
S1 725+50	Guadalupe River	144	92.160	10,000
S1 732+25	Los Gatos Creek	54.8	35,072	7,980

Source: WRECO 2017~~6~~b.

[a]. Federal Emergency Management Agency's Santa Clara County Flood Insurance Study.

Coyote Creek

The Coyote Creek watershed is the largest watershed in the Santa Clara Basin. It drains approximately 247 square miles (158,080 acres) from the Diablo Range on the east side of the Santa Clara Basin. Coyote Creek originates in the mountains northeast of the City of Morgan Hill, then flows northwest for 42 miles before flowing into ~~Lower~~ San Francisco Bay. At the base of the Diablo Range, Coyote Creek is impounded by two dams that form Coyote Reservoir and Anderson Reservoir.

Lower Silver Creek

Lower Silver Creek is one of the tributaries that drain to Coyote Creek. The Lower Silver Creek watershed drains approximately 44 square miles (28,160 acres). Lower Silver Creek originates near Silver Creek Road in San Jose and flows northerly to the Lake Cunningham area. It then flows in a northwesterly direction to its confluence with Coyote Creek in the City of San Jose.

The Santa Clara Valley Water District (SCVWD), in cooperation with the Natural Resources Conservation Service and the Guadalupe Coyote Resource Conservation District, proposed an approximately 4.4-mile-long section of Lower Silver Creek between its confluence with Coyote Creek and Lake Cunningham to provide flood protection from a 1 percent annual chance event. The construction for Reach 1 through Reach 3 of this six-reach flood control project was completed in 2006. As a result of this flood protection effort, the area northeast of the US 101/Lower Silver Creek crossing is no longer within a floodplain. However, the area south of the Lower Silver Creek remains within the base floodplain because this area is within the commingled floodplain of both Lower Silver Creek and Coyote Creek. Upon completion of all six reaches and Lake Cunningham, SCVWD and the City of San Jose will be able to demonstrate to FEMA that all homes and businesses subject to the 1 percent annual chance flood from Lower Silver Creek have been protected. Work on Reaches 4–6 ~~are~~ is on-going and according to SCVWD will run through December 2017.

Guadalupe River

The Guadalupe River watershed drains approximately 144 square miles (92,160 acres). It originates in the eastern Santa Cruz Mountains near the summit of Loma Prieta in Los Gatos. The Guadalupe River begins on the valley floor at the confluence of Alamitos Creek and Guadalupe Creek, just downstream of Coleman Road in San Jose. It then flows north for approximately 14 miles before discharging into the Lower South San Francisco Bay from Alviso Slough.

Los Gatos Creek

Los Gatos Creek, which originates in the Santa Cruz Mountains at an elevation of 3,483 feet, follows State Route (SR) 17 as it winds through the mountains. Upstream of the SR 17 crossing, the creek flows primarily in a natural channel; however, downstream of the crossing, some portions of the channel have been straightened. Downstream of SR 85, the creek continues parallel to SR 17 until it outfalls into the Guadalupe River in downtown San Jose.

Drainage Patterns

Runoff from the study area drains to an existing conveyance system, which consists of pipes, culverts, inlets, earth ditches, and natural swales and ponds. This existing conveyance system is tied to local rivers and creeks, which ultimately drain to South San Francisco Bay.

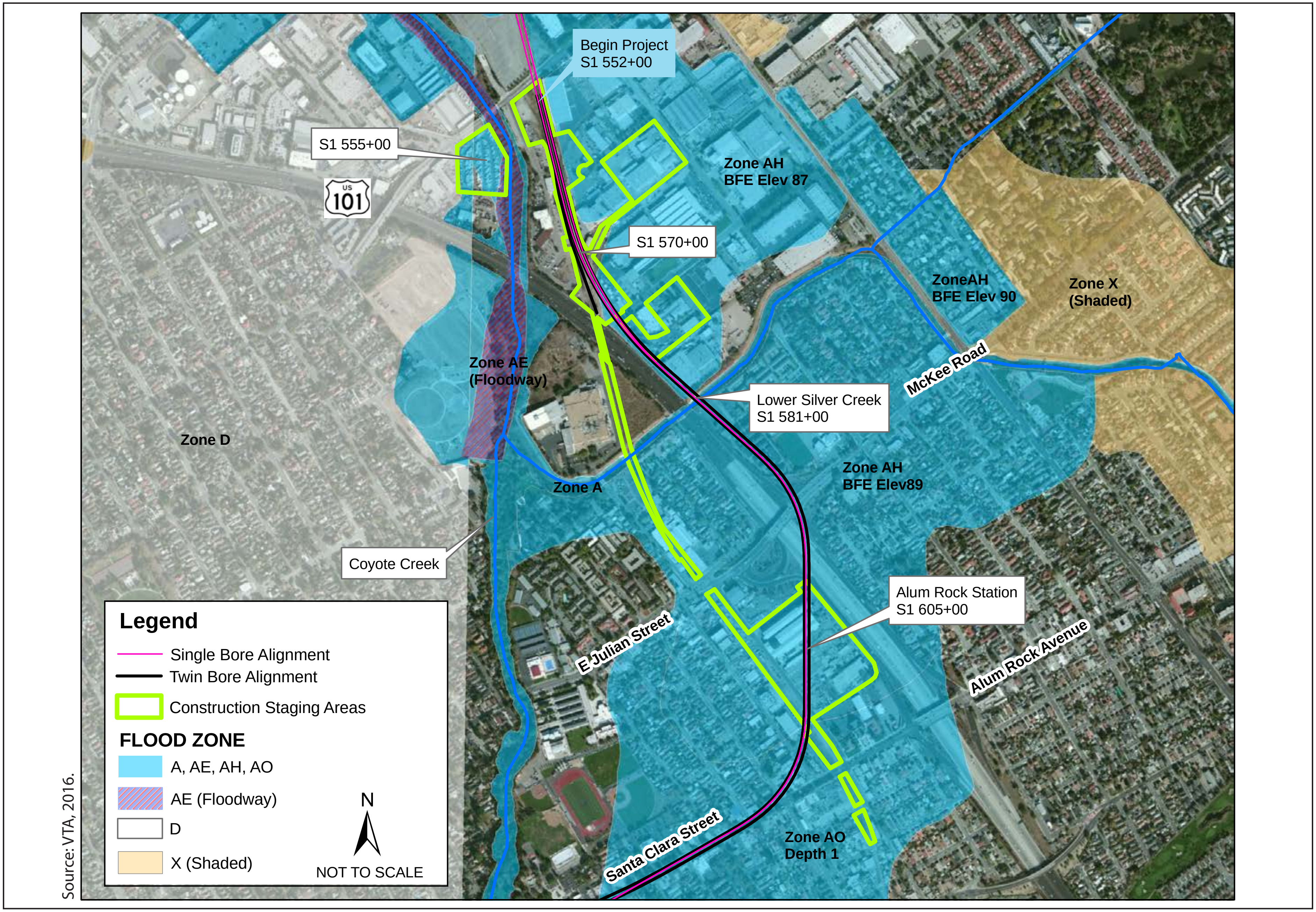
Flooding

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were used to identify the base floodplain, or the area with a 1 percent annual chance of an exceedance event, within the limits of the BART Extension Alternative. The BART Extension Alternative area contains ~~all~~ FIRM Special Flood Hazard Area (SFHA) or base floodplain categories (i.e., zones AE, AO, A, and AH~~, D, X [shaded], and X [unshaded]~~) and zones D, X (shaded), and X (unshaded), as shown in Figures 4.17-2 through 4.17-5. Zone AE is within the 100-year floodplain zone and represents areas with a 1 percent chance of flooding (Base Flood Elevations determined). Zone AO is within the 100-year floodplain zone and represents areas with a 1 percent chance of shallow flooding (usually sheet flow on sloping terrain), with specified flood depths of 1 to 3 feet usually in areas of ponding (Base Flood Elevations determined). Zone A represents areas with a 1 percent annual chance of flooding (base flood elevations have not been determined for this zone). Zone AH is within the 100-year floodplain zone and represents areas with a 1 percent annual chance of shallow flooding, with specified flood depths of 1 to 3 feet. There are also portions of the BART Extension Alternative within Zone D, Zone X (shaded), and Zone X (unshaded); these areas are not considered base floodplains, and no analysis of flood hazards has been conducted. Possible but undetermined flood hazards can occur within Zone D.~~; this area is not considered a SFHA, and no analysis of flood hazards has been conducted.~~ Zone X (unshaded) includes areas where minimal flooding can occur, with elevations higher than areas with a 0.2 percent annual chance of flood event. Zone X (shaded) is an area with a moderate flood hazard, usually the area between the limits of 100- and 500-year floods (includes areas affected by a 0.2 percent annual chance of flood) (WRECO 2017~~6~~b).

FEMA's 2009 *Flood Insurance Study: Santa Clara County and Incorporated Areas* was used to obtain existing floodplain information and supplement data provided by the FIRMs. The flood insurance study (FIS) provides hydrologic information and explains the methods of analysis that were used to generate the floodplain shown on the FIRMs. The FIS also includes profiles of the floodplain elevations. Table 4.17-2 summarizes the hydrologic, hydraulic, and base floodplain information.

Table 4.17-2: Floodplain Information

Approximate Floodplain Station	Flood Source	FIRM Number	Flood Hazard Zone	FIRM Panel Date	100-year Flood Depth (feet)	100-year Water surface elevation (feet)
555+00	Coyote Creek	06085C0251J 06085C0232H	AE	February 19, 2014 May 18, 2009	--	--
555+00	Coyote Creek	06085C0251J	AE (Floodplain)	February 19, 2014	--	82–83
565+00	Lower Silver Creek	06085C0251J	AH	February 19, 2014	--	87
581+00	Lower Silver Creek	06085C0251J	A	February 19, 2014	--	--
605+00	Lower Silver Creek/Coyote Creek	06085C0251J	AH/AO	February 19, 2014	1	89
725+00	Guadalupe River	06085C0234H	A	May 18, 2009	--	--
732+50	Los Gatos Creek	06085C0234H	A	May 18, 2009	--	--
745+00	N/A	06085C0234H	AO	May 18, 2009	1	—
880+00	N/A	06085C0234H 06085C0227H	AH/A	May 18, 2009 May 18, 2009	—	63–66



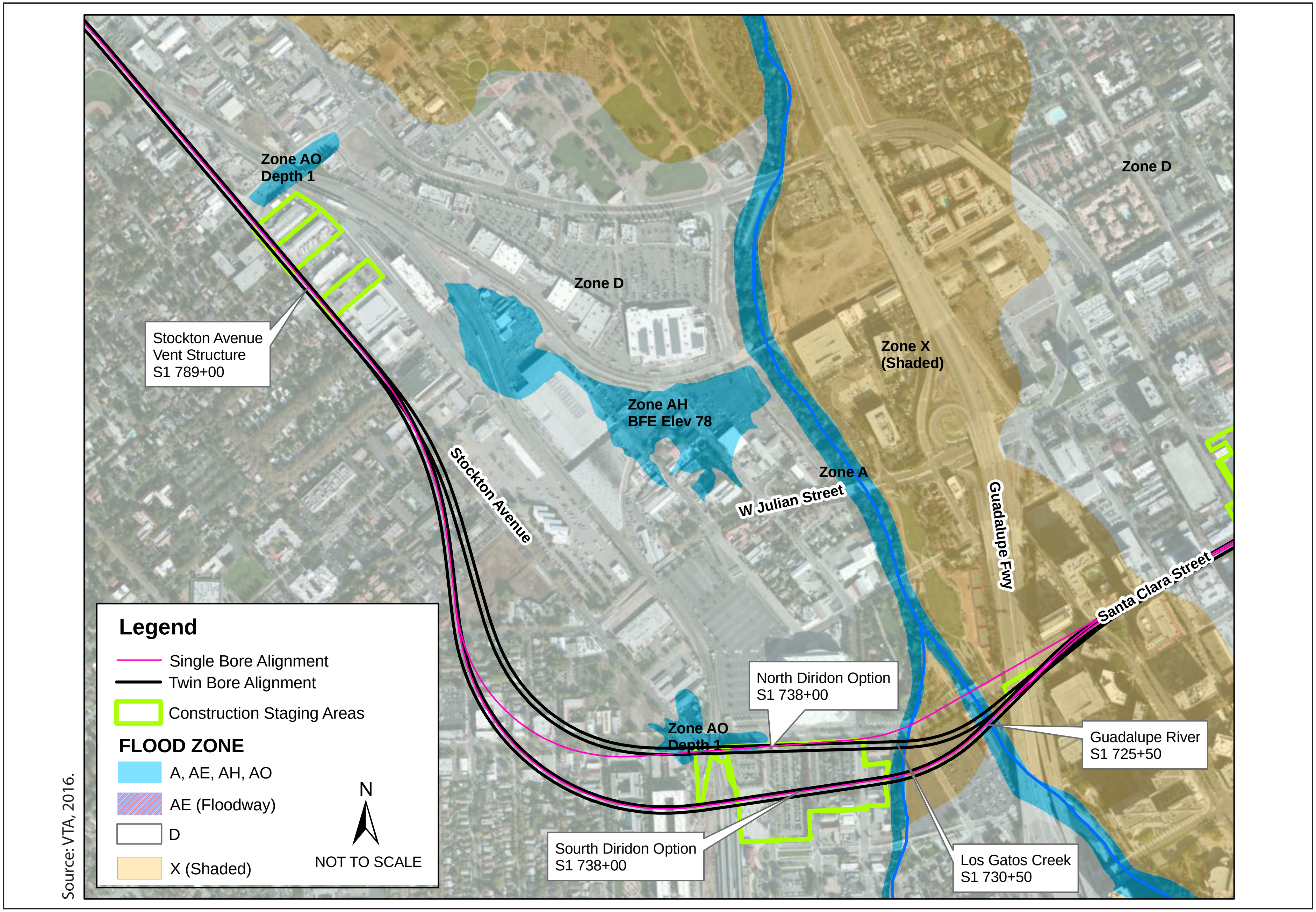
Graphics ... 00332.13 (10-13-2016)

Figure 4.17-2
Floodplains, Part 1 of 4
VTA's BART Silicon Valley–Phase II Extension Project

Source: VTA, 2016.

Graphics … 00332.13 (10-13-2016)

Figure 4.17-3
Floodplains, Part 2 of 4
VTA's BART Silicon Valley–Phase II Extension Project



Graphics … 00332.13 (10-13-2016)

Figure 4.17-4
Floodplains, Part 3 of 4
VTA's BART Silicon Valley–Phase II Extension Project

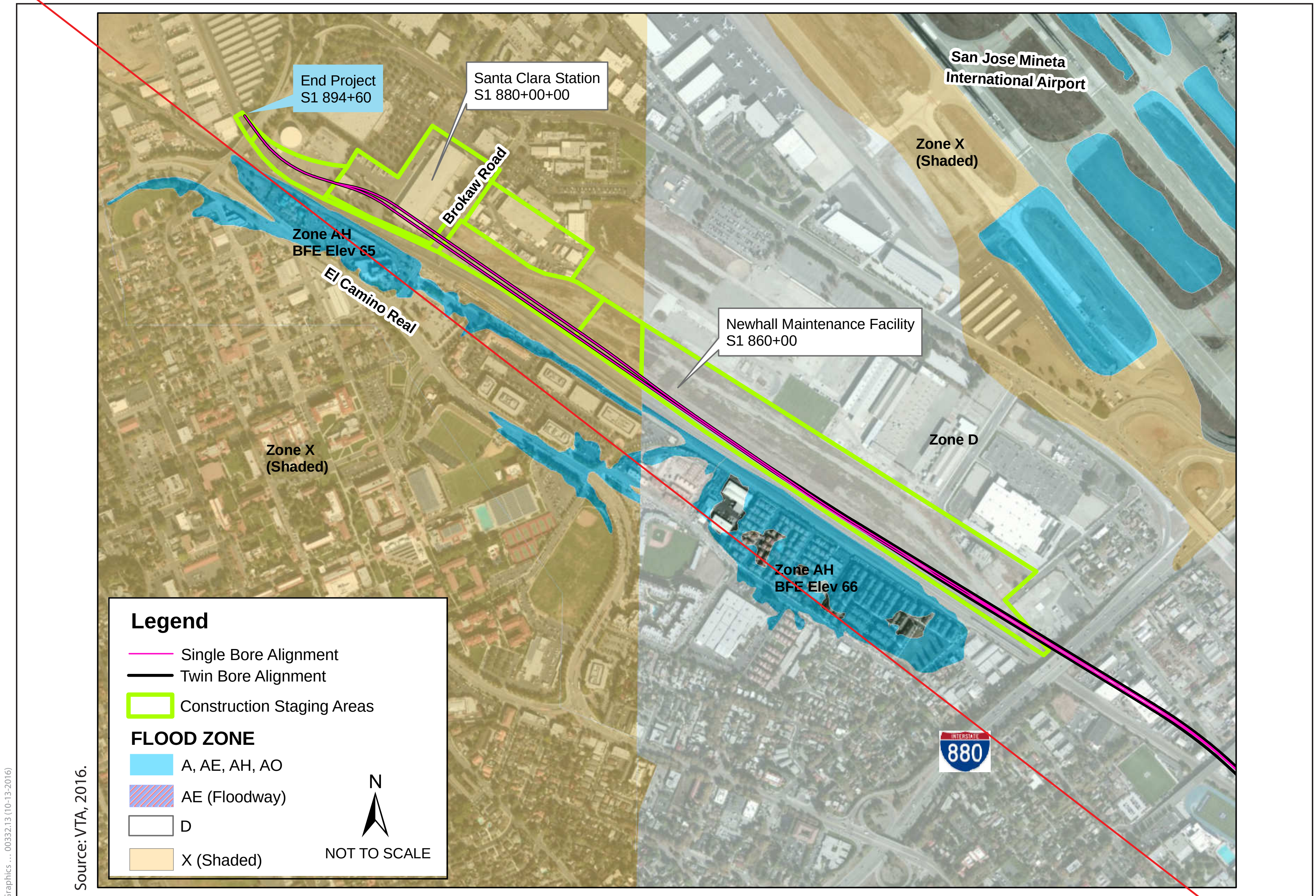
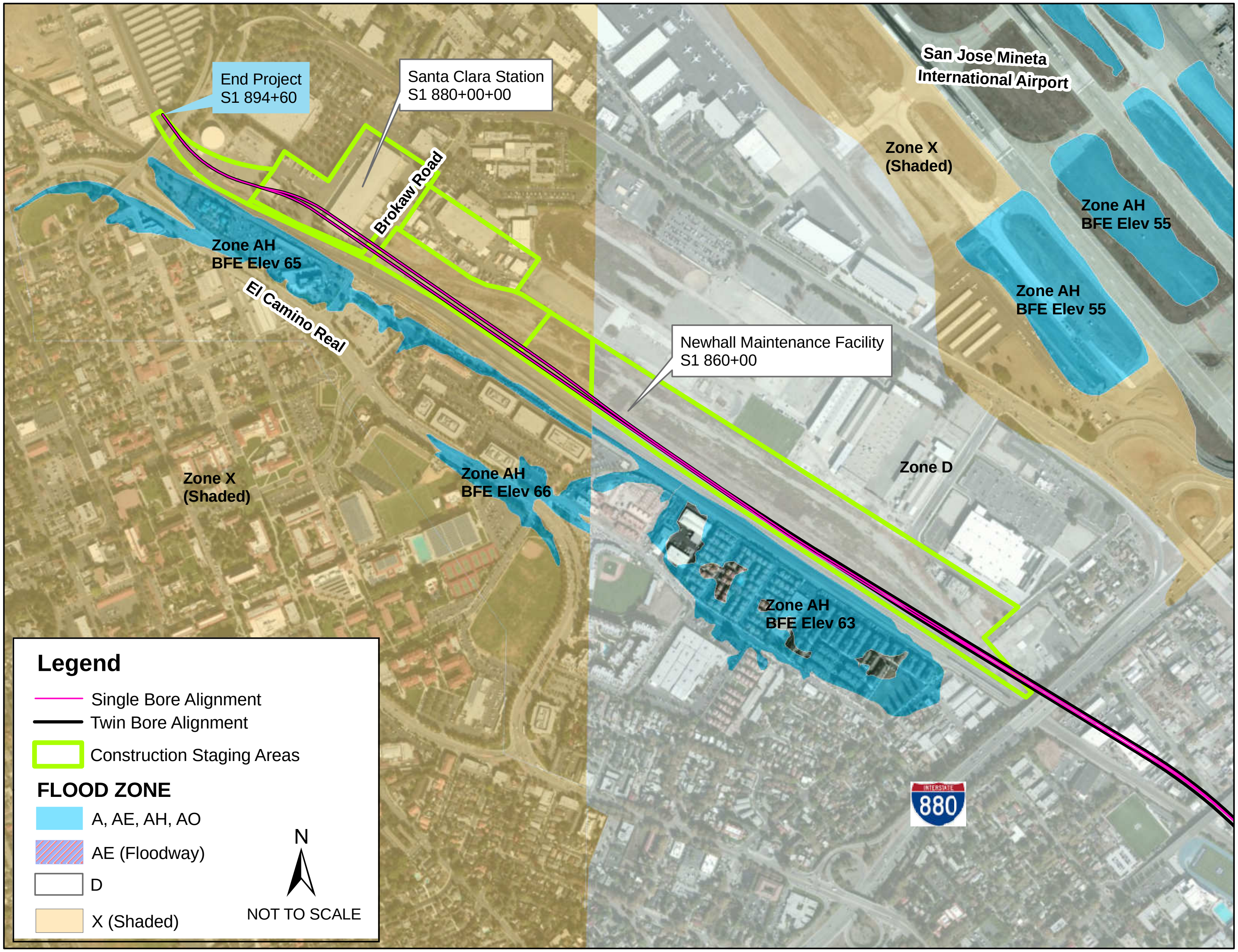


Figure 4.17-5
Floodplains, Part 4 of 4
VTA's BART Silicon Valley–Phase II Extension Project



Source: VTA, 2017.

Graphics ... 00332.13 (8-18-2017)

Figure 4.17-5
Floodplains, Part 4 of 4 <u>(Revised)</u>
VTA's BART Silicon Valley–Phase II Extension Project

Groundwater Hydrology

The BART Extension Alternative is located within the Santa Clara Valley groundwater basin and the Santa Clara subbasin (the subbasin is also known as Coyote Valley). The Santa Clara subbasin occupies a structural trough parallel to the northwest-trending Coast Ranges. To the north, the inland valley is drained by tributaries to San Francisco Bay, including Coyote Creek, the Guadalupe River, and Los Gatos Creek. The Coyote Valley region of the Santa Clara subbasin is fairly shallow, extending to a maximum depth of approximately 500 feet (California Department of Water Resources 2004).

Historically, water level declines from groundwater pumping have induced subsidence in the Santa Clara subbasin and caused degradation of the aquifer adjacent to the bay from saltwater intrusion. As a result of increases in recharge and decreases in pumping, groundwater levels have generally increased since 1965. According to *VTA's BART Silicon Valley—Phase II Extension Project Geotechnical Memorandum* (PARIKH 2014), groundwater has been detected at depths averaging between 14 and 18 feet below ground surface (bgs) in the study area (WRECO 2017~~6~~a).

4.17.2.2 Water Quality

Water Quality Objectives/Standard Beneficial Uses

The San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) identifies narrative and numerical water quality objectives for the region. The general objectives for the region involve bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, taste and odor, temperature, toxicity, turbidity, and unionized ammonia.

Beneficial uses are critical to water quality management in California. According to state law, the beneficial uses of California's water that may be protected against quality degradation include, but are not limited to, "domestic, municipal, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning.

The Basin Plan identifies beneficial uses for water bodies within its jurisdiction. Runoff from the BART Extension Alternative area would drain into storm drainage systems of Santa Clara and San Jose. Existing and potential beneficial uses for water bodies in the BART Extension Alternative limits are listed in Table 4.17-3.

Table 4.17-3: Existing and Potential Beneficial Uses

Water Body	MUN	FRSH	GWR	COMM	COLD	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2
Coyote Creek			E	E	E	E	E	E	E	E	E	E
Lower Silver Creek									E	E	E	E
Guadalupe River			E		E	E	E	E	E	E	E	E
Los Gatos Creek	E	E	E		E	P	E	P	E	E	E	P

SOURCE: San Francisco Bay Regional Water Quality Control Board 2015.

MUN = municipal and domestic supply
FRSH = freshwater replenishment
GWR = groundwater recharge
COMM = commercial and sport fishing
MIGR= fish migration
RARE = preservation of rare and endangered species
SPWN = fish spawning
WARM = warm freshwater habitat
WILD = wildlife habitat
REC-1 = water contact recreation
REC-2 = noncontact water recreation
E = existing beneficial use
P = potential beneficial use

The Basin Plan identifies general narrative and numerical water quality objectives for the region.

Existing Water Quality

The BART Extension Alternative site is located within in developed areas of the Cities of San Jose and Santa Clara. The majority of the ground surface is covered by pavement (roads and parking lots) and structures (office and commercial buildings).

Common sources of stormwater pollution in urban areas include construction sites, parking lots, large landscaped areas, and household and industrial sites. Street surfaces are the primary source of pollutants in stormwater runoff in urban areas. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots and be carried into storm drains by runoff.

Polychlorinated biphenyls (PCBs) are listed as 303(d) impairments in the Lower San Francisco Bay. PCBs can be found in automobile engines and other common items in urban areas. In addition, pesticides, herbicides, fungicides, and fertilizers for landscape maintenance can be washed into storm drains when irrigation exceeds the rate of soil infiltration and plant uptake or when these chemicals are applied in excess. Grading and earthmoving activities associated with new construction can accelerate soil erosion.

Table 4.17-4 shows 303(d)-listed impairments for Coyote Creek, Lower Silver Creek, and the Guadalupe River, based on the 2010 California Integrated Report (State Water Resources Control Board 2011). As shown in the table, diazinon, a pesticide; trash; and mercury are listed as 303(d) impairments in water bodies within the BART Extension Alternative area. Paints, solvents, soap products, and other toxic materials may be inadvertently or deliberately deposited in storm drains in residential and industrial areas. Trash can threaten aquatic life and recreational beneficial uses designated by the Basin Plan. Trash and litter can collect in storm drain inlets and ultimately be discharged into nearby waterways.

Table 4.17-4: 303(d)-Listed Water Bodies

Water Body	Pollutant	Expected TMDL Completion Date	EPA TMDL Approved Date	Potential Sources
Coyote Creek	Diazinon		5/16/2007	Urban runoff/storm sewers
	Trash	2021		Illegal dumping
	Trash	2021		Urban runoff/storm sewers
Lower Silver Creek	Trash	2021		Urban runoff/storm sewers
	Trash	2021		Illegal dumping
Guadalupe River	Diazinon		5/16/2007	Urban runoff/storm sewers
	Mercury	2008		Mine tailings
	Trash	2021		Urban runoff/storm sewers
	Trash	2021		Illegal dumping

EPA = U.S. Environmental Protection Agency; TMDL = total maximum daily load
SOURCE: State Water Resources Control Board 2011.

The receiving water bodies ultimately discharge into the South San Francisco Bay, which is identified on the 303(d) list for the region (see Table 4.17~~5~~-5 for listed pollutants).

Table 4.17-5: 303(d)-Listed Water Body – South San Francisco Bay

Water Body	Pollutant	Expected TMDL Completion Date	EPA TMDL Approved Date	Potential Sources
San Francisco Bay, South	Chlordane	2013		Nonpoint source
	DDT	2013		Nonpoint source
	Dieldrin	2013		Nonpoint source
	Dioxin compounds (including 2,3,7,8-TCDD)	2019		Atmospheric deposition
	Furan Compounds	2019		Atmospheric deposition
	Invasive Species	2019		Ballast water
	Mercury		2/29/2008	Nonpoint source
	Mercury		2/29/2008	Municipal point sources
	Mercury		2/29/2008	Industrial point sources
	Mercury		2/29/2008	Atmospheric deposition
	Mercury		2/29/2008	Natural sources
	Mercury		2/29/2008	Resource extraction
	PCBs	2008		Unknown nonpoint source
	PCBs (dioxin-like)	2008		Unknown nonpoint source
	Selenium	2019		Domestic use of groundwater

DDT = dichlorodiphenyltrichloroethane

Groundwater

In Santa Clara County, almost half of all water used comes from groundwater. In general, groundwater quality in the Santa Clara Valley is good. Throughout most of the region, groundwater quality is suitable for most urban and agricultural uses, with the exception of a few local impairments.

Designated beneficial uses identified for the Santa Clara Valley groundwater basin include municipal and domestic water supply (MUN), industrial process water supply (PROC), and industrial service water supply (IND).

Under existing law, the San Francisco Bay Regional Water Quality Control Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater and are in continuity with surface water cannot cause violations of any applicable surface water standards. In July 2012, the Santa Clara Valley Water District (SCVWD) Board of Directors approved the 2012 Groundwater Management Plan, which describes SCVWD’s groundwater basin management objectives.

Groundwater Quality

Groundwater contamination can be the result of historical industrial activities, soil contamination, or underground storage tank releases of hazardous materials. According to GeoTracker, leaking underground storage tank cleanup sites are found along the BART Extension, which has a history of soil contamination. A Department of Toxic Substances Control (DTSC) cleanup site is located within the study area (State Water Resources Control Board 2015a).

Baseline Environmental Consulting prepared an initial site assessment (2017), which characterized groundwater contamination within the BART Extension Alternative area. The assessment listed 12 known hazardous material release sites and 11 potential hazardous materials that could affect the soil and/or groundwater within the BART Extension Alternative limits. Groundwater monitoring results show that water quality ranges from good to excellent for all major zones in the Santa Clara Basin. In general, contaminants are not detected. However, in some areas, groundwater that has been contaminated by hazardous material releases has spread underneath the railroad corridor. SCVWD has been largely successful in its efforts to prevent groundwater overdraft, curb land subsidence, and protect water quality (WRECO 2017~~6~~a)

4.17.2.3 Regulatory Setting

The federal regulations discussed below are applicable to the study area. Executive Order (EO) 13690, which amends EO 11988, Floodplain Management, directs all federal agencies to avoid conducting, allowing, or supporting construction in the base floodplain. EO 13690 also directs federal agencies to take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by the floodplain. The primary federal law for regulating water quality is the federal Clean Water Act (CWA). The U.S. Environmental Protection Agency (EPA) has delegated enforcement of the CWA in California to the State Water Resources Control Board (State Water Board) and its nine Regional Water Quality Control Boards (Regional Water Boards). All BART Extension-related activities need to be in compliance with, at a minimum, the CWA, the California Water Code's Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and the Basin Plan (San Francisco Bay Regional Water Quality Control Board 2015). Chapter 6, Section 6.15, *Water Resources*, provides further details regarding state and local regulations related to water resources.

Federal

Clean Water Act

Several sections of the CWA pertain to regulating impacts on waters of the United States. The CWA sections discussed below pertain to the BART Extension. The term *waters of the United States* essentially refers to all surface waters, such as navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters. The EPA is the overarching authority for protecting the quality of waters of the United States. However, the State Water Board regulates waters of the United States and State under CWA Sections 303, 401 and 402, and the U.S. Army Corps of Engineers (USACE) has jurisdiction over waters of the United States under CWA Section 404.

CWA Sections 303 and 402 apply to the BART Extension because of potential effects on water quality. CWA Sections 404 and 401 apply to wetlands and other waters of the United States and are not discussed further because the BART Extension would not involve work within water features.

Section 303—Impaired Waters

The state of California adopts water quality standards to protect beneficial uses of waters of the state, as required by Section 303(d) of the CWA and the Porter-Cologne Act. Section 303(d) of the CWA established the total maximum daily load (TMDL) process to guide the application of state water quality standards (refer to the discussion of state water quality standards below). To identify candidate water bodies for TMDL analysis, a list of water quality–limited segments was generated by the State Water Board. These stream or river segments are impaired by the presence of pollutants such as sediment and are more sensitive to disturbance because of this impairment.

In addition to the impaired water body list required by CWA Section 303(d), CWA Section 305(b) requires states to develop a report for assessing statewide surface water quality. Both CWA requirements are being addressed through development of a 303(d)/305(b) Integrated Report, which will address both an update to the 303(d) list and a 305(b) assessment of statewide water quality. The State Water Board developed the statewide 2010 California

Integrated Report, which was based on the integrated reports from each of the nine Regional Water Boards. The 2010 California Integrated Report was approved by the State Water Board on August 4, 2010, and approved by EPA on November 12, 2010. The 2012 California Integrated Report with 303(d) listings was adopted by the State Water Board on April 8, 2015 (Resolution 2015-0021).

Drainage from the BART Extension Alternative area ultimately discharges into the San Francisco Bay. The 303(d)-listed impairments for the Lower San Francisco Bay are shown in Table 4.17-3.

Section 402—National Pollutant Discharge Elimination System

The 1972 amendments to the federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point-source discharges, or discharges that one can point to as a known source of pollutants. NPDES is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

The 1987 amendments to the CWA created a new CWA section, which is devoted to stormwater permitting (Section 402). EPA has granted the state of California primacy in administering and enforcing the provisions of the CWA and NPDES within state boundaries.

NPDES permits are issued by one of the nine Regional Water Boards. Section 402(p) requires permits for discharges of stormwater from industrial, construction, and Municipal Separate Storm Sewer Systems (MS4s). The following NPDES permits are relevant to the BART Extension Alternative:

- San Francisco Bay Municipal Regional Permit (for City owned areas)
- Small Municipal Separate Storm Sewer System General Permit (for VTA property)
- Construction General Permit
- Industrial General Permit (for Newhall Maintenance Facility)
- Utility Vault and Dewatering Permit (for operations as needed)

San Francisco Bay Municipal Regional Permit

~~This permit ensures attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat and applies to City-owned areas that may be impacted by the BART Extension.~~ The Municipal Regional Permit (NPDES Permit No. CAS612008) mandates City-owned areas that may be impacted by the BART Extension use their planning and development review authority to require that stormwater management measures such as Site Design, Pollutant Source Control, and Treatment measures are included in new and redevelopment projects to minimize and properly treat stormwater runoff. This permit ensures attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the State Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in section 402(p) of the CWA. In addition, this permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this permit is deemed compliance with the requirements of this permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the State Water Board may invoke Provision C.1 and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the permit will be pursued against individual Permittee(s) responsible for specific violations of the permit.

Small Municipal Separate Storm Sewer Systems General Permit

The State Water Board's Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (General Permit) (Order No. 2013-0001-DWQ [Phase II MS4 Permit]) regulates stormwater discharges from municipalities and agencies that are not covered under an individual MS4 permit or Phase I MS4 permit. The State Water Board has identified VTA and BART as non-traditional small MS4s that are covered under the Phase II MS4 Permit. The State Water Board or the Regional Water Board issues NPDES permits for 5 years; permit requirements remain active until a new permit has been adopted.

Construction General Permit

The State Water Board's NPDES Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No, 2009-0009-DWQ, as amended by subsequent orders), or commonly known as the Construction General Permit (CGP), regulates stormwater discharges from construction sites that result in a disturbed soil area of 1 acre or greater. For all projects that are subject to the CGP, applicants are required to develop and implement an effective Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must list BMPs that the discharger will use to protect stormwater runoff and document the placement and maintenance of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants, to be implemented in case of a BMP failure; and a monitoring plan for turbidity and pH for projects that meet defined risk criteria (State Water Resources Control Board 2015b). The requirements of the SWPPP are based on the construction design specifications detailed in the final design plans for a project and the hydrology and geology expected to be encountered during construction. The local or lead agency requires proof of coverage under the CGP prior to issuance of the building permit. The SWPPP is submitted to the State Water Board, and a copy is kept at the jobsite where it is updated during different phases of construction.

The CGP separates projects into risk levels 1, 2, or 3. The determination of risk level is based on the potential for erosion and sediment transport to receiving waters. Requirements are applied according to the risk level determined. Because the area of land disturbance would be greater than 1 acre, a CGP would be required for activities.

It was determined that all four watersheds, Coyote Creek, Lower Silver Creek, Los Gatos, and the Guadalupe River, were risk level 2 and therefore subject to temporary construction site BMP implementation and visual monitoring requirements. Additionally, risk level 2 projects are subject to Numeric Action Levels for pH and turbidity associated with stormwater runoff. The BART Extension risk levels will be further evaluated and verified during the plans, specifications, and estimate phase.

Industrial General Permit

The State Water Board and Regional Water Boards regulate all specified industrial activities under the Waste Discharge Requirements for Discharges of Stormwater Associated with Industrial Activities, Excluding Construction Activities (Industrial General Permit, State Water Board Order No. 97-03-DQ, NPDES General Permit No. CAS000001). On April 1, 2014, the State Water Board adopted the new statewide Industrial General Permit (WQO No. 2014-0057-DWQ), which became effective on July 1, 2015, and supersedes the existing Industrial General Permit (97-03-DWQ). The Industrial General Permit requires the implementation of management measures that achieve the performance standard of best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). The Industrial General Permit also requires development of a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are identified, and the means for managing the sources and reducing stormwater pollution are described. Any Industrial General Permit noncompliance constitutes a violation of the CWA and the Porter-Cologne Act and is grounds for (a) enforcement action; (b) Industrial General Permit termination, revocation and reissuance, or modification; or (c) denial of an Industrial General Permit renewal application. The BART Extension would be a Category 8 industrial discharger because of the associated maintenance facilities (Category 8 includes transportation facilities that conduct any type of vehicle maintenance, such as fueling, cleaning, repairing, etc.) and therefore subject to conditions of the Industrial General Permit.

Utility Vault and Dewatering Permit

This permit is intended to authorize short-term intermittent discharges of pollutants to surface waters from dewatering of utility vaults and underground structures. The BART Extension would likely involve dewatering of vaults during operations. To be covered, discharges must meet the following criteria: pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance in a receiving water of any applicable criterion established by the EPA pursuant to CWA Section 303; pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance in a receiving water of any water quality objective adopted by the State Water Board or Regional Water Boards including prohibitions of discharge for the receiving water; and the discharge does not cause acute or chronic toxicity in the receiving water.

National Flood Insurance Program

In response to increasing costs of disaster relief, Congress passed the National Flood Insurance Act (NFIP) of 1968 and the Flood Disaster Protection Act of 1973. FEMA administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. A FIRM is the official FEMA-prepared map of a community; it delineates both the special flood hazard areas and flood risk premium zones that are applicable to the community.

The BART Extension Alternative contains all FEMA-designated flood zones (i.e., zones AE, AO, A, AH, D, X [shaded], and X [unshaded]). More information is provided in Section 4.17.2.1, *Environmental Setting.*

4.17.3 Methodology

For the analysis of impacts on hydrology and water resources, an *adverse effect* determination means the BART Extension would contribute to a violation of regulatory standards or an exceedance of the capacity of existing facilities.

4.17.4 Environmental Consequences and Mitigation Measures

This section identifies impacts and evaluates whether they would be adverse according to the National Environmental Policy Act (NEPA), using the criteria (i.e., context and intensity) identified in Section 4.17.3, *Methodology*. This section also identifies design commitments, BMPs, and other measures to avoid, minimize, or mitigate impacts.

4.17.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative,* for a list of these projects). Under the No Build Alternative, the effects of the current built environment on surface waters would continue, including effects from continued operation of roads, transit vehicles, highways, and transit facilities. Higher vehicle traffic is expected, which could degrade water quality because of increased pollutants in stormwater from roadways and associated vehicular use. Projects planned under the No Build Alternative would most likely include BMPs to reduce pollutants from stormwater runoff that are consistent with the Santa Clara Valley Urban Runoff Pollution Prevention Program NPDES permits, the NPDES General Industrial Stormwater Permit, MS4 permits, and/or General Waste Discharge Requirements. Projects under the No Build Alternative would be designed in accordance with regulatory requirements and agency criteria from FEMA, SCVWD criteria and engineering guidelines, and the municipal codes of the local cities. Projects planned under the No Build Alternative would undergo separate environmental review to define effects on water resources and quality.

4.17.4.2 BART Extension Alternative

Potential impacts on water resources (i.e., surface waters, groundwater, floodplains) and water quality are discussed below. Potential erosion impacts are also discussed because they have the potential to affect the BART Extension.

Surface Waters

Surface water quality may be affected by polluted stormwater runoff from station areas, parking lot structures, kiss-and-ride facilities, access roads, the Newhall Maintenance Facility, and other sites that have impervious surfaces. Runoff from impervious surfaces could contain nonpoint-source pollution, which is typical of urban settings and commonly associated with automobiles, trash, cleaning solutions, and landscaped areas. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots and be carried into storm drains by runoff. Stormwater would be drained by a combination of new and existing pipes, drainage inlets, and other storm drain facilities. Runoff from the BART Extension would be conveyed to local storm drain systems and ultimately to South San Francisco Bay.

The BART Extension would be designed in accordance with the Phase II MS4 Permit, Section F.5.g, for post-construction stormwater management. BART would operate the system in accordance with the Phase II MS4 Permit for the guideway and systems and other facilities that they would be operating. VTA would apply the MS4 Permit for the station campuses and other facilities where BART is not the operator.

VTA developed a *Stormwater and Landscaping Design Criteria Manual* (effective June 30, 2015) to assist VTA engineers with incorporating the post-construction stormwater requirements of the small MS4 permit into VTA operated facilities. Following VTA's *Stormwater and Landscaping Design Criteria Manual*, VTA would implement BMPs and post-construction stormwater treatment measures because the BART Extension would replace or create more than 5,000 square feet of impervious surfaces. The criteria and standards are similar to those of the Santa Clara Valley Urban Runoff Pollution Prevention

Program guidelines. Stormwater treatment designs would preferentially utilize site design measures, source-control BMPs, and Low-Impact Development (LID) treatment features. Generally, the LID measures would include vegetative improvements, which must comply with VTA's Sustainable Landscaping Policy.

To minimize any adverse effects on water quality due to stormwater runoff, stormwater management measures are included as part of the design. These would utilize LID techniques to reduce pollutant discharges and BMPs to reduce pollutants from stormwater runoff, consistent with VTA's *Stormwater and Landscaping Design Criteria Manual*, the Santa Clara Valley Urban Runoff Pollution Prevention Program stormwater handbook, City of San Jose and Santa Clara NPDES permits, MS4 permits, and/or General Waste Discharge Requirements as applicable. In the design phase, specifications and design details would be further developed to include site-specific source control, LID, and post-construction stormwater treatment measures.

A new drainage system may be required to capture stormwater throughout the BART Extension Alternative area. The drainage system may include detention basins, which detain water temporarily to reduce peak discharges before slowly releasing the water to the storm sewer system by gravity flow. Regardless of whether water is released to the storm sewer system through the detention basins or through direct discharge, the BART Extension would comply with applicable NPDES and/or MS4 permit requirements and include BMPs to reduce pollutants from stormwater runoff. In addition, BMPs and LID measures would be implemented to minimize erosion, siltation, and/or flooding (WRECO 2017~~6~~a).

No effects on surface waters are anticipated because of the depth of the tunnels, which would be constructed below the water table, at an average depth of 40 feet below ground at the crown (i.e., top of the tunnel) for the Twin-Bore Option and an average depth of 70 feet below ground at the crown for the Single-Bore Option. The track alignment would be underground until the End-of-the-Line Maintenance Yard. The Twin-Bore Option would pass approximately 25 feet below Coyote Creek, under the retaining wall at the Guadalupe River (at the lowest point in the tunnel alignment, approximately 45 feet below the Guadalupe River), and approximately 20 feet below Los Gatos Creek (WRECO 2017~~6~~a).

Under the Phase II MS4 Permit, the BART Extension Alternative would be required to use BMPs and permanent erosion control measures because it would replace or create more than 5,000 square feet of impervious surfaces. With application of the Phase II MS4 Permit, the BART Extension Alternative would not contribute any detectable concentrations of diazinon or mercury to any watercourses within the study area that have been identified as impaired by the Regional Water Board, pursuant to Section 303(d) of the federal CWA. The BART Extension Alternative would not violate water quality standards or waste discharge requirements or provide substantial additional sources of polluted runoff. *No adverse effect* related to surface waters would result. No mitigation is required.

Groundwater

The BART Extension would add approximately 44.99 net acres of impervious area (WRECO 2017~~6~~a). Compared with existing conditions, the increase in impervious areas at the stations, structured parking, kiss-and-ride facilities, and other sites would be limited. These sites are already developed and therefore would have minimal adverse effect on groundwater recharge. However, to facilitate groundwater recharge, if necessary, engineered methods that either allow for infiltration or reduce impervious cover would be included in the BART Extension design.

Dewatering would be necessary inside retained cuts, underground stations, and tunnels during operations to keep the facilities dry. The quantity of water to be removed is anticipated to be minimal, and no detectable changes to the groundwater supply would occur. The retained cuts and underground stations would be designed to prevent water intrusion, and the tunnels would be sealed. Landscape design features at station areas and potentially the BART trackways that are being considered include planting native, drought-resistant plants; using low-flow fixtures; increasing pervious surfaces with use of porous paving and unit pavers; capturing surface flow with bioretention basins and rain gardens, and using soil-water separators and other filters.

A dewatering plan would be required as part of the Contractor's SWPPP for any dewatering proposed up to 10,000 gallons per day. Water quality sampling and analysis would be required prior to any discharge into the sanitary sewer, storm drainage system, or downstream receiving water bodies. For areas of known contamination and where pumping will exceed 10,000 gallons per day, the CGP may not be used for dewatering, and a separate NPDES permit for Structural Dewatering, VOC contaminated groundwater, and/or a project-specific Waste Discharge Requirements (WDR) permit would be needed to address potential contamination of groundwater and treatment needed prior to discharge.

Tunnel structures and underground stations may temporarily affect groundwater flow direction and pathways, resulting in the diversion of the normal flow of groundwater, the mounding of groundwater upgradient of the aforementioned facilities, or a localized rise in the water table. ~~To minimize these adverse effects, highly permeable gravel channels and/or slotted PVC pipes would be placed in areas where water would be routed around a sealed tunnel to minimize effects on groundwater paths and directions. In addition, t~~Tunnels would be constructed below the water table, at a minimum depth of 20 feet below ground at the tunnel crown (WRECO 2017~~6~~a). The Geotechnical Memorandum (PARIKH Consultants 2014) identifies deep sand and gravel bearing soil types that are below the groundwater table or "aquifers." The impervious tunnel may temporarily affect these deeper aquifers during construction whether an earth pressure balance or slurry tunnel boring machine is utilized. Groundwater flow paths in the subsurface are interconnected in a complex way, with multiple sand and gravel lenses connecting in the subsurface to form deeper aquifers. These interconnected systems have not been comprehensively mapped by any agency, but extend outside the diameter of the tunnel bore(s). The groundwater flow paths within the aquifers surround the tunnel alignment and would not be blocked by the tunnel based on the depths of the deposits. Groundwater flows would thus naturally adjust around the tunnel after boring. BART Facility Standards require that tunnels be waterproofed and limit infiltration rates in underground structures; however, some groundwater infiltration into facilities is inevitable and it must be removed. Removing the groundwater infiltrated into the tunnel would not result in a loss of quantities of water that would deplete deeper aquifer groundwater supplies. Therefore, groundwater would be able to flow above and/or below the~~ tunnel structure~~ BART facilities and structures, and the mounding of groundwater upgradient ~~from the tunnel structure ~~is not anticipated. ~~If any fill material this is placed during construction fails to provide adequate permeability, additional drainage design features could be applied.~~

The BART Extension would comply with the SCVWD 2012 *Groundwater Management Plan*. The BART Extension would not affect groundwater supply and would have minimal effects on groundwater recharge. It would not alter groundwater flow directions or pathways. There would be *no adverse effect* on groundwater. No mitigation is required.

Floodplains

Several areas in the vicinity of the alignment crossing for the Alum Rock/28th Street Station are within the base floodplain. Ground parking, system facilities, and station entrances and roadway improvements are entirely within the floodplain of Coyote Creek/Lower Silver Creek and occupy a total of approximately 9.25 acres. However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 2.77 acres and are also entirely within the same floodplain. The station improvements would add approximately 2.54 acres of added impervious area (AIA) to the floodplain area. The removal of structures (light industrial warehouses) helps with the reducing/offsetting floodplain risk. In addition, it is anticipated that the roadway improvements would not significantly change the existing grade. The Alum Rock/28th Street Station is located within Zone AH, with a base flood elevation of 89 feet (NAVD) and a Zone AO depth of 1 foot. Station features would have a floor elevation of 2 to 3 feet above the base flood elevation, depending on whether the feature is deemed non-critical or critical per Executive Order 13690 and the San Jose floodplain ordinance. Critical facilities such as traction power substations, gap breaker stations, train control and communication buildings, and vent shaft openings, would be set above the 0.2 percent annual storm event. Minimization measures at this station would include balancing pre-fill and post-fill in the floodplain to minimize the amount of fill and prevent flood storage from being lost. Balancing the pre-fill and post-fill would result in *no effect* because flooding would not be exacerbated as a result of the project. The floodflow pattern would be maintained as much as possible by incorporating and providing a flow-through area in the station campus, especially in the parking areas. Per the San Jose floodplain ordinance adequate drainage paths to guide flood waters around and away from the structures will be proposed. Storage and detention would be implemented as necessary to make up for storage lost as a result of the BART Extension (WRECO 2017~~6~~b).

The area of the structures within the base floodplain is insignificant compared with the overall floodplain area for Coyote Creek/Lower Silver Creek (approximately 28,160 acres). Therefore, the BART Extension Alternative would not significantly change the base floodplain water surface elevation (WSE) at Alum Rock/28th Street Station. Although there would be fill in the floodplain as a result of the Alum Rock/28th Street Station, with the minimization measures mentioned above, such as balancing the fill and storage capacity and providing a flow-through area to ensure floodflow is maintained, mitigation measures will not be required (WRECO 2017~~6~~b). Therefore, floodplain impacts as a result of the BART Extension Alternative would be minimal at Alum Rock/28th Street Station. In addition, after completion of work at all six reaches of the Lower Silver Creek Flood Protection Project, SCVWD and the City of San Jose will be able to demonstrate to FEMA that all homes and businesses that are subject to a 1 percent annual chance flood from Lower Silver Creek have been protected. However, the BART Extension remains within the base floodplain because this area is within the commingled floodplain of both Lower Silver Creek and Coyote Creek, and will have to comply with the San Jose floodplain ordinance.

The BART Extension would be designed to withstand 10 percent annual storm events, and specific facilities would be designed to withstand 1 percent and 0.2 percent annual storm events, as required by BART Facility Standards (Bay Area Rapid Transit 2011). In addition, the design of critical facilities would comply with Executive Order 13690.

The Newhall Maintenance Facility is a critical facility and would be designed in accordance with the standards and requirements for critical facilities. The Newhall Maintenance Facility would add approximately 2.16 acres of structures, and the AIA would be 41.86 acres, within Zones D and Zone X (shaded). These areas are not considered a base floodplain. According to the *Hydraulic Study* (WRECO 2017~~6~~b), critical facilities, including traction power, train control, and communications buildings, are to be set a minimum of 1 foot above the 0.2 percent WSE, with an overland flood release path that ensures that no more than 1 foot of ponding can develop. The Newhall Maintenance Facility would not be located within any base floodplain. Therefore, there would be *no effect* on floodplains as a result of the BART Extension Alternative at this location. Mitigation is not required.

Some of the station options (~~Alum Rock/28th Street Station,~~ Downtown San Jose Station East Option and Downtown San Jose West Option, and Diridon Station South Option and Diridon Station North Option) would be underground and therefore would not extend into floodplain. The Downtown San Jose Station East Option would add 0.72 acre of structures, such as system facilities and transit plazas, and 0.10 acre of AIA. The Downtown San Jose Station West Option would add approximately 0.40 acre of structures, such as system facilities and transit plazas, and 0.03 acre of AIA. However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 0.16 acre. There would be approximately 0.24 acre of additional building structures within Zone D. Within Zone D, flooding is undetermined but possible; this zone is not considered ~~an SFHA~~. ~~or~~ a base floodplain. The station would not be located within any base floodplain. The Diridon Station South Option would add approximately 1.08 acres of structures, such as system facilities and transit plazas (station entrances). However, the BART Extension Alternative would remove adjacent buildings that currently occupy approximately 0.21 acre. The AIA to this station is negligible (WRECO 2017~~6~~b). The Diridon Station North Option would add acreage similar to the Diridon Station South Option.

The track alignment would not encroach upon any base floodplains because it would not be within any base floodplain areas or would be underground within a bored tunnel. As a result, there would be *no effect* on the base floodplain, and there would be no floodplain effects as a result of the BART Extension Alternative. Mitigation is not required.

The Santa Clara Station would be aboveground and would add approximately 4.61 acres of structures in Zone X (shaded, an area of moderate flood hazard) and approximately 0.46 acre of AIA to the floodplain. However, the BART Extension would remove the adjacent building that currently occupies approximately 3.42 acres, which is also entirely within the same floodplain. Localized and temporary flooding and ponding may result in areas with added impervious cover during storm events. The station would not be located within any base floodplain. Therefore, there would be *no adverse effect* in terms of the floodplain as a result of the BART Extension at this location. Mitigation is not required.

The BART Extension would not change the land use of the study area. Currently, all of the BART Extension Alternative area within the floodplain is developed, partially developed, or zoned for development. Some of the projected base floodplain development would occur regardless of the BART Extension. In general, the BART Extension would be consistent with development plans for the area and would not significantly change the land use in the area because it is currently developed or zoned for development. The base floodplain impacts as a result of the BART Extension are summarized in Table 4.17-6.

Table 4.17-6:Summary of Base Floodplain Impacts

BART Extension Alternative Element	Flood Hazard Zone	Impervious Area per Feature (ac)	Total Impervious Area (ac)	Added Impervious Area (ac)	Existing Building to be Removed	Impacts	Watershed	Watershed Drainage Area (ac)	Increase Area to Watershed (ac)	Notes
Mabury Road CSA	AE/AE (Floodplain)	4.29	25.25	--	0.00	Minimal	Coyote Creek	158,080	N/A	
	AH	20.96		--	3.74	Minimal				
Alum Rock CSA	A/AH/AO	0.71	9.96	--	0.00	Minimal	Lower Silver Creek[a]	28,160	0.01%	1
Alum Rock/28th Street Station	AH/AO	9.25	48.62	2.54	2.77	Minimal				
Downtown San Jose Station East Option	D	0.77		0.01	0.00	No Impact	Guadalupe River[b]	92,160	0.05%	2
Downtown San Jose Station West Option	D	0.40		0.03	0.16	No Impact				
Newhall Maintenance Facilities	D/X (Shaded)	43.86		41.86	0.00	No Impact				
Santa Clara Station	X (Shaded)	3.59		0.46	3.42	No Impact				
Diridon Station (South and North Options)	D	3.47	3.47	Negligible	0.21	No Impact	Los Gatos Creek	35,072	N/A	

[a] Improvements to Lower Silver Creek by SCVWD and the Natural Resources Conservation Service could result in changes to the FIRM.

[b] Improvements to Guadalupe River by the USACE and SCVWD could result in changes to the FIRM.

ac = acres; CSA = Construction Staging Area

The change in WSE would be minimal because there would be minimal fill in the base floodplains with proper minimization measures (WRECO ~~2016b~~2017b). The BART Extension would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. Natural and beneficial floodplain values would not be affected by the BART Extension. In addition, the BART Extension Alternative would not create or contribute runoff that would exceed the capacity of existing or planned drainage systems. There would be *no adverse effect*. No mitigation is necessary.

4.17.5 NEPA Conclusion

The BART Extension Alternative would not expose people or structures to the risk of flooding, create floodplains, or result in an increase in the base flood elevation. The BART Extension Alternative would result in *no adverse effect* on water resources. With the implementation of minimization measures and measure in compliance with regulations, the BART Extension would result in *no adverse effect*. No additional mitigation is required.

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4.18 Environmental Justice

4.18.1 Introduction

This section describes the affected environment and environmental consequences related to environmental justice from operations of the NEPA Alternatives. The following sources of information were used to prepare the analysis in this section.

- *American Community Survey* (U.S. Census Bureau 2010–2014).
- *American Fact Finder* (U.S. Census Bureau 2010).
- *Bay Area Projections 2013* (Association of Bay Area Governments 2013).
- *Unemployment Rate and Labor Force* (California Employment Development Department 2015).
- *VTA's BART Silicon Valley—Phase II Extension Project Socioeconomics and Environmental Justice Technical Memorandum* (Circlepoint 2017~~6~~).

4.18.2 Environmental and Regulatory Setting

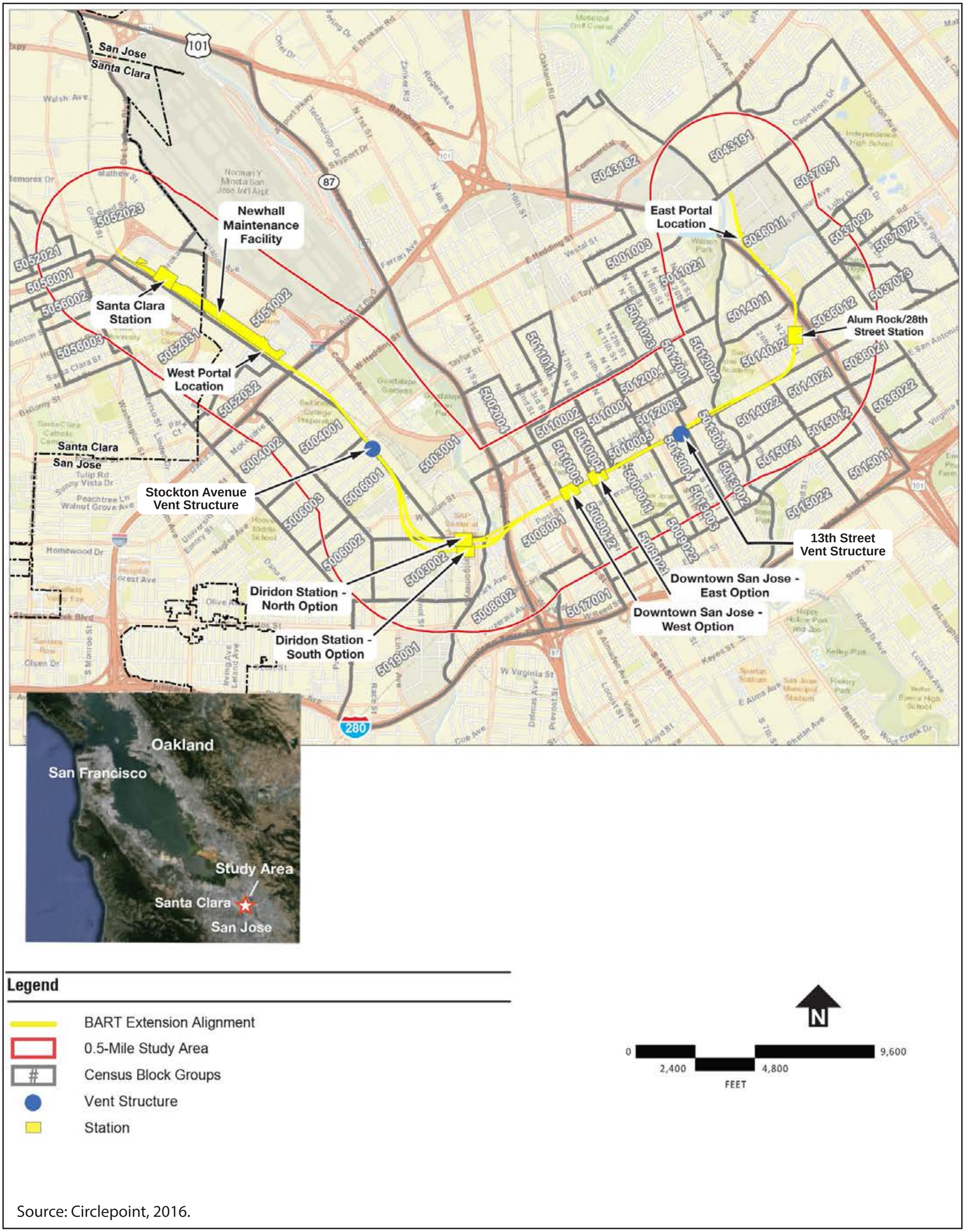
4.18.2.1 Environmental Setting

This section discusses the existing conditions related to environmental justice along the BART Extension alignment (including staging areas).

An environmental justice community is a particular geographic area that meets certain socioeconomic and demographic thresholds. Environmental justice populations can either qualify based on their minority population and/or income status.

The study area represents U.S. Census Block Groups (59 block groups) located within 0.5 mile of the alignment.[1] Figure 4.18-1 depicts the study area block groups.

[1] A census tract is a geographic region within a county. The census tract is broken into smaller block groups, which provide specific data for a more refined geography. Block groups are generally the size of several city blocks, and are therefore a useful geography boundary to represent a community.



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Source: Circlepoint, 2016.

Figure 4.18-1
Study Area
VTA's BART Silicon Valley–Phase II Extension Project

Minority Populations

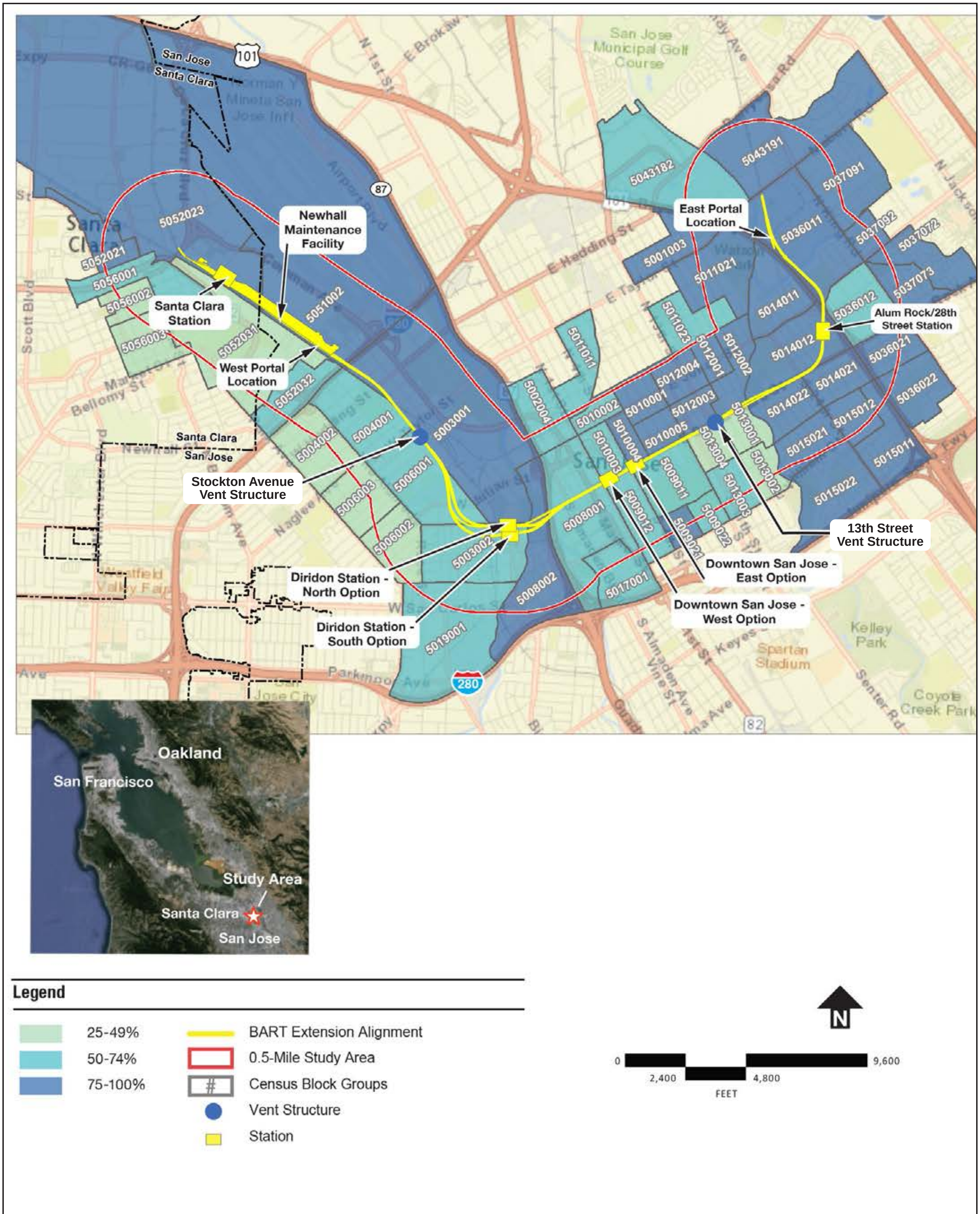
San Jose and Santa Clara are generally diverse populations, representing a variety of races and ethnicities as shown in Table 4.18-1. The study area provides a more localized assessment of the community demographics within the areas immediately surrounding the BART Extension alignment. Table 4.18-2 further summarizes these demographics by outlining the percent minority. The study area minority population is slightly higher than in San Jose and Santa Clara. Figure 4.18-2 depicts the minority percent distribution.

Table 4.18-1: Demographic Profile of the Study Area and Region

Population	San Jose	Santa Clara	Study Area
Total Population	945,942 (100%)	116,468 (100%)	89,896 (100%)
Hispanic or Latino (of any race)	*313,636 (33%)*	*22,589 (19%)*	*39,252 (44%)*
Not Hispanic or Latino	*632,306 (67%)*	*93,879 (81%)*	*50,644 (56%)*
White	271,382 (29%)	42,026 (36%)	24,357 (27%)
Black or African American	27,508 (2%)	2,929 (3%)	3,329 (4%)
American Indian and Alaska Native	2,255 (0.2%)	240 (0.2%)	245 (0.2%)
Asian	300,022 (32%)	43,531 (38%)	19,735 (22%)
Native Hawaiian and Other Pacific Islander	3,492 (0.4%)	604 (0.5%)	377 (0.4%)
Some Other Race	1,820 (0.2%)	321 (0.3%)	252 (0.3%)
Two or More Races	25,827 (3%)	4,228 (4%)	2,349 (3%)
Source: U.S. Census 2010			

Table 4.18-2: Minority Percent

Location	Percent Minority
San Jose	71%
Santa Clara	64%
Study Area	73%
Source: U.S. Census 2010	



Source: Circlepoint, 2016.

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Figure 4.18-2
Minority Percent Distribution
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.18-3 summarizes the minority percent for each U.S. census block group within the study area. The minority percentage of block groups that exceed the minority percentage of the city (San Jose at 71 percent and Santa Clara at 64 percent) in which they are located are shown in **bold**. The block groups in bold represent the populations with the greatest minority populations within the study area and are considered environmental justice populations. Accordingly, these environmental justice populations are shown in Figure 4.18-5, and the aboveground BART Extension features within these block group geographic boundaries are considered in the effects analysis in Section 4.18.4.2, *BART Extension Alternative*.

Table 4.18-3: Study Area Minority Percent Distribution

Block Group	Minority Percent
San Jose Block Groups	
Block Group 3, Census Tract 5001	**87%**
Block Group 4, Census Tract 5002	51%
Block Group 1, Census Tract 5003	**77%**
Block Group 2, Census Tract 5003	53%
Block Group 1, Census Tract 5004	58%
Block Group 2, Census Tract 5004	49%
Block Group 1, Census Tract 5006	60%
Block Group 2, Census Tract 5006	30%
Block Group 3, Census Tract 5006	41%
Block Group 1, Census Tract 5008	58%
Block Group 2, Census Tract 5008	**75%**
Block Group 1, Census Tract 5009.01	**73%**
Block Group 2, Census Tract 5009.01	59%
Block Group 1, Census Tract 5009.02	**83%**
Block Group 2, Census Tract 5009.02	64%
Block Group 1, Census Tract 5010	**86%**
Block Group 2, Census Tract 5010	**72%**
Block Group 3, Census Tract 5010	**73%**
Block Group 4, Census Tract 5010	**75%**
Block Group 5, Census Tract 5010	**75%**
Block Group 1, Census Tract 5011.01	68%
Block Group 1, Census Tract 5011.02	**78%**
Block Group 3, Census Tract 5011.02	**73%**
Block Group 1, Census Tract 5012	**79%**
Block Group 2, Census Tract 5012	**82%**
Block Group 3, Census Tract 5012	**77%**
Block Group 4, Census Tract 5012	**79%**
Block Group 1, Census Tract 5013	44%
Block Group 2, Census Tract 5013	34%
Block Group 3, Census Tract 5013	60%

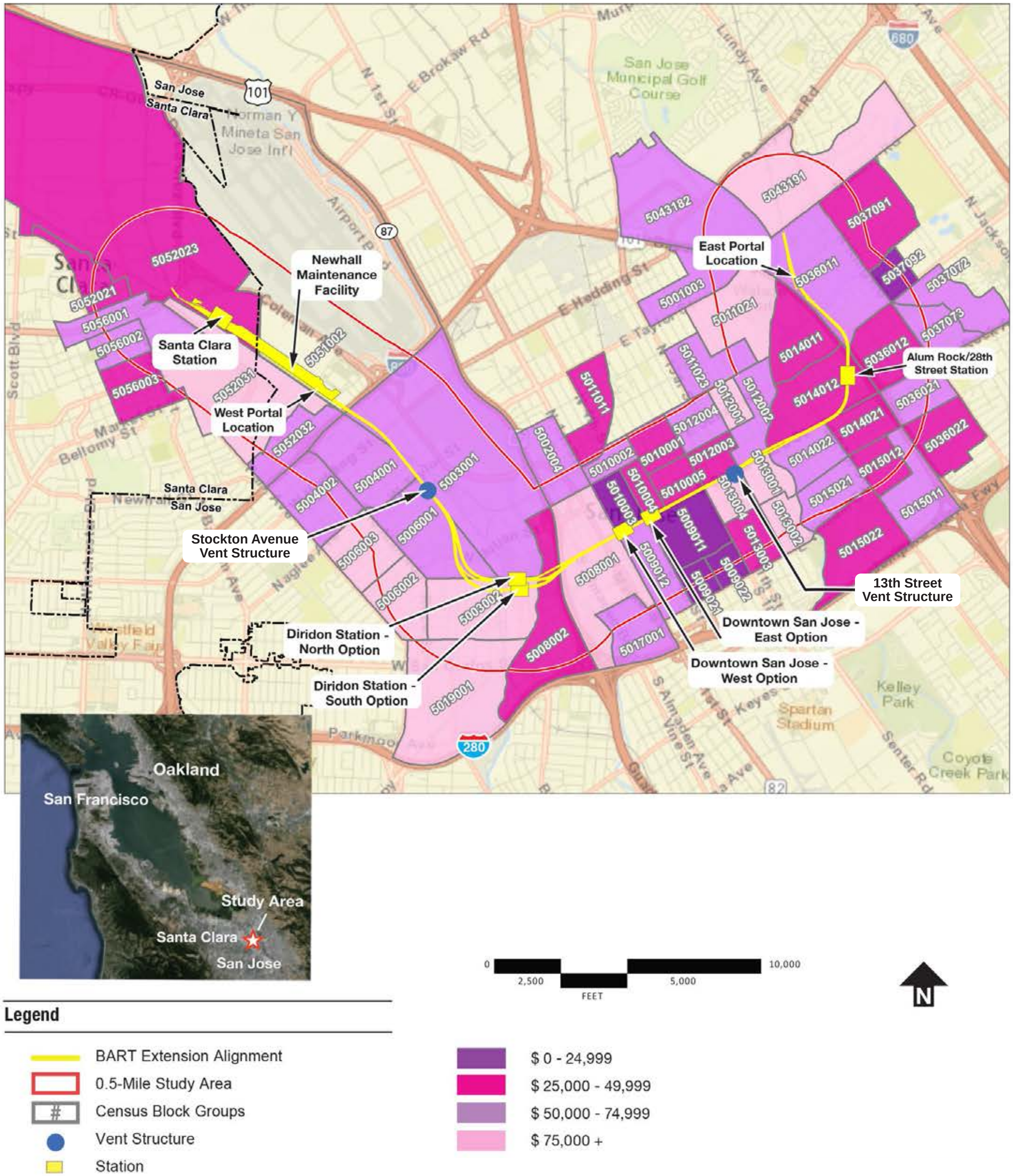
Block Group	Minority Percent
Block Group 4, Census Tract 5013	48%
Block Group 1, Census Tract 5014.01	**92%**
Block Group 2, Census Tract 5014.01	**83%**
Block Group 1, Census Tract 5014.02	**75%**
Block Group 2, Census Tract 5014.02	**87%**
Block Group 1, Census Tract 5015.01	**96%**
Block Group 2, Census Tract 5015.01	**93%**
Block Group 1, Census Tract 5015.02	**83%**
Block Group 2, Census Tract 5015.02	**92%**
Block Group 1, Census Tract 5017	70%
Block Group 1, Census Tract 5019	68%
Block Group 1, Census Tract 5036.01	**78%**
Block Group 2, Census Tract 5036.01	**72%**
Block Group 1, Census Tract 5036.02	**88%**
Block Group 2, Census Tract 5036.02	**95%**
Block Group 2, Census Tract 5037.07	**95%**
Block Group 3, Census Tract 5037.07	**90%**
Block Group 1, Census Tract 5037.09	**98%**
Block Group 2, Census Tract 5037.09	**97%**
Block Group 2, Census Tract 5043.18	56%
Block Group 1, Census Tract 5043.19	**91%**
Block Group 2, Census Tract 5051	**78%**
Block Group 2, Census Tract 5052.03	55%
Santa Clara Block Groups	
Block Group 1, Census Tract 5052.02	**75%**
Block Group 3, Census Tract 5052.02	**83%**
Block Group 1, Census Tract 5052.03	49%
Block Group 1, Census Tract 5056	51%
Block Group 2, Census Tract 5056	47%
Block Group 3, Census Tract 5056	44%

Source: U.S. Census 2010

Note: Bolded text identifies an environmental justice block group because the minority percentage exceeded the minority percentage of the city in which they are located (San Jose: 71%; Santa Clara: 64%)

Low-Income Populations

The study area contains a high percentage of low-income individuals. An environmental justice low-income population refers to the median household income compared to the Department of Health and Human Services (HHS) poverty guidelines within geographic proximity to the alignment. The average household size is 2.9 persons per household (averaged to 3), which correlates to the HHS poverty guideline threshold of $20,090. Figure 4.18-3 depicts the ranges of median household income amongst the population.



Source: Circlepoint, 2016.

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Figure 4.18-3
Median Household Income
VTA's BART Silicon Valley–Phase II Extension Project

Table 4.18-4 identifies the low-income population of the entire study area as well as within San Jose and Santa Clara. Approximately 13 percent of individuals living within the study area are low-income. The study area average is slightly more than the San Jose and Santa Clara overall averages. Figure 4.18-4 depicts the low-income percent ranges within the study area. Table 4.18-5 outlines the census block groups that are considered low income. The low-income percentage of block groups that exceed the low-income percentage of the city in which they are located are shown in **bold**. The block groups in bold represent the populations with the greatest low-income populations within the study area and are considered environmental justice populations. Accordingly, these environmental justice populations are shown in Figure 4.18-5, and the aboveground BART Extension features within these block group geographic boundaries are considered in the effects analysis in Section 4.18.4.2, *BART Extension Alternative*.

Table 4.18-4: Low-Income Population

Geographic Area	Low-Income Percent
San Jose	12%
Santa Clara	9%
Study Area	13%
Source: American Community Survey (ACS), U.S. Census 2010–2014	

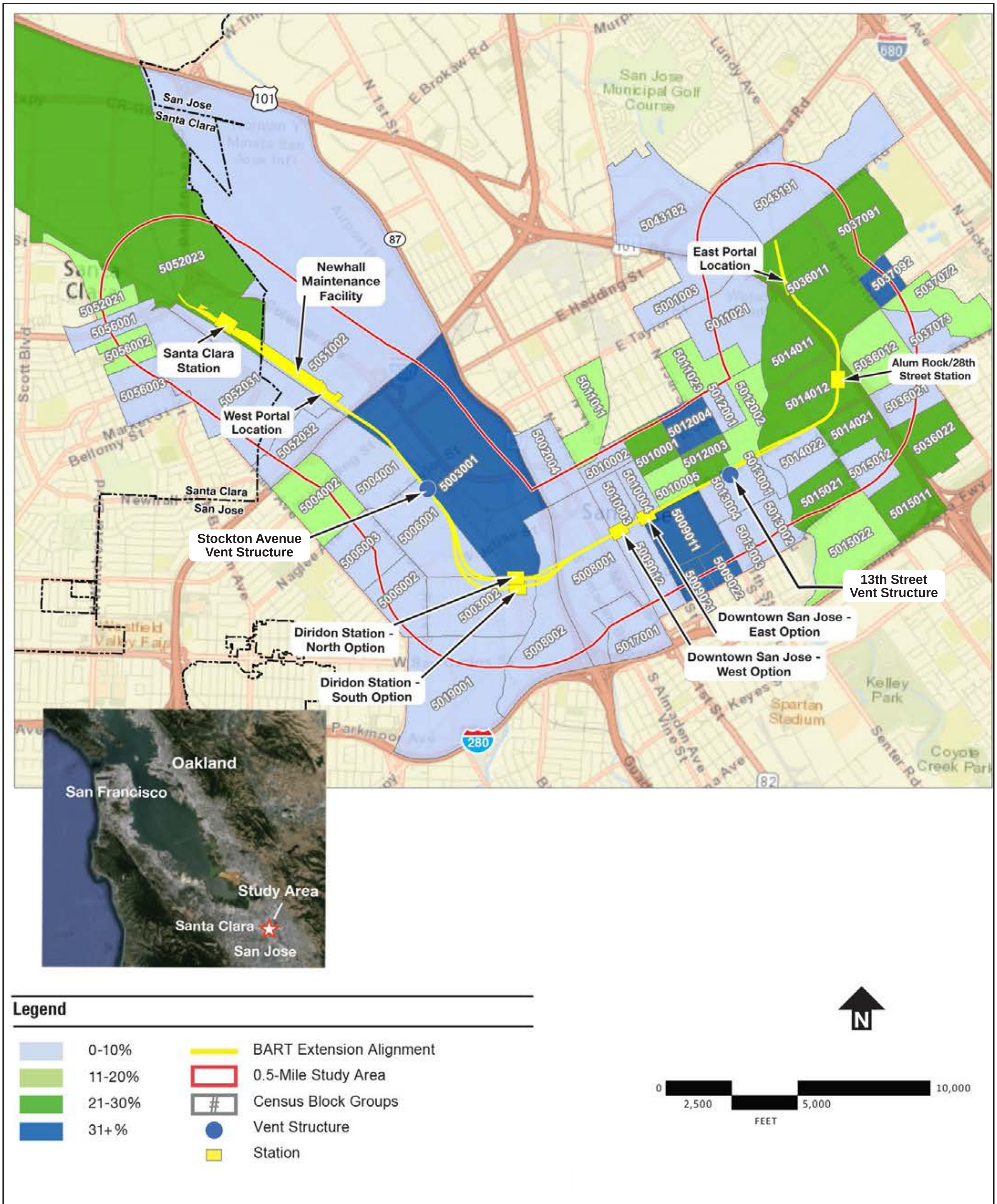
Table 4.18-5: Study Area Low-Income Percent Distribution

Block Groups	Low-Income Percent
San Jose Block Groups	
Block Group 3, Census Tract 5001	0%
Block Group 4, Census Tract 5002	2%
Block Group 1, Census Tract 5003	**37%**
Block Group 2, Census Tract 5003	3%
Block Group 1, Census Tract 5004	0%
Block Group 2, Census Tract 5004	**21%**
Block Group 1, Census Tract 5006	4%
Block Group 2, Census Tract 5006	0%
Block Group 3, Census Tract 5006	4%
Block Group 1, Census Tract 5008	6%
Block Group 2, Census Tract 5008	4%
Block Group 1, Census Tract 5009.01	**48%**
Block Group 2, Census Tract 5009.01	9%
Block Group 1, Census Tract 5009.02	**43%**
Block Group 2, Census Tract 5009.02	**43%**
Block Group 1, Census Tract 5010	**23%**
Block Group 2, Census Tract 5010	0%
Block Group 3, Census Tract 5010	8%
Block Group 4, Census Tract 5010	0%
Block Group 5, Census Tract 5010	**18%**
Block Group 1, Census Tract 5011.01	**16%**
Block Group 1, Census Tract 5011.02	2%
Block Group 3, Census Tract 5011.02	**15%**
Block Group 1, Census Tract 5012	5%
Block Group 2, Census Tract 5012	**16%**
Block Group 3, Census Tract 5012	**22%**
Block Group 4, Census Tract 5012	**34%**
Block Group 1, Census Tract 5013	0%
Block Group 2, Census Tract 5013	0%
Block Group 3, Census Tract 5013	0%
Block Group 4, Census Tract 5013	11%
Block Group 1, Census Tract 5014.01	**21%**
Block Group 2, Census Tract 5014.01	**21%**
Block Group 1, Census Tract 5014.02	**26%**
Block Group 2, Census Tract 5014.02	10%
Block Group 1, Census Tract 5015.01	**23%**
Block Group 2, Census Tract 5015.01	9%
Block Group 1, Census Tract 5015.02	**21%**

Block Groups	Low-Income Percent
Block Group 2, Census Tract 5015.02	**13%**
Block Group 1, Census Tract 5017	0%
Block Group 1, Census Tract 5019	9%
Block Group 1, Census Tract 5036.01	**23%**
Block Group 2, Census Tract 5036.01	**20%**
Block Group 1, Census Tract 5036.02	10%
Block Group 2, Census Tract 5036.02	**23%**
Block Group 2, Census Tract 5037.07	**19%**
Block Group 3, Census Tract 5037.07	8%
Block Group 1, Census Tract 5037.09	**30%**
Block Group 2, Census Tract 5037.09	**47%**
Block Group 2, Census Tract 5043.18	0%
Block Group 1, Census Tract 5043.19	4%
Block Group 2, Census Tract 5051	0%
Block Group 2, Census Tract 5052.03	0%
Santa Clara Block Groups	
Block Group 1, Census Tract 5052.02	**16%**
Block Group 3, Census Tract 5052.02	**28%**
Block Group 1, Census Tract 5052.03	6%
Block Group 1, Census Tract 5056	0%
Block Group 2, Census Tract 5056	**12%**
Block Group 3, Census Tract 5056	5%

Source: ACS, U.S. Census 2010–2014

Note: Bolded text identifies an environmental justice block group because the low-income percentage exceeded the low-income percentage of the city they are located (San Jose: 12%; Santa Clara: 9%)



Source: Circlepoint, 2016.

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Figure 4.18-4
Percent Below Poverty
VTA's BART Silicon Valley–Phase II Extension Project

The study area is 73 percent minority. For comparison, the Cities of San Jose and Santa Clara are 71 and 64 percent minority, respectively. As the majority of the study area is within the City of San Jose, the study area minority demographics do not deviate largely from the City of San Jose minority demographics.

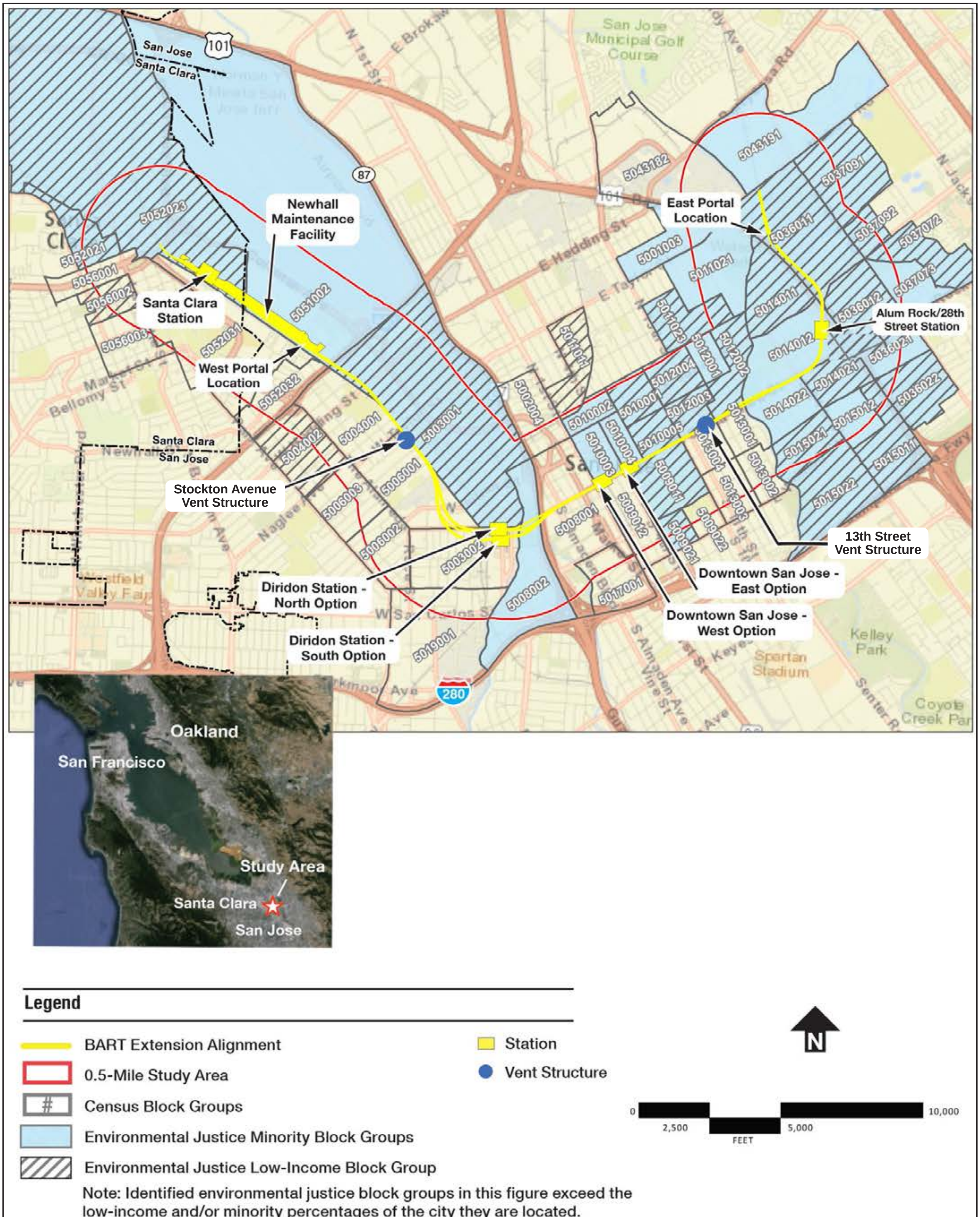
The average median household income of the overall study area is $61,063 per year, and 13 percent of the study area is considered to be low income. For comparison, the Cities of San Jose and Santa Clara median household income is $83,787 and $93,840 per year, respectively; the percent low income is 12 and 9 percent, respectively.

Environmental Justice Populations

Figure 4.18-5 summarizes the geographic locations (census block groups) of the populations with the greatest concentrations of minority and low-income percentages within the study area and are considered to be environmental justice populations. Such environmental justice determinations were based on the minority and low-income criteria outlined above in the *Minority Population* and *Low-Income* subsections. If the minority population percentage exceeded the threshold of the city in which they are located (San Jose at 71 percent and Santa Clara at 64 percent) or if the low-income population exceeded the threshold of the city (San Jose at 12 percent and Santa Clara at 9 percent), the population would be considered an environmental justice population. If the population did not exceed such thresholds, the population would not be considered an environmental justice population.

As described above, the census block groups identified in bold in Tables 4.18-3 and 4.18-5 exceed the minority and low-income population percentage thresholds of the city in which they are located and are therefore considered environmental justice populations. These environmental justice populations are shown in Figure 4.18-5. The minority environmental justice populations are shown in blue, and the low-income environmental justice populations are shown with a cross hatching. The section below describes each of the BART Extension elements and the environmental justice populations that surround each elements.

Potential adverse effects on these populations are analyzed in Section 4.18.4, *Environmental Consequences and Mitigation Measures*, along with whether such effects would be disproportionately high and adverse.



Source: Circlepoint, 2016.

Graphics … 00332.13 (12-1-2016)

Figure 4.18-5
Environmental Justice Communities
VTA's BART Silicon Valley–Phase II Extension Project

BART Extension Alignment from East to West

At the eastern end of the BART Extension Alternative, the extension would be at grade where it would connect to the Phase I Extension before diving underground into a tunnel and crossing under U.S. 101 and into the underground station at Alum Rock/28th Street Station. Aboveground station elements at the Alum Rock/28th Street Station would include station entrances, systems facilities, and a parking garage. The area surrounding the aboveground tracks on the east side of U.S. 101 is almost entirely industrial, and the area surrounding the proposed Alum Rock/28th Street Station contains mostly residential neighborhoods between Julian Street and Santa Clara Street. As shown in Figure 4.18-5, the census block groups surrounding the alignment between Mabury Road and Santa Clara Street exceed the minority and low-income population percentage thresholds of the City of San Jose and are therefore considered to be environmental justice populations.

The alignment would remain underground starting at Alum Rock/28th Street Station and would reemerge north of Interstate (I-) 880 at the proposed Newhall Maintenance Facility and Santa Clara Station. However, other BART Extension features such as mid-tunnel ventilation structures and station facilities, including entrances, systems facilities, and parking, would be above ground. The surrounding land uses and presence of environmental justice populations are described in detail below.

The alignment would curve west from Alum Rock/28th Street Station and line up directly under Santa Clara Street as it travels west toward downtown San Jose. An aboveground ventilation structure is proposed at 13th Street on the north side of Santa Clara Street. The area surrounding the ventilation structure is mostly commercial along Santa Clara Street and residential to the north and south. As shown in Figure 4.18-5, the census block groups located immediately adjacent to this vent structure and north of Santa Clara Street exceed the minority and low-income population percentage thresholds of the City of San Jose and are, therefore, considered to be environmental justice populations. Census block groups south of Santa Clara Street and across from the 13th Street Ventilation Structure do not exceed the minority or low-income population percentage thresholds of the City of San Jose and are, therefore, not considered to be environmental justice populations.

The alignment would continue west to the Downtown San Jose Station East and West Options. The areas that surround these station options are predominantly commercial interspersed with residential uses. While both options would be below ground, station entrances and systems facilities would be aboveground.

For the East Option, as shown in Figure 4.18-5, most of the census block groups (except the southwest block group) adjoining the aboveground station have minority populations that exceed the City of San Jose's minority population percentage thresholds and are, therefore, considered to be environmental justice populations. The census block groups to the east and south of the station have low-income populations that exceed the City of San Jose's low-income population percentage thresholds; therefore, these populations are considered to be environmental justice populations. The other census block groups adjacent to the East Option do not exceed the City of San Jose's minority or low-income population percentage thresholds and are, therefore, not considered environmental justice populations.

For the West Option, only the census block group to the north exceeds the City of San Jose's minority population percentage thresholds and is, therefore, considered an environmental justice population. However, none of the census block groups surrounding the West Option exceed the City of San Jose's minority or low-income population percentage thresholds; therefore, these are not considered low-income environmental justice populations.

The alignment would continue west, pass under State Route 87, and enter the proposed Diridon Station South and North Options underground, but both options would include aboveground system facilities, station entrances, and a reconstructed bus transit center. The land uses within and around the Diridon Station South and North Options include the Caltrain Station and associated tracks to the west, the SAP Center to the North, residential and industrial uses to the south, and commercial/office establishments to the east.

For the Diridon Station South and North Options, the census block groups to the north and east exceed the City of San Jose's minority population percentage thresholds, and the census block group to the north also exceeds the City of San Jose's low-income population percentage thresholds; therefore, these census block groups are considered environmental justice populations. The other census block groups do not exceed the City of San Jose's minority or low-income population percentage thresholds and are, therefore, not considered environmental justice populations.

The alignment would continue west then swing northwest and line up under Stockton Avenue south of I-880. The Stockton Ventilation Structure would be located at Stockton Avenue south of Taylor Street. Land uses to the north, east, and southeast of the Stockton Avenue Vent Structure are mostly industrial and commercial uses. The census block group to the north and east exceeds the City of San Jose's minority and low-income population percentage thresholds; therefore, it is considered to be an environmental justice population. The census block groups to the west and southwest do not exceed the City of San Jose's minority or low-income population percentage thresholds. Therefore, they are not considered environmental justice populations.

The alignment would continue northwest, pass under I-880, and enter into the Newhall Maintenance Facility and Santa Clara Station, both of which would be aboveground and located within an industrial area with some residential uses to the southwest, south, and southeast.

The Newhall Maintenance Facility is located within the City of San Jose and City of Santa Clara. The census block groups to the north, northeast, and east of the Newhall Maintenance Facility exceed the City of San Jose and the City of Santa Clara's minority and low-income population percentage thresholds and are, therefore, considered environmental justice populations. The census block groups to the southwest and south do not exceed the City of

San Jose or the City of Santa Clara's minority or low-income population percentage thresholds; therefore, they are not considered environmental justice populations.

The Santa Clara Station is located within the City of Santa Clara. The census block groups to the southwest and south of the station do not exceed Santa Clara's minority or low-income population percentage thresholds; therefore, they are not considered environmental justice populations. However, census block groups to the north, northeast, and east exceed the City of Santa Clara's minority and low-income population percentage thresholds and are, therefore, considered environmental justice populations.

4.18.2.2 Regulatory Setting

The following federal regulations are applicable to the BART Extension Alternative.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order (EO) 12898 directs federal agencies to "promote nondiscrimination in Federal programs substantially affecting human health and the environment, and provide minority and low-income communities' access to public information on, and an opportunity for public participation in, matters related to human health or the environment." The order directs agencies to use existing law to ensure that when they act:

- They do not discriminate on the basis of race, color, or national origin.
- They ensure public participation.
- They identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations.

Environmental Justice is defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, adoption, implementation and enforcement of environmental laws and policies." (California Senate Bill 115, Solis.)

Federal Transit Administration Circular 4703.1

The Federal Transit Administration (FTA) Circular 4703.1 (August 2012), *Environmental Justice Policy Guidance for Federal Transit Administration Recipients,* provides recipients of FTA financial assistance with guidance in order to incorporate environmental justice principles into plans, projects, and activities that receive funding from FTA. The Circular provides guidance in addressing, as appropriate, disproportionately adverse human health or environmental effects of programs, policies, and activities on minority populations and/or low-income populations. Environmental justice and non-discrimination principles are incorporated into decision-making processes.

U.S. Department of Transportation Order 5610.2(a)

The U.S. Department of Transportation (USDOT) Order 5610.2(a) (updated May 2012), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* sets forth the USDOT policy to consider environmental justice principles in all USDOT programs, policies, and activities. It describes how the objectives of environmental justice will be integrated into planning and programming, rulemaking, and policy formulation.

4.18.3 Methodology

Potential effects on environmental justice populations are measured by intensity using the terms *adverse effect* and *disproportionately high and adverse effect*, which are defined as follows.

- An *adverse effect* on minority and low-income populations means the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to:
  - Bodily impairment, infirmity, illness or death;
  - Air, noise, and water pollution and soil contamination;
  - Destruction or disruption of human-made or natural resources;
  - Destruction or diminution of aesthetic values;
  - Destruction or disruption of community cohesion or a community's economic vitality;
  - Destruction or disruption of the availability of public and private facilities and services;
  - Vibration;
  - Adverse employment effects;
  - Displacement of persons, businesses, farms, or nonprofit organizations;
  - Increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and
  - The denial of, reduction in, or significant delay in the receipt of, benefits of USDOT programs, policies, or activities.
- A *disproportionately high and adverse effect* on minority and low-income populations means an adverse effect that:
  1. Is predominately borne by a minority population and/or a low-income population, or
  2. Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

4.18.4 Environmental Consequences and Mitigation Measures

4.18.4.1 No Build Alternative

The No Build Alternative consists of the existing transit and roadway networks and planned and programmed improvements (see Chapter 2, Section 2.2.1, *NEPA No Build Alternative*, for a list of these projects). These projects would likely result in effects on environmental justice typically associated with transit, highway, bicycle, and pedestrian facilities and roadway projects. Projects planned under the No Build Alternative would undergo separate environmental review to determine whether the projects would adversely affect environmental justice, which would include an analysis of mitigation measures to mitigate potential impacts on environmental justice. With the No Build Alternative, land uses along the alignment would be built out in accordance with the Cities of San Jose and Santa Clara General Plans, which would include residential, commercial, and industrial projects, but not the BART Extension and its associated accessibility enhancements and transportation options.

4.18.4.2 BART Extension Alternative

Resource Areas with No Adverse Effects

The resource topics below would have no disproportionately high and adverse effect on environmental justice populations.

Air Quality

Once operational, the BART Extension would reduce the amount of air quality emissions generated in the region. This benefit is directly related to the BART Extension encouraging a transportation modal shift from single-occupancy vehicles toward transit. No operational adverse effects were identified for air quality; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Electromagnetic Fields

No operational adverse effects were identified for electromagnetic field generation; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Hazardous Materials

No operational adverse effects were identified for hazardous materials; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Socioeconomics

No operational adverse effects were identified for socioeconomics; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Transportation

No operational adverse effects were identified for transit, bicycle/pedestrian facilities, and vehicles; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Visual Quality

No operational adverse effects were identified for visual quality; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Water Resources, Water Quality, and Floodplains

No operational adverse effects were identified for water resources, water quality, and floodplains; therefore, *no disproportionately high and adverse effects* would occur on environmental justice populations, and this topic is not discussed further.

Resource Areas with Potential Adverse Effects

The resource topics below would have potential to have a disproportionately high and adverse effect on environmental justice populations; however, mitigation would reduce the potential effect so it would not be appreciably more severe or greater in magnitude than the adverse effect on non-environmental justice populations.

Noise and Vibration

The BART Extension has the potential to cause adverse effects resulting from operational airborne noise and operational groundborne noise as discussed below. No potential adverse effects are anticipated from operational vibration.

Airborne noise impacts from train operations can occur where trains are running on track aboveground, at ventilation facilities where train noise is transmitted to the surface from the tunnel below, and from storage yard tracks and maintenance facility activities. Aboveground BART operations on at-grade track north of I-880 would result in a Moderate Noise Impact at one ground-floor receiver located 290 feet away from the BART alignment, and two second-story receivers near the Santa Clara Station located 223 feet and 235 feet away from the BART alignment. However, the increases are 2 dBA or less, which is not a readily perceived amount. Therefore, no mitigation is proposed.

Operation of emergency ventilation fans, piston relief shafts, traction power substations, and emergency backup generators could result in exceedances of Cities of San Jose and Santa

Clara noise criteria at nearby residences located within 200 to 630 feet of these facilities, which would be considered an adverse effect due to airborne noise. However, with implementation of Mitigation Measure NV-A, described in Section 4.12, *Noise and Vibration*, this impact would have no adverse effect.

Train operations in the tunnel are predicted to result in exceedance of FTA groundborne noise criteria at many receptor locations, which would be considered an adverse effect. However, with implementation of Mitigation Measures NV-A~~B~~ and NV-B~~C~~, this impact would have no adverse effect.

As described, the study area is composed of predominantly environmental justice populations interspersed among non-environmental justice populations. The BART Extension is predicted to cause potential airborne noise effects from aboveground BART Extension elements and potential groundborne noise effects from underground train operations within or immediately adjacent to environmental justice populations and non-environmental justice populations. However, mitigation would reduce potential airborne and groundborne noise effects; therefore, these impacts would have no adverse effect. The BART Extension operations do not result in any vibration impacts. Consequently, following mitigation, *no disproportionately high and adverse effects* on environmental justice populations would occur.

Community Outreach Efforts

VTA has taken measures to ensure the public is aware and has been engaged during the design period of the BART Extension. VTA displayed advertisements in the local newspapers, mailed individuals located within the vicinity of the alignment, emailed VTA's web recipients, posted on social media, and issued press releases to announce the BART Extension and held public meetings during the scoping period. The mailers were sent to 58,000 recipients within a 0.25-mile radius of the alignment and within a 1-mile radius of stations. The mailers were translated into five languages (Spanish, Vietnamese, Korean, Chinese, and Portuguese). All of these outreach efforts included a method to contact VTA with concerns or comments. These efforts are further outlined in the *Environmental Scoping Report*.

VTA conducted three scoping meetings to gather input from the community which provided information to the community and initiated public involvement in the environmental review process (see Chapter 10, *Agency and Community Participation*). The community offered suggestions and concerns at several public forums, including scoping meetings. During the scoping process, VTA invited the community to provide input on the BART Extension. The community offered suggestions and voiced concerns related to several BART Extension components. Such community input has helped to guide the development, particularly for aboveground station areas, to minimize adverse community effects of the BART Extension. The main concerns of the community were regarding parking constraints, traffic congestion, entry points of the stations, pedestrian safety, gentrification, displacement, and potential impacts on Five Wounds Church and Cristo Rey San Jose Jesuit High School. The community was also concerned about construction effects of the BART Extension regarding dust, air quality, and noise. The community also requested understanding of how all of these potential concerns would affect environmental justice populations.

VTA took this community feedback into consideration while determining the most feasible alignment. The BART Extension would expand BART service to the greater San Jose and Santa Clara community, thereby increasing connectivity in the regional San Francisco Bay Area, which would be a direct benefit of this same community. Implementation would facilitate residential and employment growth and infill development planned for the regional area.

4.18.5 NEPA Conclusion

As described above, operation of the BART Extension Alternative would not result in adverse effects regarding air quality; electromagnetic fields; hazardous materials, socioeconomics, transportation; visual quality; and water resources, water quality, and floodplains.

Operation of the BART Extension Alternative would result in potential adverse effects regarding noise and vibration. As described, VTA would implement mitigation that would reduce potential effects to a level such that *no adverse effects* would occur. The BART Extension Alternative would expand BART service to the greater San Jose and Santa Clara community, thereby increasing connectivity in the regional San Francisco Bay Area. The BART Extension would create direct and indirect jobs associated with operations that would provide new employment opportunities for all populations including environmental justice populations. Implementation of the BART Extension would facilitate residential and employment growth and infill development planned for the area. Once in operation, the BART Extension Alternative would increase regional mass transit access and reduce air pollutant emissions by shifting more users to public transit. Such effects would benefit environmental justice and non-environmental justice populations. Furthermore, VTA has taken measures to ensure the public is aware of the BART Phase II Project and engaged in the implementation process. With the community outreach efforts that have occurred to-date and with implementation of mitigation, the BART Extension Alternative would not result in adverse effects. Accordingly, *no disproportionately high and adverse effects* from operation of the BART Extension Alternative would result for environmental justice populations.

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