BART to Livermore Extension

Draft Program Environmental Impact Report

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BART TO LIVERMORE EXTENSION
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Section 1
Introduction

1.1 EIR OVERVIEW

The San Francisco Bay Area Rapid Transit District (BART) is proposing to extend transit service into eastern Alameda County from its existing Dublin/Pleasanton BART Station within and adjacent to the Interstate 580 (I-580) right-of-way, pass the cities of Dublin and Pleasanton city limits and on to a terminus station in the City of Livermore. The program being considered in this document is the BART to Livermore Extension Program. This document does not evaluate a single alignment connecting the Dublin/Pleasanton BART Station and Livermore; rather, a group of alternatives that effectively extends BART service has been identified, and this report is intended to consider the environmental effects of these different alignments and enable BART to select a preferred alternative.

Purpose of an EIR

This document is a Program Environmental Impact Report (EIR) prepared pursuant to the California Environmental Quality Act (CEQA). In accordance with CEQA, California Public Resources Code Section 21002.1, BART has prepared this EIR for the following purposes:

- To identify the significant effects on the environment of the proposed action, to identify alternatives to the proposed action, and to indicate the manner in which those significant effects can be mitigated or avoided.
- To mitigate or avoid the significant effects of the proposed action on the environment whenever it is feasible to do so.
- To consider the effects, both individual and collective, of all activities involved in the proposed action.
- To provide more meaningful public disclosure and focus on potentially significant effects on the environment of a proposed action.

For the purposes of this EIR, BART is the designated "lead agency," which, according to Section 15367 of the CEQA Guidelines, is defined as the public agency with the principal responsibility for carrying out or approving a project and conducting the environmental review.

As provided in both CEQA and the CEQA Guidelines, the lead agency, in this case BART, is charged with the duty to substantially lessen or avoid significant environmental effects where feasible for projects subject to CEQA (refer to PRC Section 21004, CEQA Guidelines Sections 15002(a)(3) and 15021(a)(2)). As defined in the CEQA Guidelines Section 15382, a "significant effect on the environment" is:

> … a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant. In discharging this duty, the lead agency has an obligation to balance a variety of public objectives, taking into account economic, environmental, and social issues.

The EIR is an informational document intended to analyze and to disclose to the public and public agencies the environmental effects and benefits of a proposed program and its alternatives. The preparation, circulation, and public review of this Draft Program EIR allows for public agency and public comment on the evaluation of alternatives, including a No Build Alternative (No Project Alternative); the assessment of environmental impacts; and the effectiveness of the suggested methods to reduce impacts that are considered significant.

Although this Program EIR does not determine which alternative is selected, the BART Board of Directors must consider the information in this EIR and public comments on significant effects identified in this EIR. The BART Board of Directors will use the Program EIR, along with other information, to select a preferred alignment alternative to extend BART service to Livermore, and to specify any applicable environmental mitigation as part of the approval.

Program EIR versus a Project EIR

A Program EIR is a type of "high level" EIR that allows a public agency, such as BART, to consider broad policy alternatives and program-wide mitigation measures at the early stages of planning. Program EIRs may be followed by project-level EIRs or other CEQA documents that evaluate the impacts of specific projects within the program. In the case of the BART to Livermore Extension Program, BART is preparing a Program EIR to evaluate alignment alternatives on a broad level and will subsequently consider, in greater detail, impacts and alternatives associated with a preferred alignment and station locations once a project is chosen.

Preparation of a program-level document followed by more detailed project-specific documentation that "tiers" off the program-level document offers a number of advantages. As described in CEQA Guidelines, Section 15168(b), a program EIR can:

1. Provide an occasion for more exhaustive consideration of effects and alternatives that would be practical in an EIR on an individual action;
2. Ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis;
3. Avoid duplicative reconsideration of basic policy considerations;

4. Allow the lead agency to consider broad policy alternatives and program wide mitigation measures at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts; and

5. Allow reduction in paperwork.

For the BART to Livermore Extension Program, BART is preparing a Program EIR to evaluate alignment alternatives on a broad level. The Program EIR will be used to narrow the range of reasonable and feasible alignment alternatives by evaluating the potential environmental impacts and tradeoffs associated with the different routes, in order to identify alignment and station alternatives that may be considered in a future project-specific environmental document.

The Program EIR will provide an overview of potential environmental impacts associated with different alignments and station locations which will allow BART to refine station choices during subsequent, more detailed planning and to begin the process of protecting the right-of-way for future development of a transit system and releasing funds. At a later date, BART intends to prepare a project-level EIR before making the decision whether to construct a project. The subsequent environmental documentation will also consider other technology choices for providing transit services to the City of Livermore.

The required contents of a program EIR are the same as those of a project-level document. However, the level of detail and analysis in the two documents differ because a program-level document analyzes a general conceptual design and location of the proposed alternatives rather than providing a detailed level of analysis for a specific alignment. For example, at the program level, the generalized station locations are identified and evaluated, but more specific details such as the siting, scale, and orientation of the station facilities are unknown at this time. Sufficient planning has been completed to identify the station area as a logical location and to acknowledge that the area is large enough to accommodate the facilities that might eventually be proposed as part of a more specific proposal.

1.2 PROGRAM OVERVIEW

Existing BART Service

BART has been in operation since 1972 and currently operates in four Bay Area counties: San Francisco, Alameda, Contra Costa, and San Mateo. The entire BART system is illustrated in Figure 1-1. The most recent completed extensions to the BART system are those to Dublin/Pleasanton in eastern Alameda County, to Pittsburg/Bay Point in east Contra Costa County, and to San Francisco International Airport in San Mateo County, with a terminus in Millbrae. Other extensions have been approved and include BART to Warm Springs, eBART extending service further into east Contra Costa County, and Oakland Airport Connector providing an Automated Guideway Transit connection to the Oakland International Airport. The Santa Clara Valley Transportation Authority is also proposing a

Source: BART, 2009.

REGIONAL LOCATION AND EXISTING BART SYSTEM
FIGURE 1-1

BART extension from Warm Springs to the Santa Clara County (Silicon Valley Rapid Transit Corridor Project), which is currently undergoing environmental review.

In eastern Alameda County, BART service extends as far east as the Dublin/Pleasanton Station, which is located in the median of I-580 just west of the Dougherty Road/I-580 interchange. BART opened the Dublin/Pleasanton BART Station in 1997.[1] This station offered a transit alternative for travel between the Tri-Valley area of eastern Alameda County, which includes the cities of Dublin, Pleasanton, and Livermore, and the rest of the BART service area. Since opening, the station and line have been heavily used, as an average of 7,858 persons enter and exit the station each weekday.[2]

Proposed BART to Livermore Extension Alternatives

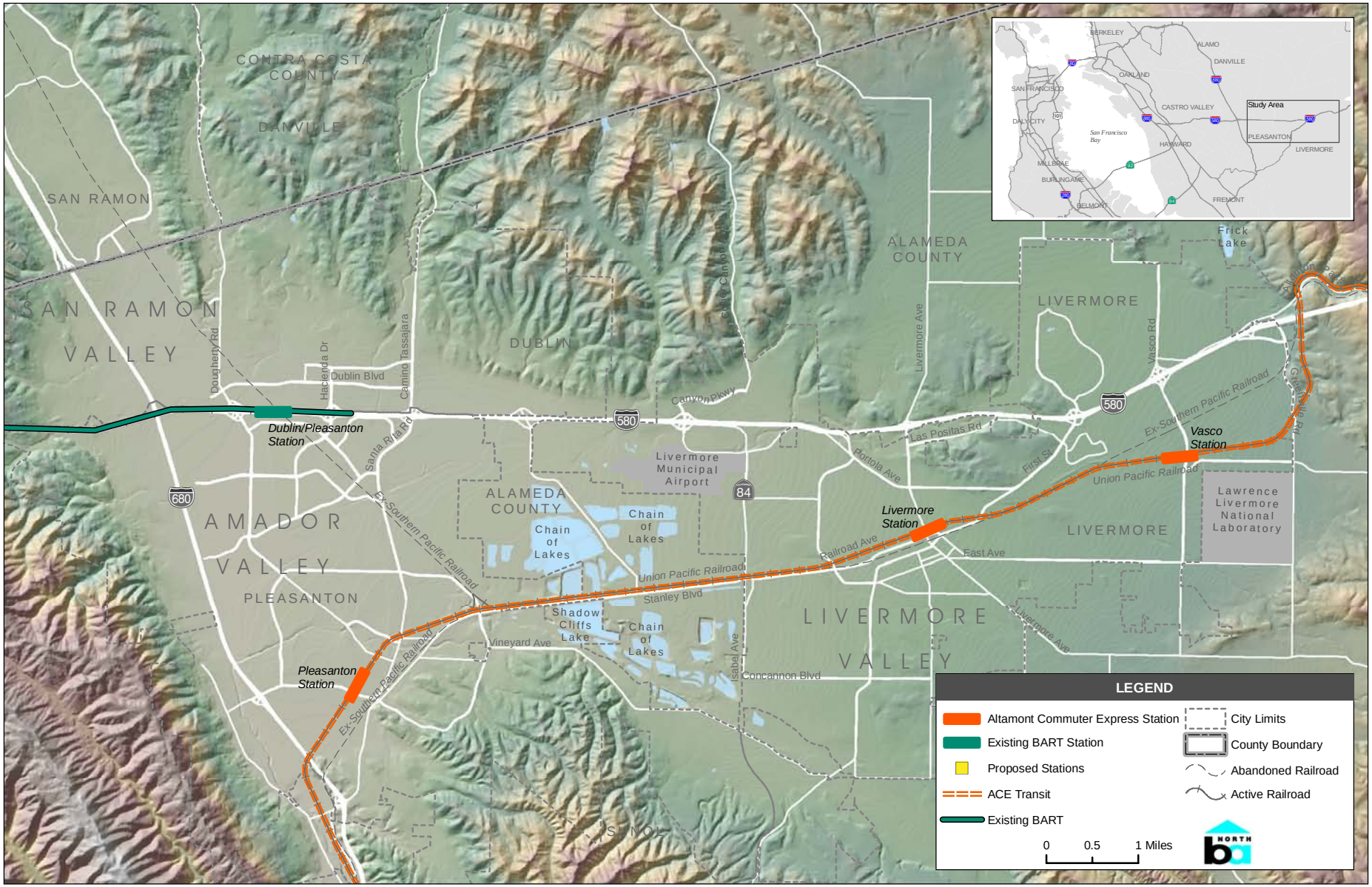
Since its original planning phases, BART has considered proposals to extend rail service to Livermore. This BART to Livermore Extension Program considers nine unique alignments for extending existing BART service eastward to Livermore, using BART's existing heavy rail electric technology, which runs on grade-separated rights-of-way and reaches maximum speeds of 80 miles per hour. The routes and station locations incorporate previous studies by BART as well as current input from BART's local partners in Alameda County and the Tri-Valley area. As is further explained in Section 2, Alternatives, of this EIR, these alternatives were adapted from a wider range of potential station and alignment pairings based on their abilities to best fulfill the program purpose and need in a feasible manner. A No Build Alternative is also analyzed in this EIR and represents the region's existing transportation network consisting of highways, arterial roads, and public transit facilities. Specifically, this alternative considers the transportation network as it exists at present with the addition of programs and projects that are currently in regional transportation plans and have identified funds for implementation by 2035. This alternative defines the future transportation conditions without any BART extension to Livermore.

Figure 1-2 shows the Tri-Valley area, where the BART to Livermore Extension Program is examining alternative alignments and station locations. This figure also shows existing highways, roadways, railways, and permanent transit stations and rights-of-way, including BART and Altamont Commuter Express (ACE) transit service routes and stations within the eastern Alameda County area.

The BART extension alternatives, ordered counterclockwise from the easternmost terminus station, are illustrated in Figure 1-3. All of the extension alternatives originate at the existing Dublin/Pleasanton BART Station and extend eastward in the median of I-580. As shown in Figure 1-3, only Alternative 1 remains in the I-580 median for most of its length and Alternative 4 is entirely within the median. Alternatives 1a, 1b, 2a, 3a, and 5 follow El Charro Road to reach the UPRR tracks. Alternative 2 uses Las Positas Road and Alternative 3 uses Portola Avenue to reach the UPRR tracks.

[1] BART, BART Chronology, January 1974 – March 2009, www.bart.com/docs/BARThistory.pdf, accessed June 10, 2009.

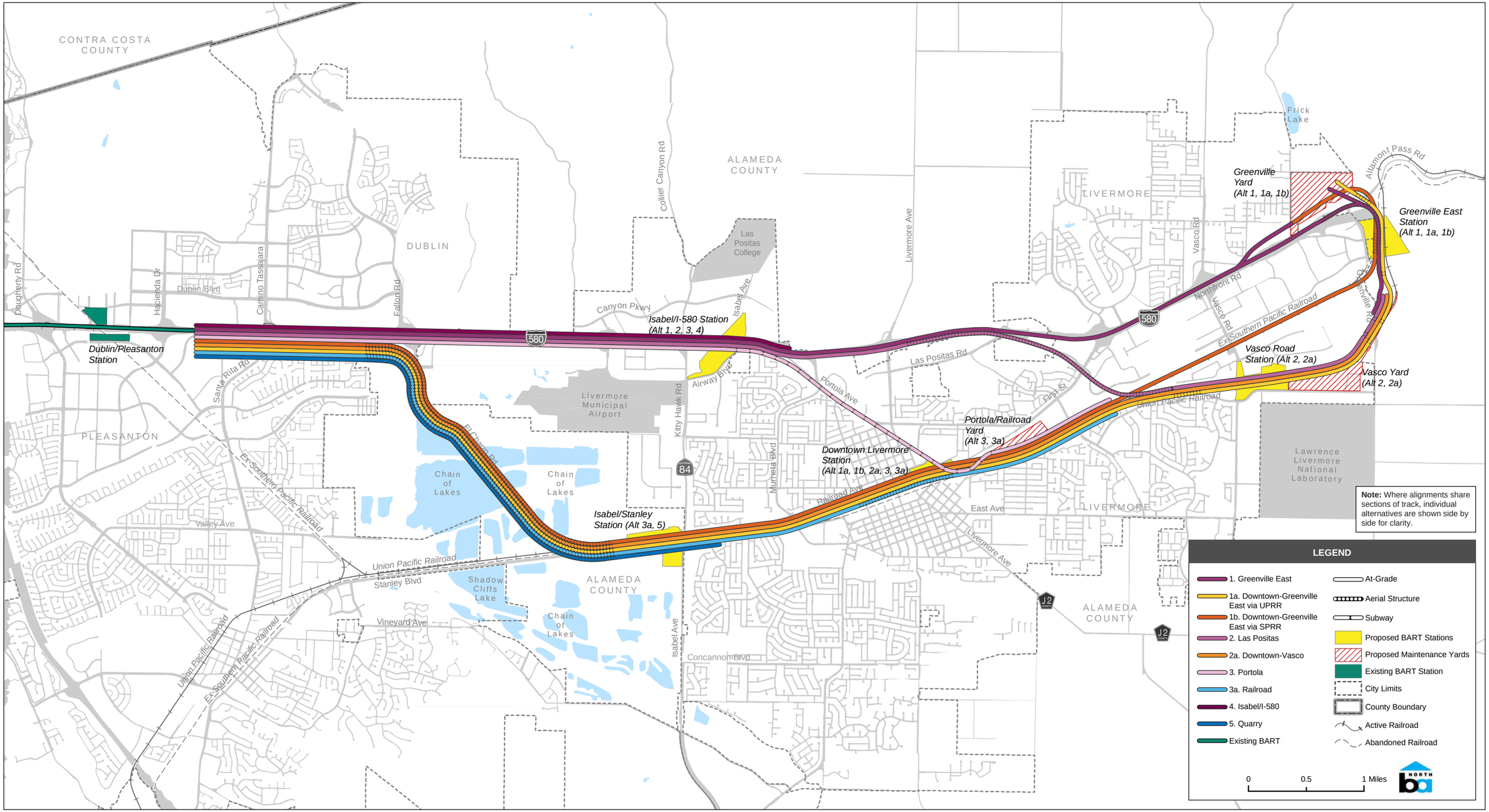
[2] BART, BART Fiscal Year Weekday Average Exits, FY08, http://www.bart.gov/docs/station_exits_FY.pdf, accessed July 30, 2009.



Source: USGS DEM; Caltrans, 2009.

BART TO LIVERMORE EXTENSION PROGRAM STUDY AREA

FIGURE 1-2



Source: AECOM, May 4, 2009.

BART TO LIVERMORE EXTENSION ALTERNATIVES

FIGURE 1-3

- Alternative 1 – Greenville East. This alternative would follow the median of I-580, include an intermediate station at Isabel/I-580, and continue to a terminus station at Greenville Road just south of I-580.

- Alternative 1a – Downtown-Greenville East via UPRR. This alternative would originate at the existing Dublin/Pleasanton BART Station and move eastward within the median of I-580, veer southeast along El Charro Road, into the Union Pacific Railroad (UPRR) right-of-way, and then north to the proposed Greenville East Station.

- Alternative 1b — Downtown-Greenville East via SPRR. This alternative would have the same alignment and elements described above for Alternative 1a, except that the segment between the proposed Downtown Livermore Station and a terminus at Greenville East would be in the former Southern Pacific Railroad (SPRR) right-of-way. The departure from the UPRR right-of-way east of downtown Livermore would occur near the intersection of Mines Road.

- Alternative 2 – Las Positas. The Las Positas alignment would follow the median of I-580, include an intermediate station at Isabel/I-580, then diverge southeasterly along Las Positas Road, toward central Livermore, to the UPRR right-of-way, at which point the alignment would be in the UPRR right-of-way to a terminus station at the existing Vasco Road ACE Station.

- Alternative 2a – Downtown-Vasco. This alternative would have the same alignment and elements described above for Alternatives 1a and 1b, between the existing end of track at the Dublin/Pleasanton BART Station and the proposed Downtown Livermore Station. Alternative 2a would include a Downtown Livermore Station and a terminus station at Vasco Road.

- Alternative 3 – Portola. The Portola alignment would follow the median of I-580, include an intermediate station at Isabel/I-580, then diverge from the I-580 corridor at Airway Boulevard, transition to Portola and Junction Avenues to a terminus station adjacent to the existing downtown Livermore ACE Station.

- Alternative 3a – Railroad. The Railroad alignment would follow the same route as Alternatives 1a, 1b, and 2a from the Dublin/Pleasanton BART Station eastward in the I-580 median, along El Charro Road, to the UPRR right-of-way; however, this alternative would terminate adjacent to the existing downtown Livermore ACE Station.

- Alternative 4 — Isabel/I-580. The Isabel/I-580 alignment would be constructed within the median of I-580 to a terminus station immediately east of the planned Isabel Avenue overpass/interchange.

- Alternative 5 — Quarry. The Quarry alignment would follow the median of I-580 and diverge from the I-580 corridor at El Charro Road, and proceed southeasterly to the UPRR right-of-way, at which point the alignment would be in the UPRR right-of-way to a terminus station west of the Isabel Avenue (SR-84) and Stanley Boulevard intersection.

While the alignment and station locations differ among these nine BART alternatives, all alignments would be fully grade-separated and would run at-grade, on an aerial structure, in a retained trench, or in a subway (cut and cover) as necessitated by surrounding terrain or existing conditions. Rights-of-way would make use of track, signal, and communications technology currently used by BART. Service would be provided using existing specifications for BART vehicles (or future vehicles superseding existing BART rolling stock) powered by an electrified third rail propulsion system.

1.3 OVERVIEW OF STUDY AREA

The study area for this Program EIR lies in eastern Alameda County, California within the nine-county San Francisco Bay Area. The Tri-Valley study area (see Figure 1-2) has been one of the fastest growing subregions of the San Francisco Bay Area. As a result, travel demand in the region has continued to increase, even though gridlock occurs on a regular basis on I-580 through the study area. The study area's profile of continued growth, a constrained road network, and limited transit service and options, as detailed below, creates a need to introduce additional transit services to improve mobility throughout the area.

Growth Trends and Travel Patterns

Between 1970 and 2000, the Tri-Valley area experienced a population increase of 140 percent, compared to the County increase of 35 percent.[3] Within the past decade for which US Census data are available, between 1990 and 2000, population growth in the Tri-Valley area accounted for about 26 percent of total growth within the entire County, and approximately five percent of total growth within the Bay Area. Over this period, the Tri-Valley area experienced an average yearly population growth of approximately five percent, compared to one percent annually for the County overall.

According to the Association of Bay Area Government's (ABAG) 2007 projections, the total population of all communities within the Tri-Valley area (Dublin, Pleasanton, and Livermore) will increase substantially by 2030, placing higher demand on area roadways, especially I-580. ABAG population forecasts suggest that the study area will continue to absorb a substantial share of the Bay Area's population and household growth over the next 20 to 30 years. Between 2000 and 2030, population in the Tri-Valley area is projected to grow from about 168,906 people to 279,900 people (about 66 percent).[4] During that same timeframe, population in the County is expected to increase about 29 percent, and the population of the Bay Area is projected to increase about 28 percent. As a result, the Tri-Valley area is forecast to accommodate an even greater proportion of the Bay Area's development in 2030 than it does currently.

[3] Metropolitan Transportation Commission and the Association of Bay Area Governments, Bay Area Census, Online at: http://www.bayareacensus.ca.gov, Accessed June 12, 2009.

[4] Association of Bay Area Governments, *ABAG Projections 2007*, December 2006. Population data are for the cities of Dublin, Pleasanton, and Livermore.

Over the last two decades, San Joaquin County has essentially become a suburb to the Bay Area as more and more residents have relocated to the Central Valley, willing to tolerate longer commutes to work in exchange for the opportunity to buy housing. Between 1990 and 2000, the percentage of working residents in San Joaquin County commuting to the Bay Area for work increased from 10.4 percent to 15.7 percent; by 2005, it was 17.3 percent. Between 1990 and 2000, San Joaquin County's population grew at an annual rate of 1.6 percent; between 2000 and 2005, the percentage jumped to 3.4 percent. Trends for San Joaquin County continue to show rapid household growth,[5] and a high demand to cross the Altamont Pass to access jobs in the Bay Area.

While growth in eastern Alameda County and San Joaquin County has been tempered by the housing mortgage crisis, which has resulted in foreclosures and a drop in housing prices over the past few years, factors that contributed to the Tri-Valley area and San Joaquin County development boom over the past two decades are still present – available land, lower housing costs, attractive weather, and suburban lifestyle. As a result, even though growth will certainly slow in the short term, compared to historical patterns, development would be expected to resume and travel conditions along I-580, already heavily congested, would continue to worsen.

Transportation Conditions in Eastern Alameda County

I-580 is the primary east-west transportation corridor in eastern Alameda County, the only inter-regional route of significance that runs east and west in the eastern county, and the only highway link between western and eastern Alameda County. The geography of the area to the north and south of I-580 limits alternative east-west transportation routes in the area. As previously discussed, rapid development within eastern Alameda County and the Central Valley has resulted in severe congestion along I-580. Furthermore, there is a job/housing imbalance within the corridor, suggesting a high level of commuting within and through the I-580 corridor.

Vehicle delay is the delay incurred during the peak hour as a result of congestion on a freeway or freeway ramp and is measured in units of "vehicle hours." In 2007, both the eastbound afternoon commute along I-580 from I-680 Dublin/Pleasanton to the Greenville Road interchange in Livermore, and the westbound morning commute along I-580 from I-205 in San Joaquin County, immediately east of Alameda County, was listed as one of the "top ten" most congested freeway segments in the Bay Area. Throughout the Bay Area, the daily number of vehicle hours of delay due to commute congestion rose by six percent between 2005 and 2006. Of the nine counties that comprise the Bay Area, the largest overall increase in freeway congestion in 2006 occurred in Contra Costa County, while Alameda County ranked third in overall increase in freeway congestion.[6]

[5] San Joaquin Council of Governments and the University of the Pacific Eberhardt School of Business Forecasting Center, Regional Analyst, "San Joaquin County Population Forecast", July 2008.

[6] Metropolitan Transportation Commission and Caltrans, Daily Freeway Delay by Bay Area County, 2002-2006, Online at: http://www.mtc.ca.gov/news/press_releases/congestion/Table-07.pdf, Accessed June 15, 2009. Santa Clara and Sonoma counties both ranked second in overall increase in freeway congestion in 2006.

Transit Services in the Study Area

BART Service. BART operates a heavy rail, electrified rapid transit system in Alameda, Contra Costa, San Francisco, and San Mateo Counties. BART's Millbrae – Dublin/Pleasanton Line provides regional rail access to the Tri-Valley area. The line originates at the Millbrae BART/Caltrain intermodal station, extends through San Francisco, reaches Oakland via the Transbay Tube, then continues south through San Leandro and Castro Valley before proceeding east to its terminus at the Dublin/Pleasanton Station. The Dublin/Pleasanton Station serves as a primary transfer point between BART and local, regional, and commuter bus services provided by Livermore Amador Valley Transit Authority (LAVTA), Contra Costa County Connection, Tri Delta Transit, San Joaquin Regional Transit District, Modesto Area Express, and Amtrak California. A new station is under construction at West Dublin/Pleasanton, just west of the I-580/I-680 interchange, to serve local development in the station area and long-distance commuters along the I-580 and I-680 corridors.

Altamont Commuter Express (ACE) Service. The ACE service was initiated on October 19, 1998 with two daily round-trip trains between Stockton and San Jose. Running primarily on tracks owned by freight railroads, ACE heavy commuter rail service is operated using diesel-powered locomotives. The 86-mile ACE corridor parallels I-5, I-205, I-580, I-680, and I-880. ACE operates four weekday peak hour commuter rail trains between Stockton and San Jose, and serves the Tri-Valley area at three stations: Pleasanton, Livermore (located in the city's downtown core), and Vasco Road in Livermore. Each of these stations provides commuter parking and transit connections. The Livermore ACE Station functions as a regional transit hub and connects to nine LAVTA bus routes as well as Amtrak California intercity bus service. There are no direct connections between the ACE system and BART. LAVTA's Line 54 provides a bus route from the Dublin/Pleasanton Station to ACE's Pleasanton Station, which is about 3.5 miles south near the Pleasanton Fairgrounds and Civic Center.

Livermore Amador Valley Transit Authority Service (LAVTA). LAVTA is the local public transit service provider in the Tri-Valley area. LAVTA provides fixed route bus service, consisting of 1 express, 20 local, and 24 supplemental school service routes, as well as flexible dial-a-ride service. LAVTA structures its bus service around two primary transit hubs: the Dublin/Pleasanton BART Station and the downtown Livermore Transit Center/Livermore ACE Station. Eleven bus routes provide service to the Dublin/Pleasanton BART Station. Eight routes serve the Livermore Transit Center.

1.4 PROGRAM OBJECTIVES

Given the transportation characteristics and future travel demand in east Alameda County in general and along the project corridor in particular, the following objectives have been identified by BART for extension of transit service to Livermore:

- Increase BART ridership.
- Provide congestion relief along the I-580 corridor through the Tri-Valley area.

- Provide convenient intermodal connections between BART, the Altamont Commuter Express, and the Livermore Amador Valley Transit Authority.
- Support local efforts, initiatives, and policies to promote transit-oriented development.
- Enhance economic benefits, contributing to local investment and development opportunities.
- Provide a cost effective transit system, recognizing budget constraints and available funding.
- Conform with the BART System Expansion Policy and with the Metropolitan Transportation Commission's Resolution #3434 – Transit-Oriented Development Policy for Regional Transit Extension Projects.
- Protect and enhance the environment.
- Improve transit mobility between the Silicon Valley, the Tri-Valley area, the East Bay Area, and San Francisco in support of efforts to reduce greenhouse gas emissions, consistent with Senate Bill (SB) 375.

1.5 TRANSIT SYSTEM EXTENSIONS IN THE BAY AREA

While BART has specific program objectives for extending transit services into Livermore, major investments in transit in the San Francisco Bay Area are shaped and influenced by two key policies that provide an overarching framework for improving regional mobility. These policy directives are Resolution #3434 of the MTC and BART's System Expansion Policy. Because these two policies must be satisfied if any BART service is to be offered, it is important to describe them and understand the efforts to meet the system extension criteria as a premise to this Program EIR and any future project-level environmental documentation. In addition, two other major planning efforts provide a context for rail service in the Bay Area: the Regional Rail Plan and the High-Speed Rail Plan. Both of these efforts are also briefly described as both affect rail transit service and facilities in the Bay Area.

Metropolitan Transportation Commission Resolution #3434

The MTC is responsible for planning, financing, and coordinating transportation in the nine-county San Francisco Bay Area. Of relevance to the BART to Livermore Extension Project is MTC Resolution #3434 – Transit-Oriented Development (TOD) Policy for Regional Transit Extension Projects. The MTC adopted Resolution #3434 in 2005 to aid the various jurisdictions throughout the Bay Area region in addressing multiple goals: improving the cost effectiveness of regional investments in new transit expansions; easing the Bay Area's chronic housing shortage; creating vibrant new communities; and helping preserve regional open space by ensuring cooperation in creating development patterns that support transit services. The TOD policy applies only to physical transit extensions funded by Resolution #3434, which identified specific priority projects for transit expansion. Resolution #3434 included the extension of BART service to Livermore. There are three key elements of the regional TOD policy:

- Corridor-level thresholds to quantify appropriate minimum levels of development around transit stations along new corridors;
- Local station area plans that address future land use changes, station access needs, circulation improvements, pedestrian friendly design, and other key features in a transit-oriented development; and
- Corridor working groups that bring together Congestion Management Agencies (CMAs), city and county planning staff, transit agencies, and other key stakeholders to define expectations, timelines, roles and responsibilities for key stages of the transit project development process.

Meeting the corridor-level housing thresholds requires that, within one-half mile of existing and proposed stations in the corridor, a combination of existing land uses and planned land uses meets or exceeds the overall corridor threshold for housing. Resolution #3434 requires an average of 3,850 housing units per station for conventional BART technology, including existing housing units near the current end station at Dublin/Pleasanton, to meet the MTC corridor-level thresholds.

BART System Expansion Policy

In order to guide BART in the extension and expansion of its system, such as that currently envisioned by the BART to Livermore Extension Program, the BART Board of Directors adopted a Strategic Plan in 1999 (updated in 2003 and 2008). The Strategic Plan defines BART's strategic initiatives to ensure the achievement of its mission to "provide safe, clean, reliable, and customer friendly regional public transit service in order to increase mobility and accessibility, strengthen community and economic prosperity, and preserve the environment in the Bay Area." These strategic initiatives include specific policies for system expansion and station area planning.

A System Expansion Policy (SEP) was adopted as part of the Strategic Plan in 1999. The policy identifies a uniform set of criteria to be applied to all extensions of BART service. The SEP of BART's 2008 Strategic Plan ensures that a uniform set of criteria is used for evaluating future project opportunities. These criteria include:

- Transit Supportive Land Uses and Access – How well do existing residential and/or employment land uses, intermodal connections, and local land use plans and policies support transit use?
- Ridership Development Plan – Does the project meet BART's ridership threshold, and have the local jurisdictions prepared plans to promote transit supportive uses and improve access to proposed stations?
- Cost Effectiveness – How much does it cost to increase ridership?
- Regional Network Connectivity – How well does the project close gaps in the regional transportation network?

- System and Financial Capacity – How does the project affect BART's existing system and is there a viable capital financing plan and operating financing plan?
- Partnerships – How much community and stakeholder support exists for the project?

Among the chief elements of the policy is the requirement that one or more Ridership Development Plans (RDP) may be undertaken for proposed expansion projects of the existing BART system. The RDP(s) must demonstrate that a corridorwide ridership threshold can be achieved through measures such as transit-supportive land uses and investment in access programs and projects.

Ridership Estimates. Ridership at the corridor level is to be estimated using a standard modeling methodology that incorporates assumptions regarding land use and transportation policies and projected growth. The SEP establishes a minimum corridorwide ridership deemed necessary to satisfy the criteria of BART's System Expansion Policy. Under the SEP, projected average daily trips for the extension (daily entries and exits associated with new stations) are rated into five grades from low to high:

- Low – less than 5,000 average daily trips
- Low-Medium – 5,000 to 9,999 average daily trips
- Medium – 10,000-13,999 average daily trips
- Medium-High – 14,000 to 20,000 average daily trips
- High – above 20,000 average daily trips

Ridership projections are taken into consideration by BART and may determine if RDPs are needed to support the extension by providing a framework for transit-supportive uses and future investment at station areas along the proposed route.

Ridership Development Plans. As provided by BART's SEP, in determining whether to adopt a system expansion project and where to locate new stations, BART shall consider whether RDPs developed for each station can collectively demonstrate that the project will achieve the target threshold ridership level along with meeting the goals of the SEP. Strategies for boosting ridership include planning and implementation of transit-supportive land uses, improvements in local transportation programs and infrastructure, increases in transit feeder services and development of additional auto-serving parking facilities including parking in the station area. Since the proposed stations are in Livermore, the City of Livermore must demonstrate after the preferred alignment is selected that the ridership threshold for the station(s) can be achieved. Whether an individual station achieves its share of the corridorwide threshold by land use changes or access improvements or some combination of the two is at the full discretion of the City of Livermore as long as the corridorwide ridership threshold is achieved.

The SEP requires BART to determine whether the target threshold ridership level is met before deciding to proceed with construction of an expansion project. Accordingly, the City of Livermore

may be expected to prepare an RDP before or in coordination with BART's preparation of a project-level EIR for the BART to Livermore Extension.

Regional Rail Plan

The Metropolitan Transportation Commission (MTC), Caltrain, BART, California High-Speed Rail Authority, in collaboration with a coalition of rail passenger and freight operators, regional partners, and rail stakeholders, prepared a comprehensive Regional Rail Plan for the Bay Area, as required by the voters in the Regional Measure 2 (RM2) Traffic Congestion Relief Program. MTC adopted the Regional Rail Plan – Final Report on September 26, 2007.

The Regional Rail Plan examined ways to incorporate passenger trains into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit network, increase rail capacity and coordinate rail investment around transit-friendly communities and businesses. The plan included a detailed analysis of potential high-speed rail routes between the Bay Area and the Central Valley for the Rail Authority's environmental review of the proposed rail lines. Overall, the plan looked at improvements and extensions of railroad, rapid transit, and high-speed rail services for the near (5 to 10 years), intermediate (10 to 25 years), and long-terms (beyond 25 years).

The Regional Rail Plan for eastern Alameda County calls for preservation of the I-580 corridor for a possible BART extension to Livermore, intermodal connections between BART and ACE services, and increased ACE service.

High-Speed Rail

The California High-Speed Rail Authority (CHSRA) is performing engineering and environmental studies for an 800-mile high-speed train system linking northern and southern California. The trains would maintain operating speeds of up to 220 miles per hour and could connect travelers between San Francisco and Los Angeles in a little over 2-1/2 hours. A statewide program EIR/EIS (Environmental Impact Report/Environmental Impact Statement) was completed in 2005 and a second program EIR/EIS examining the Central Valley to San Francisco Bay Area was certified in 2008 by the CHSRA and the Federal Railroad Administration. Based on these documents and public input, the CHSRA identified the Pacheco Pass as the preferred connection between the Central Valley and the San Francisco Bay Area. Nevertheless, the CHSRA is continuing examination of possible enhancements through the Tri-Valley area that would be compatible with high-speed trains in the future.

Specifically, the "Altamont Corridor Project" would provide a regional rail connection between the San Francisco Bay Area and northern San Joaquin Valley via the Tri Valley area. The project would extend between San Jose to the west and Stockton and Modesto to the east. Between these end points, a broad corridor is being studied; various alignment alternatives that generally follow this route along with stations located to serve market areas and provide transit connectivity will be identified and evaluated as part of future environmental review. The project will serve as an upgrade to regional rail services presently operated by ACE. The project would include a branch east of Tracy which will connect to the north/south high-speed train line in the Central Valley to allow operation of trains

between the Inner Bay Area and Modesto as well as points beyond to the north and south including Sacramento. The project is also being planned to accommodate intermodal connections to BART should it be extended in the Livermore vicinity and in the Fremont/Union City vicinity. Intermodal connections to BART would provide transit access to Oakland, Oakland Airport, San Francisco and the greater East Bay counties of Alameda and Contra Costa served by BART.

1.6 EIR PROCESS

Initiating the Environmental Review Process

Figure 1-4
Environmental Review Process

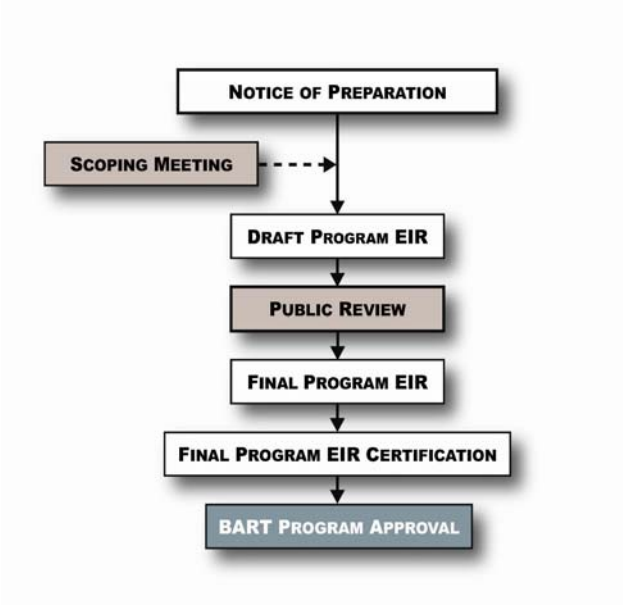


Figure 1-4 provides a flow chart that outlines the environmental review process for the BART to Livermore Extension Program. As a first step in complying with the procedural requirements of CEQA, on June 8, 2008, BART filed a Notice of Preparation (NOP) with the California Office of Planning and Research, State Clearinghouse to announce that an EIR would be prepared. (A copy of this NOP is included in Appendix A to this document and on the BART to Livermore website at www.barttolivermore.org.) In turn, the State Clearinghouse distributed the NOP to public agencies and interested parties for a public review period that began on June 8, 2008 and ended on July 18, 2008. Notices of BART's intent to prepare a Program EIR and of the scoping meeting were distributed as:

- Direct mailings to businesses and residents in the project corridor;
- Direct mailings to key stakeholders, including local, state, and federal officials and interest groups;
- Electronic correspondence (email) to registered users of the BART to Livermore website;
- Newspaper announcements in the Tri-Valley Herald and the Independent; and
- Mailed notices to approximately 30,000 addresses in the project corridor.

The purpose of the public review period was to solicit comments on the scope and content of the environmental analysis in the Draft Program EIR.

In addition to receiving written comments in response to the NOP, BART hosted a scoping meeting at the Robert J. Livermore Community Center in Livermore, California on June 18, 2008 to provide a further opportunity for interested community members to identify concerns about the proposed action

and issues that they wanted to have addressed in the EIR. Approximately 120 members of the public attended the meeting. The meeting format included a combined open house and structured public comment period. During the public comment period, members of the public had the opportunity to speak and provide comments focused on the scope of the EIR, potential impacts, and the EIR methodology.

During the scoping period, 66 comment letters were received (either at the scoping meeting or through telephone, mail, or the project website), including six from public agencies and 60 from organizations and individuals. Additional oral comments were provided by 27 attendees at the scoping meeting. The section below, "Areas of Known Controversy and Issues to be Resolved," lists the issues identified as potentially significant concerns needing consideration in the EIR.

Numerous suggestions concerning potential alternatives were provided by the commentors as well. These suggestions were incorporated in the EIR, where applicable and feasible.

Areas of Known Controversy and Issues to be Resolved

CEQA Guidelines Section 15123(b) requires that areas of controversy known to the lead agency be identified, including issues raised by other agencies and the public. Based on comments received from agencies, organizations, and members of the public during the scoping process, key issues of concern are identified below. This list identifies the primary concerns that were raised and repeated in several of the letters received and oral comments made. Other issues raised may not be included in this list; however, all comments received have been considered in developing the scope of the EIR analysis.

- Promote development that would reduce parking demands.
- Consider how BART could help reduce future air pollution from vehicles within the study area. Also, examine whether the operation and maintenance of stations and yard facilities would result in localized air quality impacts.
- Evaluate impacts on traffic operations on both local roadways and the State Highway System from building new BART stations and the operation of BART in areas that are already congested during peak hours; especially consider the level for service for both intersections and arterials, such as Stanley Boulevard.
- Consider the effects of BART on existing traffic congestion on both local roadways and the State Highway System and evaluate ability of the alignment alternatives to alleviate future traffic congestion on I-580 within the study area and between the study area and San Joaquin County.
- Plan sufficient parking supply in areas adjacent to station areas for BART passengers as well as local residents and businesses, and evaluate effects of spillover parking in proposed station areas.
- Evaluate and take into account bicycle and pedestrian safety, crime, and accessibility for Livermore residents.

- Consider the safety and security of the selected station, and evaluate impacts on police services, including additional calls for service around the stations to support BART police.
- Evaluate operational noise impacts of the BART system in close proximity to sensitive receptors and effects on ambient noise levels.
- Ensure compliance with all applicable State agency regulations and code requirements, including the California Public Utilities Commission and the Department of Transportation.

Issues and comments related to the alignment and design of different project alternatives include:

- Plan for potential multi-modal connections with other forms of existing transit, such as the ACE, and possible future connections with a High-Speed Rail system.
- Coordinate with ACE train and bus networks from the Tri-Valley and the Central Valley in order to improve transit connections throughout the region, and explore the creation of a transportation hub.
- Provide shuttles buses, connecting Downtown Livermore to the proposed station and various hubs around Livermore, including the West Livermore Park/Ride.
- Consider alternatives that encourage higher residential densities, mixed-use development and pedestrian-friendly environments, and benefit the regional economy.
- Consider alternatives that will most effectively reduce vehicle miles traveled thereby reducing existing and future congestion on I-580.
- Ensure efficient access from Livermore to the BART system.
- Support the I-580 to Greenville Road alignment.
- Suggest stations close to the North Livermore Avenue exit with shuttle buses to and from the city center of Livermore, at Vasco Road, East Livermore, West Livermore, and North Flynn Road.
- Support BART station in Downtown Livermore.
- Suggest stations at both Stanley/Isabel and Greenville Road.
- Oppose BART extension to the Stanley/Isabel area due to insufficient ridership in the area, and the resulting increase in traffic in the surrounding areas.
- Locate the alignment within the I-580 median and provide a large parking facility easily accessible from the I-580 to promote drivers coming from the Central Valley to park and ride, and facilitate BART extension along the I-580 median to Mountain House, Tracy Lathrop and Manteca in the future.
- Evaluate the short- and long -term cost of selecting an alignment which does not utilize the I-580 median.

Issues to be resolved include:

- Selection of a preferred alternative alignment.
- Selection and more detailed planning of station areas.
- Design and planning improvements for an expanded or new maintenance facility.
- Use of the UPRR right-of-way.
- Future ACE connections and service with a BART extension.
- Funding availability.

Draft Program EIR

This Draft Program EIR has been prepared following CEQA and the CEQA Guidelines. The focus of the analyses is on the physical impacts that would occur in the project corridor should the BART to Livermore extension be adopted and implemented. The Draft Program EIR contains a description of the existing conditions in the project corridor and then assesses how those conditions would change with construction and operation of the different BART to Livermore extension alternatives. Where significant impacts are identified, the Draft Program EIR recommends mitigation measures or strategies to reduce or eliminate the potentially significant impacts. Where feasible mitigation measures are insufficient to reduce an impact to less than significant, the effect is considered significant and unavoidable.

For some impacts, information and analysis available at the Program EIR stage is insufficient to determine whether or how much a significant impact can be mitigated. When it is uncertain whether an impact can be reduced to an insignificant level, the impact is conservatively identified as potentially significant and unavoidable. This does not necessarily mean that the impact cannot be reduced or avoided, when more detailed engineering and environmental analysis is performed at a later stage of project development. In the future project-level EIR, BART will re-evaluate all impacts identified as significant and unavoidable in the Program EIR and will further consider the possibilities for feasible mitigation. In addition, where mitigation measures will be project-specific and it would be premature to fully specify mitigation at the program level, the Draft Program EIR identifies the issue and provides for mitigation to be evaluated further at the project level.

This environmental document is considered a "draft" under CEQA since it is subject to revision following review and comment by other agencies and members of the public.

The Draft Program EIR can be reviewed at the following locations:

Metropolitan Transportation Commission
Association of Bay Area Governments Library
101 8th Street
Oakland, CA 94607-4700

Pleasanton Library
400 Old Bernal Avenue
Pleasanton, CA 94566

Livermore Library – Civic Center Branch
1188 South Livermore Avenue
Livermore, CA 94550-9315

Dublin Public Library
200 Civic Plaza
Dublin, CA 94568

The Draft Program EIR and related documents can be reviewed at the following location:

San Francisco Bay Area Rapid Transit District
Contact: Malcolm Quint
300 Lakeside Drive, 16th Floor
Oakland, CA 94612
(888) 441-0434

The Draft Program EIR can also be reviewed online at www.bart.gov or www.barttolivermore.org. To obtain a copy of the Draft Program EIR on CD-ROM, email info@barttolivermore.org or call (888) 441-0434.

Public Review

This Draft Program EIR is being distributed for a 45-day public review and comment period, which extends from November 5, 2009, through 5 p.m. on December 21, 2009. Readers are invited to submit comments on the adequacy of the document; that is, does this Draft Program EIR identify and analyze the possible environmental impacts and recommend appropriate mitigation measures? Comments are most helpful when they are specific and targeted to the environmental assessment; for example, by identifying specific impacts that need further evaluation and what additional information is desired, or by describing alternatives or mitigation measures that would better address significant environmental effects. CEQA Guidelines Section 15096(d) calls for responsible agencies[7] to provide comments on those project activities within the agency's area of expertise and to support those comments with either oral or written documentation.

Written comments should be submitted to:

Mr. Malcolm Quint
San Francisco Bay Area Rapid Transit District
300 Lakeside Drive, 16th Floor
Oakland, CA 94612

Comments may also be sent via the website www.barttolivermore.org, via email at info@barttolivermore.org, or via fax at (510) 464-7673. For more information, please call (888) 441-0434. However, comments cannot be accepted by phone.

A public meeting to accept comments on the Draft Program EIR will be held. The purpose of the hearing will be to afford the public agencies and members of the public an opportunity to comment on the Draft Program EIR orally or to submit written comments. Notices of the availability of the Draft Program EIR and opportunity to submit written comments or comment at the public meeting will be mailed to responsible agencies and noticed to the public in the following ways:

[7] CEQA Section 21069 defines a responsible agency as a public agency, other than the lead agency, which has responsibility for carrying out or approving a project.

- Published in the advertising section of the Tri-Valley Herald and the Independent;
- Mailed to the owners and occupants of contiguous property shown on the latest equalized assessment roll; and
- Mailed to all individuals who have submitted a written request for notification concerning the proposed program.

Final Program EIR

Following the close of the public review and comment period, written responses will be prepared to address all substantive written and oral comments on the Draft Program EIR. The Final Program EIR will consist of the Draft Program EIR, the comments received during the public review period, responses to the comments, and any revisions made to the Draft Program EIR as a result of public agency and public comments.

Policy Working Group and Preferred Alignment Memo

Prior to the preparation of the Final Program EIR, BART will consult with the Tri-Valley Regional Rail Policy Working Group (PWG) to solicit its views regarding a preferred alignment alternative. The PWG is a group of regional stakeholders currently consisting of the following members: the Alameda County Supervisor for District 1, the Mayor of Livermore, the Mayor of Dublin, the Mayor of Tracy, one Councilmember from Livermore, one Councilmember from Danville, one Councilmember from San Ramon, one Councilmember from Pleasanton, one member from the ACE Board of Directors, and BART directors from BART Districts 1 and 5.

This consultation process is separate from the preparation of the Program EIR document and is not required under CEQA. To facilitate this consultation, following publication of the Draft Program EIR and the 45-day review period, BART staff will review the public comments and prepare a Preferred Alternative Memo that will propose a preferred alignment. The Preferred Alternative Memo will be distributed to a variety of stakeholders, including the PWG; the Livermore City Council, other public agencies and elected officials, and will be available for review by members of the public. PWG members will review the Preferred Alternative Memo and will provide a recommendation on the preferred alignment to the BART Board. The BART Board will consider the PWG's recommendation when making the decision to select a preferred alignment alternative.

Program Review and Approval

The BART Board of Directors must certify that it has reviewed and considered the information in the EIR and that the EIR has been completed in conformity with the requirements of CEQA before any decision can be made regarding the program. Pursuant to CEQA Guidelines Section 15091, no public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant effects of the project unless the public agency makes one or more of the following findings, which must be supported by substantial evidence in the record:

- Changes or alterations have been required in, or incorporated into, the action which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.
- Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
- Specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or program alternatives identified in the Final EIR.

Statement of Overriding Considerations

If the BART Board of Directors decides to select a Preferred Alternative with significant effects that are identified in the Final Program EIR, but which are not avoided or substantially lessened, the BART Board of Directors must make findings that any such unavoidable significant effects are acceptable due to overriding considerations as described in CEQA Guidelines Section 15093. This is known as a "Statement of Overriding Considerations." In preparing this statement, CEQA requires the BART Board of Directors to balance the benefits of the proposed action against its unavoidable environmental impacts. If the benefits of the Preferred Alternative outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered acceptable (CEQA Guidelines Section 15093). If an agency makes a Statement of Overriding Considerations, the statement must be included in the record of the proposed action approval.

Mitigation Monitoring and Reporting Program

As part of the approval process, the BART Board of Directors must also consider and adopt a mitigation monitoring and reporting program for any required mitigation measures. This program would include all mitigation measures that BART intends to be implemented in order to avoid or reduce significant effects identified in the Final EIR. For each measure, the program would identify the party responsible for implementing the mitigation measure, the timeframe by which the measure should be implemented, and whether there are criteria to determine the success or effectiveness of the mitigation measure. BART would use the mitigation monitoring program as a mechanism to track implementation of any mitigations measures the BART to Livermore Extension Program requires.

1.7 ORGANIZATION OF THE EIR

This EIR has been organized for easy use and reference. To help the reader locate information of particular interest, a brief summary of the contents of each section of the EIR is presented below.

- **Summary** — This section provides a brief description of the proposed program (the nine alternative configurations of routes and stations) and answers to general questions concerning the features of different alternatives, the potential effects, and the CEQA process.

- **Section 1, Introduction** — This section provides a historical overview to the proposed program and the reasons it is being considered, the purpose and scope of the EIR, a summary of the environmental and public review process, and a brief outline of this document's organization.

- **Section 2, Alternatives** — This section provides a detailed description of the different alignments and station combinations, the operating plan, projected ridership, and anticipated construction schedule and activities.

- **Section 3, Environmental Analysis** — This section contains the environmental analysis for 14 topics. Each environmental topic contains a description of the environmental setting (or existing conditions), regulatory framework, and project-related and cumulative impacts. Each impact discussion includes the standards of significance used to determine the nature or magnitude of environmental impacts, and feasible mitigation measures that would avoid or minimize significant or potentially significant environmental impacts. This section also contains a separate discussion of potential construction-related impacts.

- **Section 4, Other CEQA Considerations** — As required by Section 15126.2 of the CEQA Guidelines, this section summarizes significant and unavoidable environmental impacts, irreversible changes to the environment, and growth-inducing impacts of the proposed program. This section also identifies the environmentally superior alternative.

- **Section 5, Program Merits**— This section evaluates how well the alternative alignments attain the program objectives and satisfy MTC Resolution #3434 and the BART System Expansion Policy.

- **Section 6, List of Preparers** — This section identifies the individuals responsible for the preparation of this EIR.

In addition to the above sections, a reference figure has been inserted inside the back cover of this document that illustrates the alternative alignments and summarizes key features. Because of the large number of alignment and station combinations, it can be difficult to recall the specifics associated with each of the BART extension alternatives. To assist in the review of this document, the reference figure is designed as a foldout figure that can be opened and referred to as the Program EIR is being read.

1.8 USE OF THIS REPORT

An EIR is an informational document, whose purpose is to make the public and decision makers aware of the environmental consequences of a project or program. As noted earlier, BART is the lead agency for this Program EIR. Thus, the BART Board of Directors will review this report and weigh the impacts it discloses against the benefits and any other economic, legal, social, technological, and other considerations, to select a preferred alignment alternative and identify any conditions on such approval.

Other public agencies, especially the local jurisdictions, will take a particular interest and examine this Program EIR to understand the potential land use, traffic, and community implications of introducing

the BART to Livermore Extension. The surrounding residents and businesses, and other interested individuals will also likely review the Program EIR to evaluate the effects on existing conditions, especially visual, traffic, parking, air quality and noise, as well as the proposed mitigation measures to reduce potential environmental consequences.

While no permits or approvals are being sought by state and federal agencies at this time, these other public agencies besides the lead agency may have discretionary approval if a project is advanced in the future. These agencies, known as "responsible agencies," will review the Draft Program EIR and may comment during the public review period. In addition, other agencies, known as "trustee agencies," may review this document because the BART to Livermore Extension program may affect resources over which they have jurisdiction. The responsible and trustee agencies from whom permits or approvals would likely be needed in the future for a BART extension to Livermore are listed in Table 1-1.

Table 1-1
Public Agencies with Possible Future Permit and/or Approval Authority

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Approvals Required
Federal			
U.S. Environmental Protection Agency	Section 404 permit (Clean Water Act Amendment of 1977); Clean Air Act of 1970 as amended	Section 404 oversight	Review of this EIR
U.S. Army Corps of Engineers	Section 404 permit (Clean Water Act)	Section 404—permits for discharge of dredged or fill materials into waters of the United States, including jurisdictional wetlands according to Section 404(b)(1) guidelines	ENG form 4345 "Application for a Department of the Army permit," RWQCB certification pursuant to Section 401
U.S. Fish and Wildlife Service	Section 7 (Federal Endangered Species Act of 1972); Migratory Bird Treaty Act of 1918	Section 7—Taking (kill, harm, capture, harass etc.) of endangered and other special status plant or animal species Migratory Bird Treaty Act—Prohibition to "take" (kill, harm, harass, etc.) any migratory bird listed in 50 CFR 10, including their nests, eggs, or products	Review of this EIR Review of the Biological Assessment
Federal Aviation Administration	FAA Regulations Part 77 – Objects Affecting Navigable Airspace	Review of project for potential effects on aircraft safety	Project plans
State			
California Department of Fish and Game	California Endangered Species Act (CESA); Fish and Game Code, Sections 1601-1603 review; Fish and Game Code, Sections 3503, 3503.5, 3513, 3800	CESA—Review of project for "take" of endangered and other special status plant or animal species. Sections 1601–1603—Streambed Alteration Agreement, review of project for potential to alter streamflows or the bed and bank of a stream, lake, or pond. Sections 3503, 3503.5, 3513, 3800—prohibition to take possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this Code or any regulation made pursuant thereto	Review of this EIR Form # FG2023 "Notification of Removal of Materials Game and/or Alteration of Lake, River, or Streambed Bottom or Margin," map of area indicating public access, and environmental documentation Section 2081 Permit for the take of State listed species
California Department of Transportation (Caltrans)	Caltrans Encroachment Permit	Encroachment of federal and state-funded highways requiring the use of a Caltrans Encroachment Permit	Project plans
California Public Utilities Commission	Operating/Safety Approvals	Operating/safety approvals	Project plans

Table 1-1
Public Agencies with Possible Future Permit and/or Approval Authority

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Approvals Required
California Department of Toxics Substances Control	Resource Conservation and Recovery Act of 1976; Hazardous Waste Control Law	Review and oversight of cleanup of sites where surface and/or subsurface contamination has occurred due to the potential release of hazardous materials or wastes	Project plans
State Water Resources Control Board	Section 402(o) of Clean Water Act	Section 402—National Pollutant Discharge Elimination System (NPDES) General Permits which regulate discharges of storm water from construction and industrial activities	Notice of Intent for storm water general permit coverage
State Historic Preservation Office	CEQA	Trustee agency for historic resources	Review of this EIR
Native American Heritage Commission	Public Resource Code Section 5097	Review of project for potential disturbance to native American heritage/burial sites	Consultation letter; Review of this EIR
Regional			
Regional Water Quality Control Board	Section 401 and 402 of Clean Water Act; Porter-Cologne Water Quality Control Act	Section 401 and Porter-Cologne Water Quality Control Act—Water Quality Certification, or waiver thereof, for construction in wetlands areas determined to be under Corps' jurisdiction (certification required before Corps' Section 404 permit may become effective Section 402—National Pollutant Discharge Elimination System (NPDES) permit which regulates discharge into surface waters	Application for Section 401 Water Quality Certifications and/or Report of Waste Discharge Copy of application to federal agency for permit (e.g., for Section 404 permit), EIR, copy of Section 404 (b) (1) alternative analysis, proposed mitigation plan, if any; Storm Water Pollution Prevention Plan
Metropolitan Transportation Commission	Section 176 (c) of Clean Air Act of 1970 as amended; MTC Resolution #3075; MTC Resolution #3434	Review all applications for state or federal funding	Project plans and EIR
BART	CEQA	Lead agency for EIR; approval of project and expenditure of funds	Certification of EIR and approval of Findings and Statement of Overriding Considerations

Table 1-1
Public Agencies with Possible Future Permit and/or Approval Authority

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Approvals Required
Local			
Alameda County	Encroachment permit	Possible encroachment permit for construction within County-owned right of way	Project plans
City of Livermore	Encroachment permit	Possible encroachment permit for construction within City-owned right-of-way	Project plans
City of Pleasanton	Encroachment permit	Possible encroachment permit for construction within City-owned right-of-way	Project plans
City of Dublin	Encroachment permit	Possible encroachment permit for construction within City-owned right-of-way	Project plans
Alameda County Congestion Management Agency	CEQA	Review project for conformance with ACCMA's transportation plans	Review of this EIR
Alameda County Transportation Authority/Alameda County Transportation Improvement Authority	CEQA	Review project for conformance with ACTA/ACTIA's transportation plans	Review of this EIR
Alameda County Airport Land Use Commission	Public Utilities Code Section 21670	Review project under the "Determination of Plan Consistency" process	Project plans
Zone 7 Water Agency	CEQA	Review project for conformance with Zone 7 requirements	Project plans, including hydraulic design
Livermore Amador Valley Transit Authority	CEQA	Review project for conformance with LAVTA transit plans	Review of this EIR

Source: PBS&J, 2009.

Section 2
Alternatives

2.1 INTRODUCTION

This section describes the alignment and station location alternatives considered in this Program Environmental Impact Report (Program EIR). The information presented in this section is general in nature, rather than detailed or site-specific and is intended to be used to differentiate broad differences among possible alternatives. Subsequent work may include project-level environmental studies and technical analyses to evaluate more detailed impacts and engineering challenges for alternatives presented in this document.

As described in Section 1, Introduction, the Tri-Valley area of Alameda County currently has long periods of travel congestion, due in part to increased development in and around Livermore, and from commute trips destined for the San Francisco Bay Area originating in California's Central Valley. Increased congestion may be eased by adding capacity to area freeways, interchanges, and arterial streets; however, these approaches have inherent physical and practical limitations. A BART extension to Livermore would offer a viable and attractive commuting alternative along the Interstate 580 (I-580) corridor and supplement other congestion management measures already envisioned or underway. Likewise, extending BART service to Livermore would supplement the current regional transportation network, adding to an existing 104-mile BART network of rapid transit infrastructure and station facilities. A BART extension to Livermore, under several alternatives presented in this Program EIR, would also create a new intermodal connection to the Altamont Commuter Express (ACE) regional rail service. In addition, if an Altamont Corridor high-speed rail project is developed, it could accommodate an intermodal connection to BART in the Livermore vicinity.

This section summarizes the basic assumptions of the No Build and the nine BART to Livermore Extension alternatives (hereafter referred to as the BART extension alternatives). The information provided in this section has been obtained from the project team tasked with conducting the planning, conceptual engineering, and costing for the alternatives described in this Program EIR. A conceptual engineering effort was performed to discern probable challenges that the alternatives would face if advanced to more detailed engineering and construction. The program-level engineering package developed for this Program EIR depicts a conceptual horizontal and vertical alignment, station locations, and comparative cost information. Changes and refinements to alternatives described in this document would be expected during a project-specific environmental review and again in the project's final design. A description of the development and screening of alternatives, along with an identification of those considered and withdrawn from further evaluation, is provided in Section 2.4, Alternatives Considered but Withdrawn.

2.2 NO BUILD ALTERNATIVE

The No Build Alternative represents the region's existing transportation network consisting of highways, arterial roads, public transit, and bicycle/pedestrian facilities. This alternative analyzes the network as it exists in 2009 with the programs and projects that are currently in regional transportation plans and have identified funds for implementation by the Year 2035. At this stage, it is unknown when a BART to Livermore project may be constructed and become operational. Other projects and programs anticipated as of 2035 are included in the No Build analysis because they are already funded and would be part of the future transportation network. Furthermore, 2035 is a reasonable "horizon year" because it is consistent with the current Association of Bay Area Governments growth projections and the Metropolitan Transportation Commission's Regional Transportation Plan.

The No Build Alternative represents a scenario against which the other "build" alternatives may be compared. It includes continued operation of the existing transit services in the Livermore-Amador Valley area, which include BART, ACE, and Livermore Amador Valley Transit Authority (LAVTA or "Wheels")—and assumes completion of any programmed system improvements.

This alternative also assumes continued operation and completion of programmed improvements by other regional transit providers including Contra Costa County Connection, Tri Delta Transit, San Joaquin Regional Transit District (SJRTD), Modesto Area Express (MAX), and Amtrak California. However, since BART, ACE, and LAVTA provide the "core" transit service to the Livermore-Amador Valley, they represent the primary focus of the No Build Alternative.

The No Build Alternative also assumes the completion of programmed roadway improvements within the study area and the region. Major anticipated roadway improvements include:

- The widening of both eastbound and westbound I-580 to include auxiliary and high-occupancy vehicle (HOV)/high-occupancy toll (HOT) lanes;
- The addition of the Isabel Avenue (SR 84)/I-580 interchange and upgrade of SR 84 to Caltrans expressway standards between Jack London Boulevard and Ruby Hill Drive;
- The addition/conversion of both northbound and southbound I-680 HOV/HOT lanes between SR-84 and SR-237; and
- Arterial roadway improvements as shown in the ACCMA travel demand forecasting model.

One of the objectives of the BART to Livermore extension is the creation of an effective intermodal connection to ACE. In order for this connection to be productive in terms of ridership, there will be a need for improved ACE service. For the purposes of this Program EIR, it is assumed that ACE will be able to improve its service levels over time that would be sufficient to accommodate the increased ridership related to a BART extension. This assumption is consistent with ACE's long range plan and with the planned high-speed rail improvements in this corridor, which are intended to involve upgraded ACE service.

Local Transit Service

BART Service

BART operates a heavy rail, or electrified rapid transit, within Alameda, Contra Costa, San Francisco, and San Mateo Counties. BART's Daly City/Millbrae – Dublin/Pleasanton (Blue) Line extends through the Tri-Valley area. The line originates at the Daly City Station on nights and weekends and the Millbrae BART/Caltrain intermodal station on weekdays. From its Peninsula termini, the Daly City/Millbrae – Dublin/Pleasanton line extends through San Francisco, reaches Oakland via the Transbay Tube, then proceeds south through San Leandro before turning east to Castro Valley and the end-of-line at the existing Dublin/Pleasanton Station. The existing Dublin/Pleasanton Station currently provides 4,133 parking spaces for park-and-ride commuters. The station is also regionally significant in that it serves as a primary transfer point between BART and local, regional, and commuter bus services provided by the LAVTA, Contra Costa County Connection, Tri Delta Transit, SJRTD, MAX, and Amtrak California.

Geographically, BART service currently extends from Millbrae/San Francisco International Airport in the west to Dublin/Pleasanton in the east and from Pittsburg/Bay Point and Richmond in the north to Fremont in the south. BART passengers can make timed transfers between the Millbrae – Dublin/Pleasanton (Blue) Line and other BART lines at San Bruno, Balboa Park, and Bay Fair Stations. As a future component of the regional transportation network, the No Build Alternative assumes that BART service will be extended south from Fremont to Warm Springs, a one-station extension further into southern Alameda County. The No Build Alternative also assumes completion of the new Dublin/Pleasanton Station located just west of the I-580/I-680 interchange; the Oakland Airport Connector, a people-mover linking Oakland International Airport with the Coliseum/Oakland Airport BART Station; and the eBART extension to eastern Contra Costa County.

Altamont Commuter Express (ACE) Service

ACE operates weekday peak hour commuter rail service between Stockton and San Jose, and serves the Tri-Valley area at three stations: Pleasanton, Livermore (located in the City's downtown core), and Vasco Road (located adjacent to Lawrence Livermore National Laboratory). Each of these stations provides commuter parking and transit connections. The Livermore ACE Station functions as a regional transit hub and facilitates connections between seven LAVTA bus routes as well as Amtrak California intercity bus service.

Running primarily on tracks owned by freight railroads, ACE service is operated using diesel locomotive-powered trains. ACE currently operates four weekday roundtrips between Stockton and San Jose.

Livermore Amador Valley Transit Authority Service (LAVTA)

Livermore Amador Valley Transit Authority Service (LAVTA) is the local public transit service provider in the Tri-Valley area. It provides fixed route bus service, consisting of 1 express, 20 local,

and 24 supplemental school service routes, as well as flexible dial-a-ride service. Fixed-route services are operated using conventional 40-foot buses. Dial-a-ride services are provided using small buses and vans. LAVTA structures its bus service around two primary transit hubs: existing Dublin/Pleasanton Station and the Livermore Transit Center/Livermore ACE Station. Eleven bus routes currently provide service to the existing Dublin/Pleasanton Station. Seven routes serve the Livermore Transit Center.

The No Build Alternative assumes that LAVTA will provide bus rapid transit (BRT) service over its Livermore – Dublin – Pleasanton Route 10 corridor and that multiple bus routes will be realigned to serve the currently under-construction West Dublin/Pleasanton Station.[1]

In addition to LAVTA service, County Connection, Modesto Area Express BART, SJRTD, and Tri Delta Transit offer regional and inter-regional commuter bus service. The LAVTA bus shuttle between the Pleasanton ACE Station and BART will still operate and is part of the No Build Alternative. A more detailed description of these transit services is provided in Section 3.2, Transportation.

Ridership

BART, ACE and LAVTA ridership are summarized in Table 2-1. For each transit service, the table provides system-wide average total daily weekday and weekend riders (measured in entries or exits, depending on how data were collected). The table also isolates total ridership for those stations and services that would represent the core transit network between Dublin/Pleasanton and Livermore without a BART extension. Given the variability with which weekend ridership data are reported, some figures are presented as an average of Saturday and Sunday ridership, while other numbers are presented as discreet volumes for Saturday and Sunday.

Reliability

BART. BART service tends to be very reliable compared to other transportation modes. BART has a performance standard of 95 percent on-time service and in 2007 achieved 94 percent.

ACE. ACE operates almost entirely on tracks owned by freight railroads; its reliability is therefore subject to the sporadic scheduling of freight traffic. Throughout 2006, ACE had an average on-time performance of 77 percent, although this percentage is often considerably higher when viewed on a weekly or monthly basis.[2]

[1] Livermore Amador Valley Transit Authority Service, http://www.lavta.org/administration/files/Final_2008_SRTP.pdf Accessed December 30, 2008.

[2] Altamont Commuter Express Service, http://www.acerail.com/docs/pdf/Item%207%20Draft%20SJRRC%20Short%20Range%20Transit%20Plan%202007.pdf, accessed December 30, 2008.

Table 2-1
2009 Average Total Daily BART, ACE, and LAVTA Ridership

	Weekday	Saturday	Sunday	Weekend
BART (FY 2009)				
System-wide (exits)	361,179	179,624	129,073	–
Dublin/Pleasanton Station (exits)	7,474	–	–	2,945
ACE (March 2009 – May 2009)				
System-wide (entries)	2,807	NA	NA	NA
Pleasanton Station (entries)	433	NA	NA	NA
Downtown Livermore Station (entries)	121	NA	NA	NA
Vasco Road Station (entries)	105	NA	NA	NA
LAVTA (December 2008 – April 2009)				
System-wide (entries)	7,505	3,115	2,182	–
Route 10 (entries)	3,381	2,347	1,616	–
Route 12 (entries)	742	175	120	–
Route 20 (entries)	98	NA	NA	–

Source: BART, ACE, LAVTA, 2009.

Note:

NA: Not Applicable – no weekend service

LAVTA. As noted in LAVTA's Short Range Transit Plan, although LAVTA buses are subject to delays caused by fluctuating traffic conditions, they are generally able to maintain travel times as published in schedules. However, LAVTA notes that their services encounter significant delays due to traffic congestion during the morning and afternoon commute periods. In particular, Route 18, which serves Downtown Livermore, was cited as experiencing traffic related delays of up to 15 minutes during the PM peak commute period. Routes 12 and 20, which operate on I-580, are subject to additional delays because of freeway congestion. A significant improvement to travel times and schedule reliability will come with the implementation of the Route 10 bus rapid transit service currently in the final design and procurement stages.

Schedule and Headways

BART. BART operates Monday through Friday from 4:00 a.m. to midnight and from 6:00 a.m. to midnight on Saturdays. On Sundays and holidays, BART operates from 8:00 a.m. to midnight. The Millbrae – Dublin/Pleasanton Line trains operate every 15 minutes on weekdays, on 20-minute headways from 6:00 a.m. to 6:30 p.m. and 15-minute headways from 6:30 p.m. to midnight on Saturdays, and 15-minute headways on Sundays and holidays.[3] BART plans to provide 12-minute peak headways by the year 2035.

ACE. ACE operates four weekday roundtrips between Stockton and San Jose. Trips run from Stockton to San Jose in the morning and from San Jose to Stockton during the evening. Trips depart

[3] BART's operating schedule accessed July 22, 2009. BART 20-minute weeknight and weekend headways begin September 1, 2009.

Stockton at 4:20 a.m., 5:35 a.m., 6:40 a.m., and 9:30 a.m.; return trips depart San Jose at 2:15 p.m., 5:45 p.m., 6:45 p.m., and 7:45 p.m. One-way travel between Stockton and San Jose requires approximately two hours and 10 minutes.

LAVTA. LAVTA operates weekdays from approximately 4:30 a.m. to 1:00 a.m., Saturdays 7:00 a.m. to 1:00 a.m., and Sundays 6:30 a.m. to 12:00 a.m. Two routes, 10 and 15, operate on Sundays and holidays. Route 10 provides daily 24-hour service. Most LAVTA routes operate on 30- to 60-minute headways. Route 9 and Route 10 (peak-hour service only) operate at 15-minute headways.

LAVTA is planning fixed route service reductions for the routes that serve the existing Dublin/Pleasanton Station and Livermore Transit Center as of June 27, 2009; these service reductions are described in more detail in Section 3.2, Transportation.

Fares and Fare Collection

BART. BART uses a distance-based fare structure with a surcharge for trips through the Transbay Tube and to the San Francisco International Airport. Table 2-2 identifies representative station-to-station fares departing or arriving at the existing Dublin/Pleasanton Station under 2009 conditions.

Table 2-2
BART Fares Connecting Dublin/Pleasanton Station to Selected Origins or Destinations

Origin or Destination	Base Passenger Fare (one-way)
12th Street/Oakland City Center	$4.00
Embarcadero	$5.55
Pittsburg/Bay Point	$6.35
Richmond	$4.85
Fremont	$4.35
Millbrae	$6.65
Coliseum/Oakland Airport	$3.60
San Francisco Airport (SFO)	$10.55

Source: http://www.bart.gov/stations/schedules/lineSchedules.asp, accessed July 22, 2009.

Discounted travel is available to seniors age 65 and older, persons with disabilities, Medicare cardholders, students, and children 5-12 years of age via BART's discounted ticket purchase program. BART uses an electronic fare collection system with two primary fare instruments. The first and most common is the electronically coded tickets, which are purchased from ticket machines found at BART stations. When a rider enters the fare gate, the entrance station is coded on the ticket (and the time). When a rider exits the fare gate at the destination station, the fare is calculated and deducted from the ticket. BART's other fare medium is the recently introduced EZ Rider card, which allows riders to pay

their fare simply by touching the card to the top of the fare gate. In May 2009, BART began using the regionally recognized TransLink payment system which permits riders to access the BART network using a pre-paid multi-service payment medium.

ACE. ACE uses a distance-based fare structure and offers tickets of one-way, round-trip, 20-ride, and monthly value. Tickets are purchased from vending machines or station agents and must be validated before boarding the train. Train personnel verify proof of payment onboard ACE trains. The adult one-way fares from Downtown Livermore to the following locations are:

- Pleasanton – $3.50;
- Fremont – $4.50;
- Great America – $7.75; and
- San Jose – $7.75.[4]

LAVTA. LAVTA charges a base adult fare of $2.00 for all fixed-route service. With a valid transfer, riders may connect within LAVTA, to County Connection, and ACE vehicles for free, and from BART for $1.00.[5]

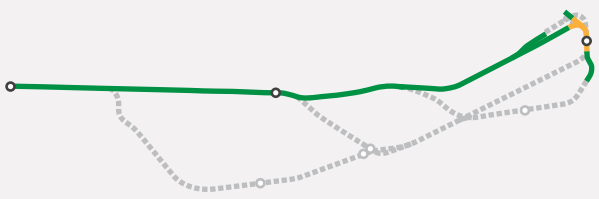
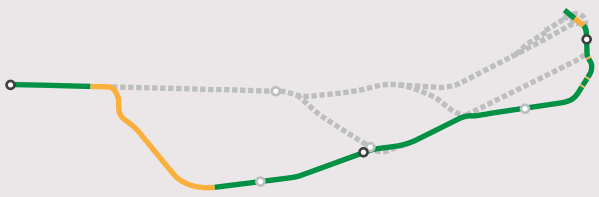
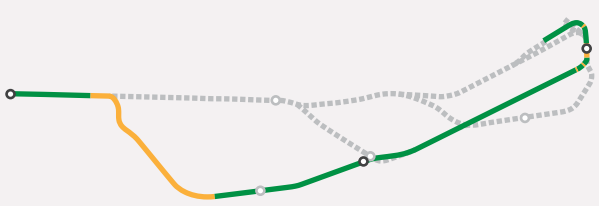
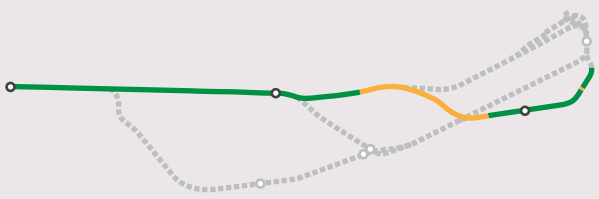
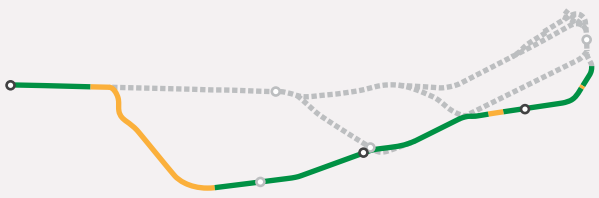
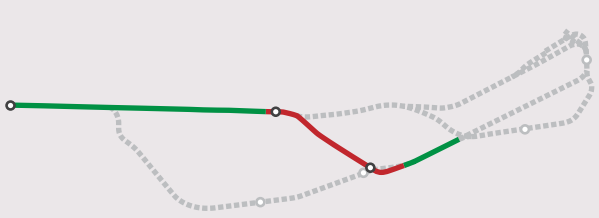
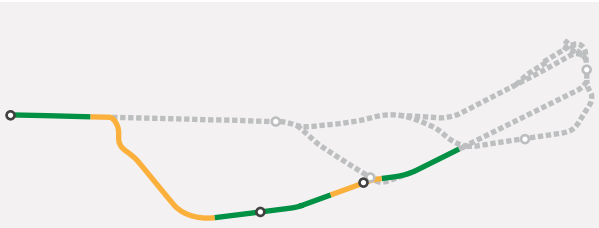
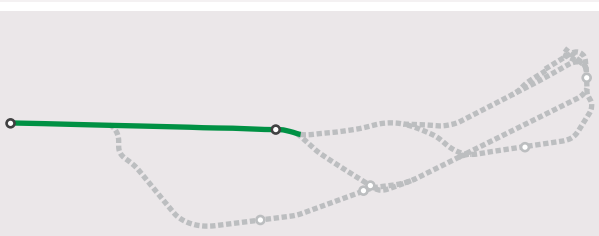
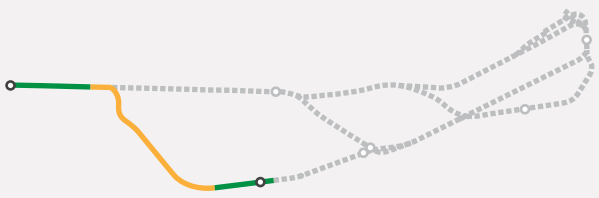
2.3 BART EXTENSION ALTERNATIVES

The following descriptions provide more detailed information about each of the alternatives under study for an eastward extension of BART service to Livermore. Figure 2-1 shows the routes proposed for each of the alternatives, indicating the type of alignment configuration (aerial, at-grade, or subway), and comparing the different alternatives by length and number of stations. A description of common characteristics to all alternatives is provided at the end of the BART extension alternatives discussion.

As discussed in the "Introduction" section, one of the goals of the project is to provide an effective intermodal connection between BART and ACE. All of the alternatives considered would provide this connection with the exception of Alternative 4 – Isabel/I-580. This alternative was included even though it does not provide an ACE connection because it represents a logical first phase of construction for several of the alternatives (Alternatives: 1 – Greenville East, 2 – Las Positas, and 3 – Portola). In the event that funding constraints delay the construction of a multiple-station extension, constructing the Isabel/I-580 alternative could provide a reasonable first phase of expansion along the I-580 corridor.

Alternative 5 – Quarry could function as a stand-alone extension offering a connection to ACE. This alternative could also be viewed as the initial phase of an extension along the UPRR corridor. The alternative would support future extensions similar to Alternative 3a – Railroad.

[4] ACE Website, http://tickets.acerail.com/fares.asp, Accessed July 22, 2009.
[5] LAVTA Website, http://www.lavta.org/fares/index.html, Accessed July 22, 2009.

Alternative	Alignment Schematic and Guideway Structure Type At-Grade Aerial Structure Subway	Stations	Storage/ Maintenance Facility	Total BART System Riders[a]	New BART Riders[b]	Travel Time[c] (Minutes)	Total Length (Miles)
1. Greenville East		Isabel/I-580 Greenville East	Greenville Yard	690,100	31,700	10.9	11.5
1a. Downtown-Greenville East via UPRR		Downtown Livermore Greenville East	Greenville Yard	689,300	30,900	13.8	13.1
1b. Downtown-Greenville East via SPRR		Downtown Livermore Greenville East	Greenville Yard	689,300	30,900	13.5	13.2
2. Las Positas		Isabel/I-580 Vasco Road	Vasco Yard	688,200	29,800	9.7	10.0
2a. Downtown-Vasco		Downtown Livermore Vasco Road	Vasco Yard	690,000	31,600	11.8	12.0
3. Portola		Isabel/I-580 Downtown Livermore	Portola/ Railroad Yard	688,300	29,900	7.7	7.2
3a. Railroad		Isabel/ Stanley Downtown Livermore	Portola/ Railroad Yard	688,100	29,700	8.4	7.9
4. Isabel/ I-580		Isabel/I-580	No yard; tail tracks only	678,300	19,900	4.7	5.2
5. Quarry		Isabel/ Stanley	No yard; tail tracks only	679,200	20,800	5.6	5.5

NOTES
a. Total BART system ridership under the No Build Alternative is anticipated to be 658,400 daily weekday riders.
b. Denotes total daily riders beginning or ending at West Dublin/Pleasanton Station, East Dublin/Pleasanton Station, and the proposed station(s) for each alternative in the Year 2035. New BART riders are defined as persons who currently travel through the Tri-Valley area using another mode of transportation, but would shift to BART service were it to become available.
c. Denotes travel time from the East Dublin/Pleasanton Station to the alternative's terminus station and includes any stops at intermediate stations.

Source: WSA, 2009.

BART TO LIVERMORE EXTENSION ALTERNATIVES SUMMARY
FIGURE 2-1

Even though these single-station alternatives might be viewed as an interim stage of a longer extension, during the time that they serve as the eastern terminus of the system, they will generate traffic, parking, and connecting transit impacts that are different from when the station is not the terminus. By including these options in this document, the implications of phased development of the extension can be addressed.

For purposes of this Program EIR, the descriptions of the alignment alternatives and their projected ridership and operational characteristics assume the use of the electric-powered heavy rail technology used in the majority of the BART system, referred to as "conventional BART technology." The use of conventional BART technology is a reasonable assumption at the programmatic stage, since conventional BART technology supports the goal of providing an effective ACE connection. Introducing a non-BART technology would require an additional mode-to-mode transfer for the short trip between the existing Dublin/Pleasanton Station and an intermodal ACE station, which is contrary to the vision of an effective BART to ACE connection.

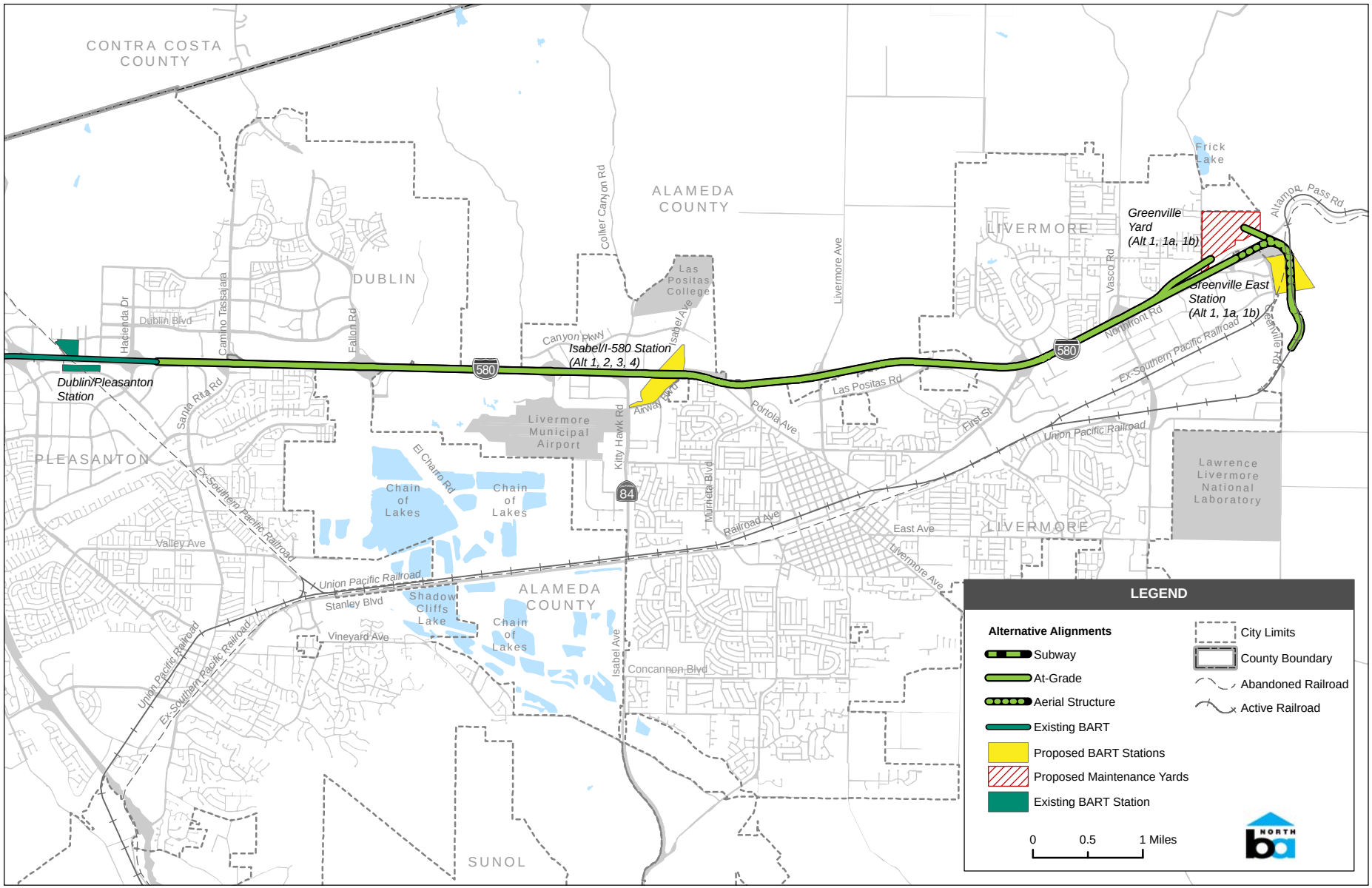
Still, it is recognized that it is possible for different rapid transit technologies to be utilized for a given alignment alternative. Since available technologies and relevant circumstances may change by the time a project is constructed, BART does not intend to select a technology at this time and is not evaluating alternative technologies in this Program EIR. Other alternative technologies, such as bus rapid transit service, will be evaluated in a future project-level EIR.

Alternative 1 – Greenville East

Route

The alignment for Alternative 1 – Greenville East would originate just east of the existing Dublin/Pleasanton Station. It would proceed eastward within the median of I-580 to a proposed station at Isabel/I-580 and continue within the median to a terminus station southeast of the I-580/Greenville Road interchange (see Figure 2-2). Alternative 1 would include a total of 11.5 route miles of track. Below is a description of the notable features of the horizontal route and the vertical profile.

- The alignment would proceed eastward, at-grade, from the existing end-of-track within the I-580 median for 9.8 miles. The alignment would then ascend on retained fill and transition onto an aerial structure at 10.1 miles, east of the point of origin. At this point, the alignment would angle northward away from the I-580 median and cross the westbound lanes of I-580 near the existing westbound I-580 Greenville Road off-ramp.
- At 10.3 miles east from the existing Dublin/Pleasanton Station, the alignment would turn to the south and cross under I-580 in a box culvert or similar structure, where the alignment would parallel the existing Union Pacific Railroad (UPRR) alignment and continue to the proposed Greenville East Station. This segment south of I-580 is the only stretch where this alternative would be adjacent to the UPRR right-of-way, and may actually need to utilize a portion of the



Source: AECOM, May 4, 2009.

ALTERNATIVE 1 - GREENVILLE EAST

FIGURE 2-2

right-of-way. The center of the Greenville East Station platform would be sited 10.8 miles east of the point of origin, and the platform would be on an aerial structure with an at-grade station concourse.

- Tailtracks for the alignment would extend to the south from the station platform along the westerly edge of the UPRR right-of-way. At 11.0 miles east of the point of origin, the aerial structure would transition to short segments of at-grade, retained cut, and fill before terminating 11.5 miles from the point of origin.
- Due to the proposed placement of track within the freeway median, approximately 10.7 miles along I-580 would be widened to accommodate the 46-foot-wide corridor for BART operations. Additional width would be required at the Isabel/I-580 Station.

Stations

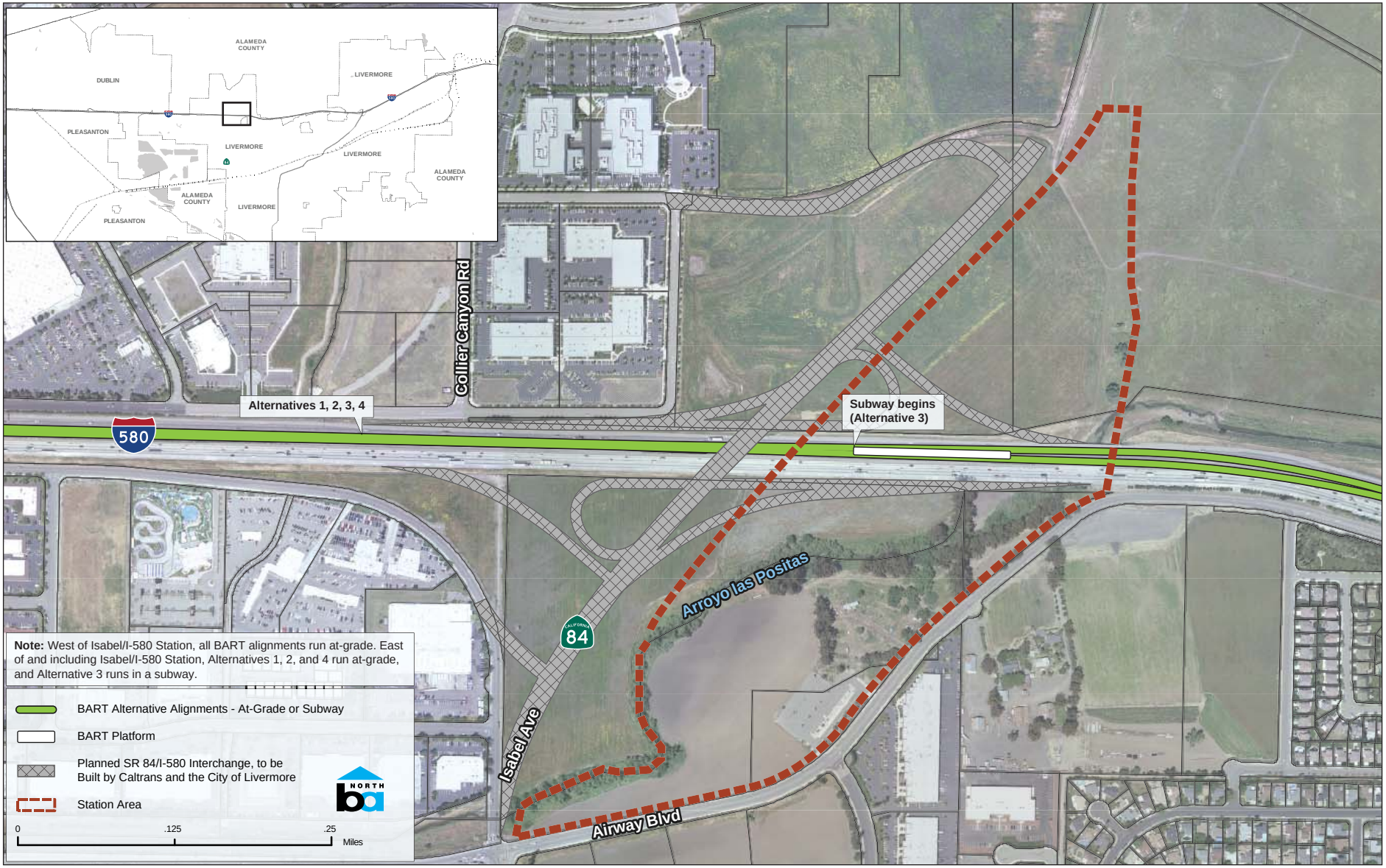
Alternative 1 would have two stations, Isabel/I-580 and Greenville East.

Isabel/I-580. The Isabel/I-580 Station would be situated on an approximately 51-acre site bisected by I-580. The station would include areas north and south of I-580 to accommodate parking and other BART facilities as well as a station platform in the freeway median; refer to Figure 2-3 for the station area limits. The portion of the site south of I-580 contains BART's existing Livermore Park and Ride lot at the intersection of Airway Boulevard and Rutan Drive.

The station platform would be at-grade in the freeway median. The station area located south of I-580 is bounded by the Arroyo Las Positas creek on the west and north and by Airway Boulevard on the east and south. The station area north of I-580 is bounded on the west and north sides by a diagonal-running realignment of Isabel Avenue. According to the California Department of Transportation (Caltrans), the reconfigured Isabel Avenue would connect to a new interchange currently under construction with I-580 and then to the existing Kitty Hawk Road/SR-84 on the south side of I-580.

Station Access. The Isabel/I-580 Station would be accessed on the north side by a driveway from the Isabel Avenue extension into the station site. Access would also be provided from Airway Boulevard to the portion of the station south of I-580. The station's location near the planned I-580/Isabel Avenue interchange would afford convenient freeway access for park-and-ride commuters, and the station design would include bus bays for regional transit services rerouted to this station.

Sidewalks and bike lanes would be constructed along access roads to facilitate pedestrian and cyclist station access. A pedestrian bridge over I-580 would connect the north and south sides of the station by an elevated concourse to the at-grade station platform in the freeway median. Passenger pick-up/drop-off areas would be located on both the north and south sides of the station adjacent to the I-580 pedestrian bridge.



Source: WSA, 2009.

ISABEL/I-580 STATION AREA
FIGURE 2-3

Parking. The Isabel/I-580 Station would contain 4,100 commuter parking spaces distributed between a combination of surface lots and parking garages. Multi-level parking structures would occupy both the southerly and northerly portions of the station area. These new parking structures would include between four and six levels of parking, with a maximum structure height of approximately 45 feet above surrounding ground elevations. Bicycle racks and storage lockers would also be provided.

Greenville East Station. The Greenville East Station would be situated on an approximately 65-acre site bounded by Greenville Road to the west and I-580 to the north. The eastern boundary of the station area would be located an average of 550 feet east of the UPRR right-of-way. To the south, the station site would extend just south of the intersection of Las Positas Road and Greenville Road and would border existing light industrial facilities. The limits of the proposed station site are depicted in Figure 2-4. This station would replace the nearby existing Vasco Road ACE Station.

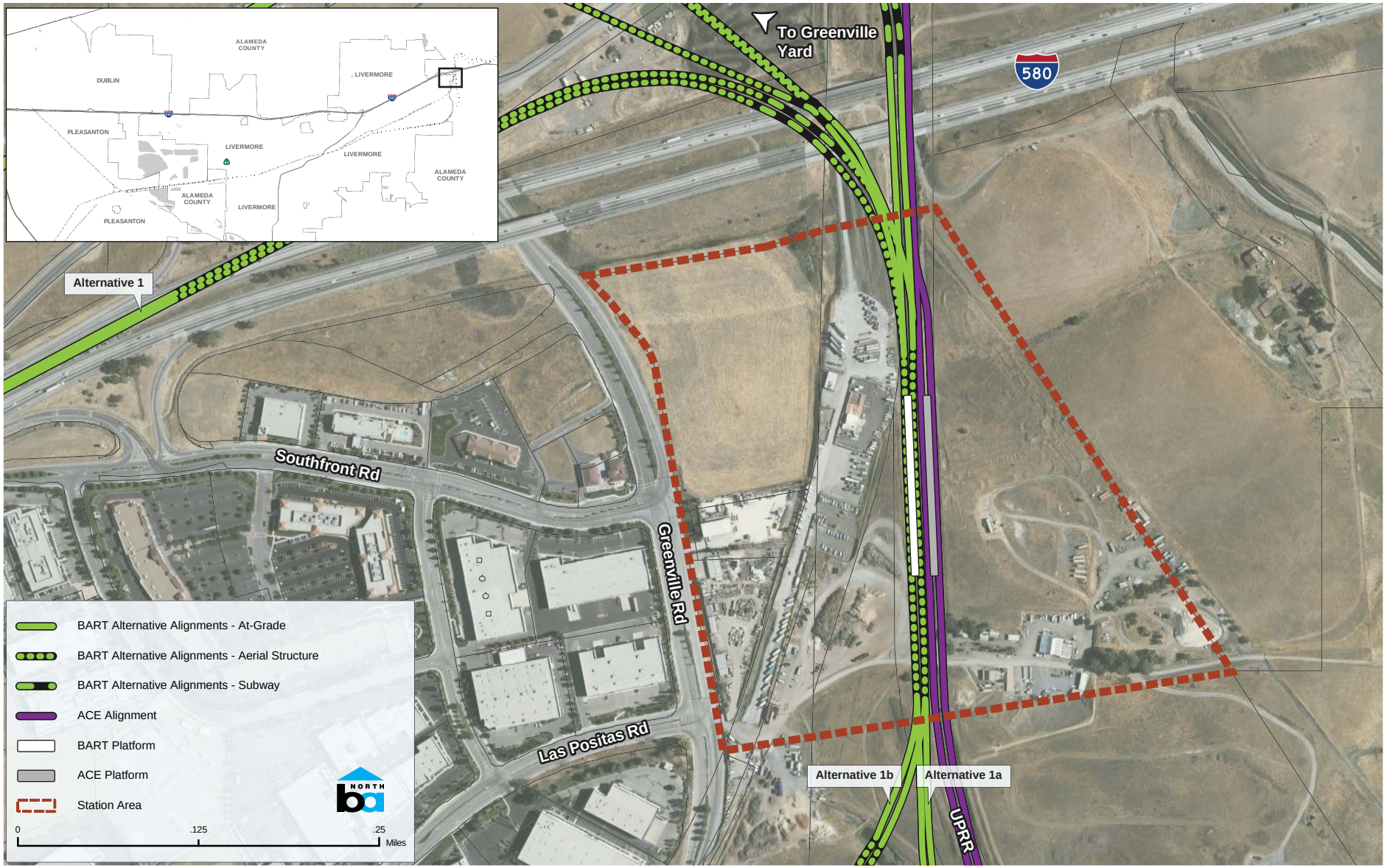
Station Access. The Greenville East Station would be accessed from Greenville Road. The location of the station near the I-580/Greenville Road interchange would provide convenient freeway access for park-and-ride commuters. Sidewalks and bike lanes would be constructed along access roads to facilitate station access by pedestrians and cyclists. A passenger pick-up/drop-off area would be provided near the train platforms.

The Greenville East Station would serve as a multimodal transfer point between BART, ACE, and regional bus service. The station would include parallel BART and ACE platforms as well as a bus transfer area. Further details of transit operations are described in the section "Interface with Existing Transit Service" below.

Parking. The station would contain 4,400 commuter parking spaces distributed between a combination of surface lots and a multi-story parking structure. All parking facilities would be located east of Greenville Road and would abut the BART/ACE platforms from the east and west. The parking structure would include between four and six levels of parking, with a maximum structure height of approximately 45 feet above surrounding ground elevations. Bicycle racks and storage lockers would also be provided.

Projected Ridership

Assuming full completion of the Isabel/I-580 interchange, other roadways, and transit improvements within the study area, Alternative 1 is estimated to attract approximately 38,100 daily, one-way passenger trips (entrances and exits) to the Isabel/I-580 and Greenville East Stations by the Year 2035. Of these trips, nearly 31,700 would be made by new BART riders.



Source: WSA, 2009.

GREENVILLE EAST STATION AREA
FIGURE 2-4

Operational Characteristics

Travel Times. The travel time would be 10.9 minutes from the existing Dublin/Pleasanton Station to the Greenville East Station including a 30-second stop at the Isabel/I-580 Station.

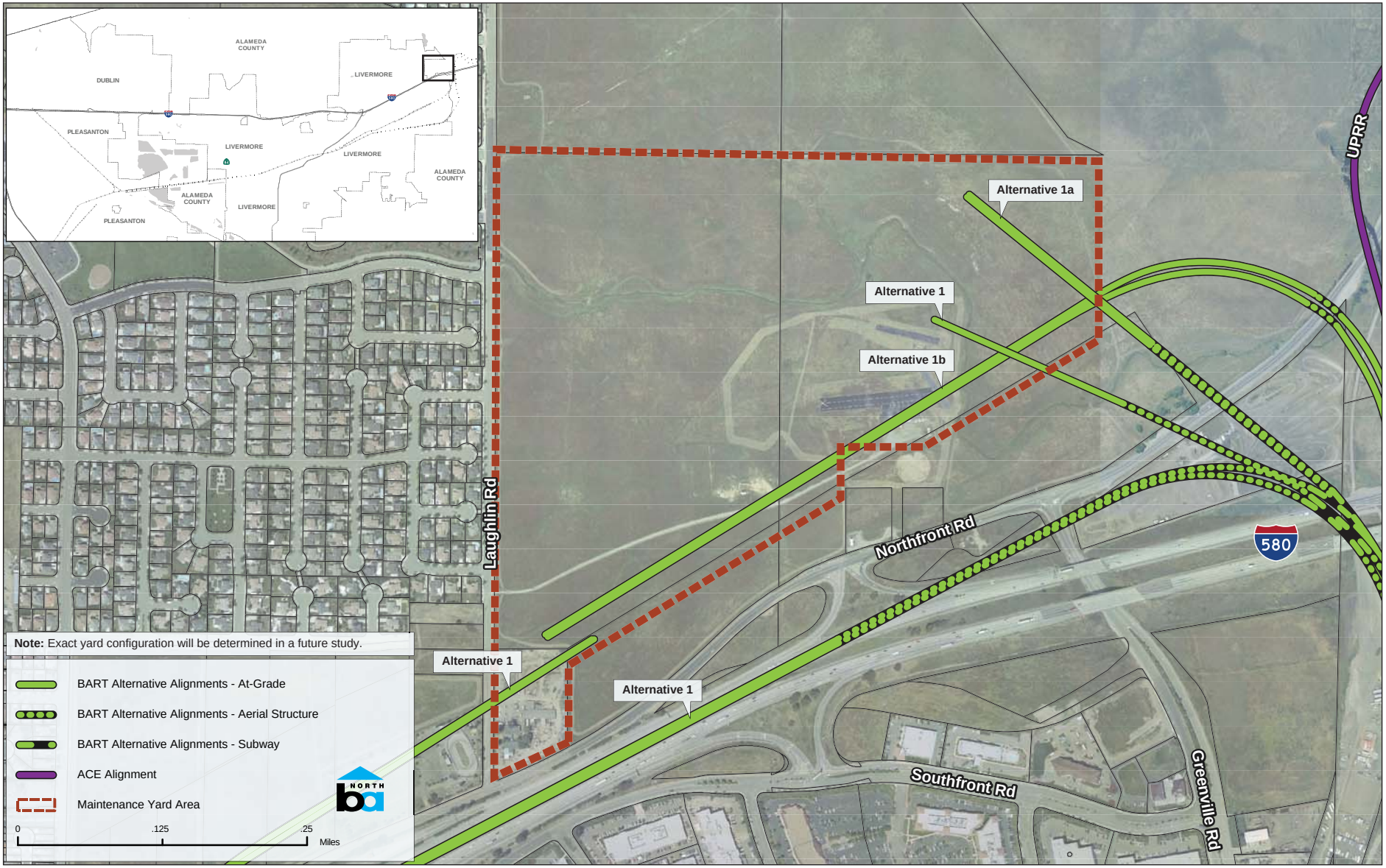
Interface with Existing Transit Service. Selected local LAVTA routes would be redirected to serve the Isabel/I-580 Station. The proposed Greenville East Station would serve as the primary intermodal connection point between BART, ACE, and regional bus service. The ACE tracks currently pass through the proposed station site but there is no ACE stop or station. This alternative assumes that the existing ACE station at Vasco Road would be replaced by the new Greenville East Station because of the close proximity of the two stations. The station would include parallel BART and ACE platforms; passengers would be required to change platforms to transfer between BART and ACE trains. The station would also include a bus facility to serve LAVTA, MAX, SJRTD, and Tri Delta Transit routes. It is assumed that existing LAVTA routes would be extended eastward to serve this station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station would be truncated to terminate at the Greenville East Station or Lawrence Livermore National Laboratory. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

A new BART maintenance/storage facility, Greenville Yard, would be constructed on an approximately 120-acre site north of I-580 and northwest of the proposed Greenville East Station. Two yard lead tracks would connect the Greenville East Station to the yard. One yard lead would parallel the mainline tracks through a box culvert under I-580, diverge from the mainline tracks, cross over Altamont Pass Road in a short aerial structure, and descend into the at-grade yard on retained fill. The second yard lead would extend from proposed BART tracks within the I-580 corridor near Herman Road traveling northeast into the yard north of I-580. Figure 2-5 depicts the proposed yard limits for the Greenville Yard.

Estimated Cost

The estimated capital cost for Alternative 1, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $2,920 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.



Source: WSA, 2009.

GREENVILLE MAINTENANCE YARD AREA

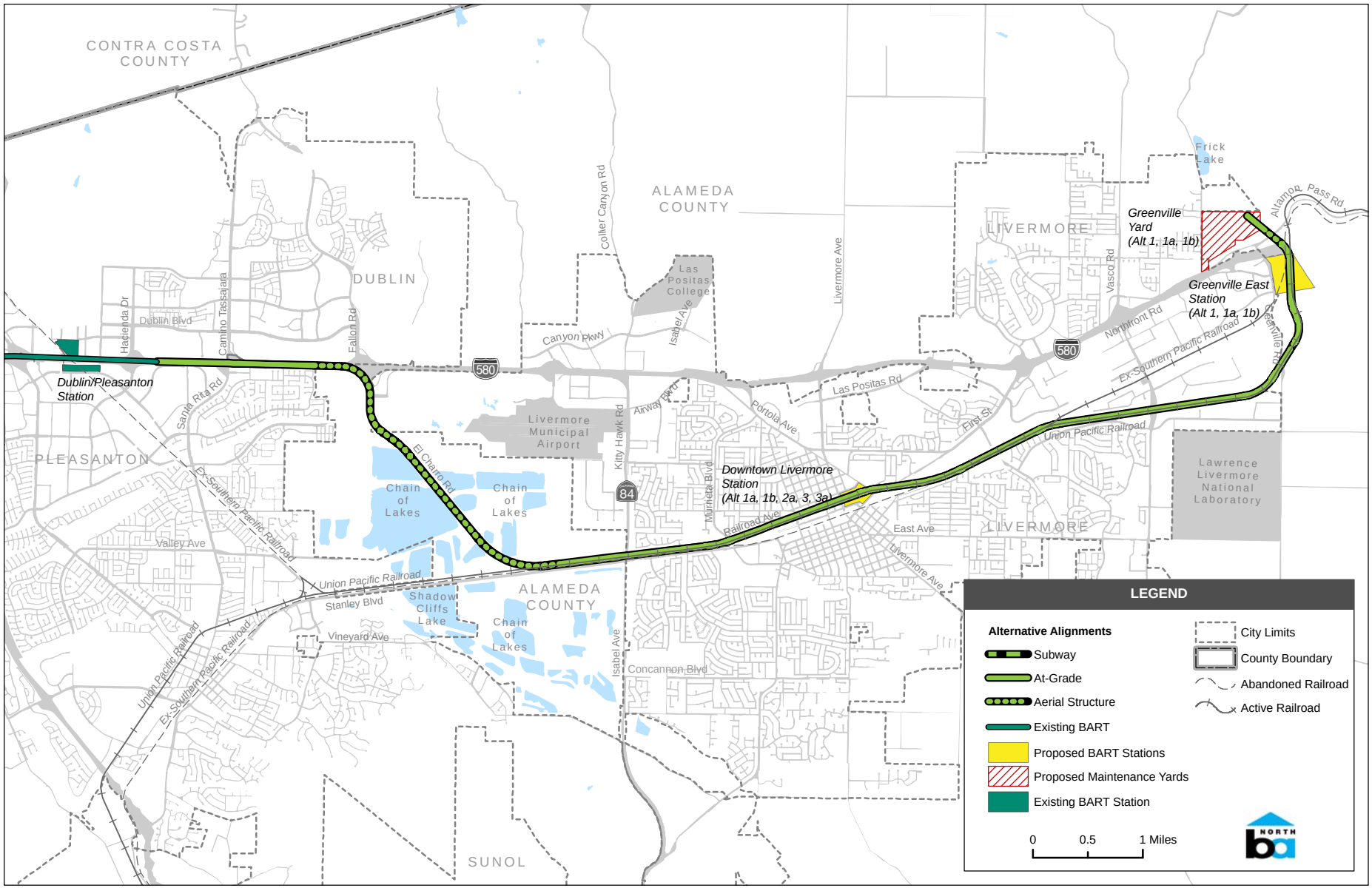
FIGURE 2-5

Alternative 1a – Downtown-Greenville East via UPRR

Route

Similar to the alignment for Alternative 1, Alternative 1a - Downtown-Greenville East via UPRR would originate from the existing Dublin/Pleasanton Station and would extend eastward within the median of I-580. The alignment would then parallel El Charro Road, the UPRR, and Railroad Avenue to a station in Downtown Livermore. The alignment would continue along the UPRR alignment to the proposed terminal of Greenville East Station (see Figure 2-6). Alternative 1a would include a total of 13.1 route miles of track. Below is a description of the notable features of the horizontal route and the vertical profile.

- Departing the existing end-of-track from the existing Dublin/Pleasanton Station, the alignment would proceed 1.2 miles at-grade, transition to retained fill, and then continue in an aerial structure at 1.4 miles from the point of origin.
- Within the aerial structure, the alignment angles southeast beginning at 1.4 miles from the point of origin and passes over the eastbound lanes of I-580 on an aerial structure to parallel El Charro Road at 2.1 miles.
- Continuing in an aerial guideway, the alignment proceeds southeast along the west side of El Charro Road and passes over an arroyo and flood control project under the management of Zone 7 Water Agency and excavated quarry pits.
- At 3.7 miles, the horizontal alignment turns toward the east to parallel the existing UPRR tracks that adjoin Stanley Boulevard.
- At 4.6 miles, the alignment descends from elevated structure onto retained fill and continues eastward along the north side of the existing UPRR track and within the UPRR right-of-way. The retained fill is required to provide vertical separation of about 6 feet between BART and freight rail operations. This separation is for safety purposes in the event of a train derailment, as the separation would prevent the derailed train from intruding into the path of the BART trains. This separation is a common feature in all cases where the BART alignment is adjacent to the freight railroad tracks.
- At 6.9 miles, at a point between N and O Streets, the two BART tracks spread apart to accommodate a crossover in front of the center-platform station and entry to the proposed Downtown Livermore Station adjacent to the existing ACE platform. These platforms would be parallel to one another, but would be offset vertically by about 6 feet to provide the safety-related separation noted above. The platform would be sited at 7.3 miles from the point of origin. This segment of the alignment would be mostly accommodated within the UPRR right-of-way.



Source: AECOM, May 4, 2009.

ALTERNATIVE 1A - DOWNTOWN-GREENVILLE EAST VIA UPRR

FIGURE 2-6

- Departing the Downtown Livermore Station and continuing eastward, the track would remain aligned within the existing UPRR right-of-way and would travel on retained fill, crossing beneath First Street and Mines Road. At 9.3 miles, and again at 9.9 miles, the proposed alignment would cross existing freight railroad spur tracks such that the BART alignment would diverge from the UPRR corridor and travel north and east of the UPRR. The effect of these crossings would be to sever the spur tracks from the UPRR mainline. It is not clear if these spur tracks are currently in active service because no freight activity was observed. If they are active, provisions would be made to maintain service to the UPRR customers using the spur tracks.

- The BART alignment would continue on retained fill and would be aligned within and along the northerly limit of the UPRR right-of-way that is shared with ACE. At 10.2 miles, the BART alignment would cross beneath the existing Vasco Road overpass and later at 11.5 miles cross Greenville Road in a short aerial structure.

- Between Greenville Road and the proposed station site at Greenville East, the alignment would transition between segments of retained cut and fill and two short aerial structures, one to traverse the westerly edge of existing UPRR track and a second which crosses a small creek or drainage channel. This alignment departs the UPRR right-of-way near 11.8 miles to permit a more direct approach to the proposed Greenville East Station.

- The proposed Greenville East Station platform would be sited at 12.4 miles on a segment of retained fill adjacent to the existing UPRR tracks and partially within the UPPR right-of-way. This station would not provide transfers between BART and ACE train service since this alternative offers an ACE intermodal connection in Downtown Livermore.

- Beyond the Greenville East Station, the proposed tracks would extend northward and, at 12.5 miles from the point of origin, would begin a turn toward the northwest to become aligned with a yard lead and entrance to the Greenville Yard described earlier under Alternative 1. The alignment descends beneath the freeway lanes of I-580 at-grade, through a short box culvert or similar structure, transitions to an aerial structure over Altamont Pass Road, and enters the yard on retained fill. The yard entrance is 13.1 miles from the point of origin at the existing end-of-track east of the existing Dublin/Pleasanton Station.

- Approximately 1.7 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor to permit BART operations.

Stations

Alternative 1a would have two stations, Downtown Livermore and Greenville East.

Downtown Livermore Station. The Downtown Livermore Station site would include the existing Livermore Transit Center/Livermore ACE Station. As shown in Figure 2-7, the Downtown Livermore Station site would be situated on an approximately 27-acre site bounded by Livermore Avenue to the west, Chestnut Street, Junction Avenue and Ladd Avenue to the north, residential parcels to the east,

and the boundary created by Old First Street, First Street, Maple Street, and Railroad Avenue to the south. UPRR/ACE tracks running east-west would bisect the station site. The Downtown Livermore Station would be an at-grade station. Junction Street would continue through the station site as an undercrossing of the BART alignment.

Access. The Downtown Livermore Station platform would be at grade. It is anticipated that passengers will need to change levels from grade via elevator, stairways or escalator in order to access the BART platform. The Downtown Livermore Station would allow vehicular access on both the north and south sides of the UPRR/ACE tracks. On the north side, access would be from I Street and Ladd Avenue. Three driveways that currently serve the existing Livermore ACE Station would provide access to the proposed Downtown Livermore Station's south side. Two driveways are located on Railroad Avenue—one that provides access to the existing ACE parking garage and another that serves as a main entrance to the existing ACE station. A third driveway is on Old First Street.

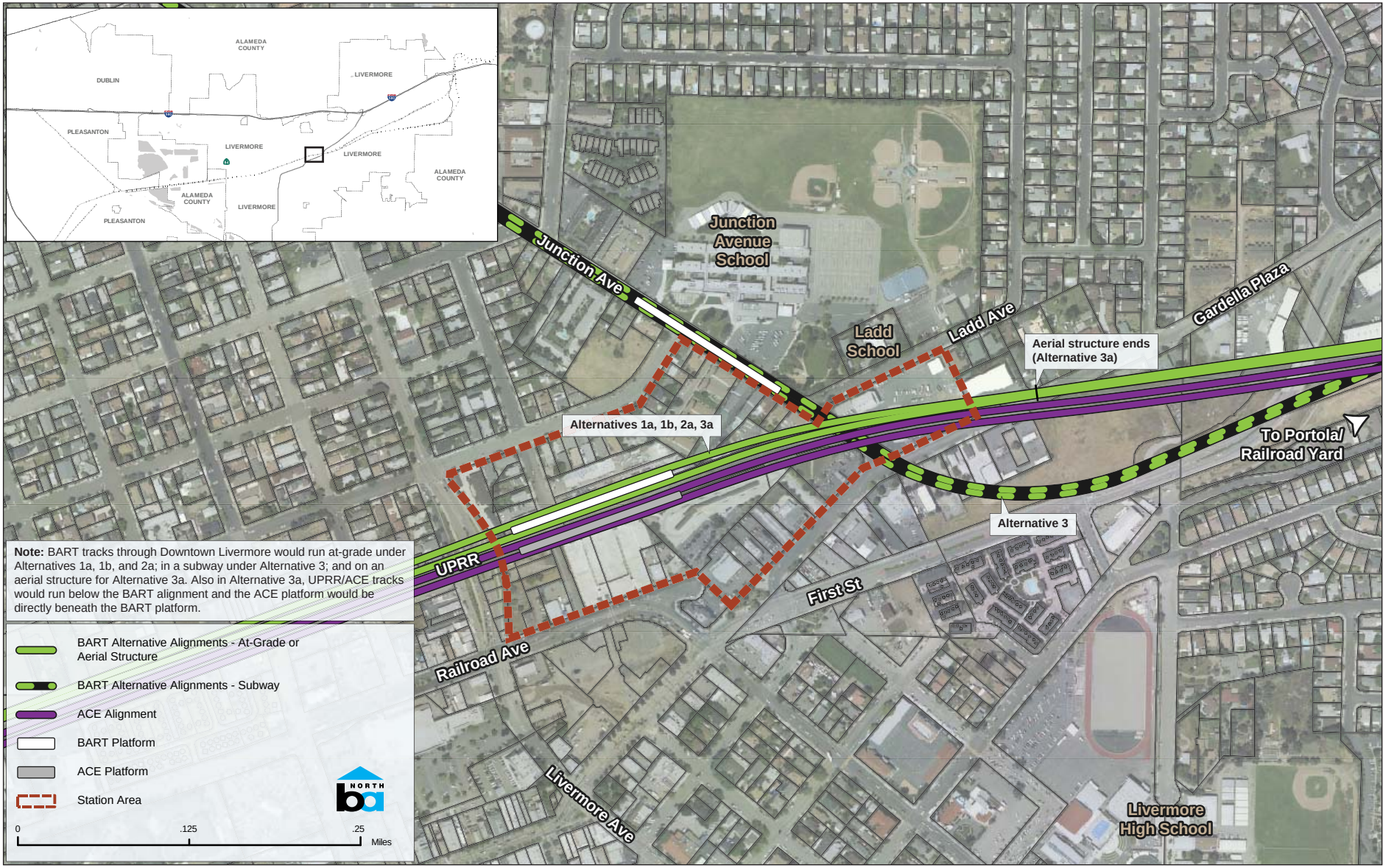
Passenger pick-up/drop-off facilities would be adjacent to the BART platform on the north side of the station and adjacent to the bus transfer zone on the south side of the station. Sidewalks and bike lanes would be present along access roads and would facilitate pedestrian and cyclist access.

The Livermore Transit Center/Livermore ACE Station currently serves as a regionally significant transit hub that facilitates connections between ACE and multiple LAVTA routes. The addition of BART service would expand the station's multimodal capacity. The station would include adjacent BART and ACE platforms as well as a bus transfer area south of the existing ACE platform. Further details of transit operations are described later in the section "Interface with Existing Transit Service."

Parking. The station would contain 2,500 commuter parking spaces distributed between a combination of surface lots, an existing 375-space parking garage, and additional multi-level parking structures. New parking structures would include between four and six levels of parking, with a maximum structure height of approximately 45 feet above surrounding ground elevations and would be on both the north and south sides of the station site. Bicycle racks and storage lockers would also be provided.

Greenville East Station. The Greenville East Station for this alternative would have the same configuration as the facility described under Alternative 1, although there would be no ACE platform and the parking would be slightly different. BART-ACE transfers would be accommodated at the existing Downtown Livermore ACE Station. Unlike Alternative 1, the Vasco Road ACE Station would remain open. There would, however, be no BART-ACE connection at the Vasco Road ACE Station.

Parking. The station would contain 3,625 commuter parking spaces distributed between a combination of surface lots and a multi-story parking structure. All parking facilities would have a configuration and layout similar to the facilities described under Alternative 1.



Source: WSA, 2009.

DOWNTOWN LIVERMORE STATION AREA

FIGURE 2-7

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, Alternative 1a is estimated to attract approximately 35,300 daily, one-way passenger trips (entrances and exits) to the Downtown Livermore and Greenville East Stations by the Year 2035. Of these trips, more than 30,900 would be made by new BART riders.

Operational Characteristics

Travel Times. The travel time would be 13.8 minutes from the existing Dublin/Pleasanton Station to the Greenville East Station including a 30-second stop at the Downtown Livermore Station.

Interface with Existing Transit Service. The proposed Downtown Livermore Station would serve as an intermodal connection point between BART, ACE, and selected regional bus services. The station would include adjacent BART and ACE platforms and passengers would be required to change platforms to transfer between trains. This facility will remain a regionally significant LAVTA transit hub.

The proposed Greenville East Station would serve as the primary connection point between BART and regional bus services from the east. Bus connections at Greenville East Station would be the same as described for Alternative 1. This station would replace the existing Vasco Road ACE Station.

Maintenance/Storage Facilities

This alternative would employ a new BART yard, Greenville Yard, to be constructed on the same site as described under Alternative 1. Yard access would be provided from a lead that would extend north from the tailtracks at Greenville East Station, through a box structure to cross beneath I-580, along an aerial structure over Altamont Pass Road, then onto retained fill to the yard, where the tracks would terminate at-grade. Yard operations would parallel those described under Alternative 1.

Estimated Cost

The estimated capital cost for Alternative 1a, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,610 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 1b – Downtown-Greenville East via SPRR

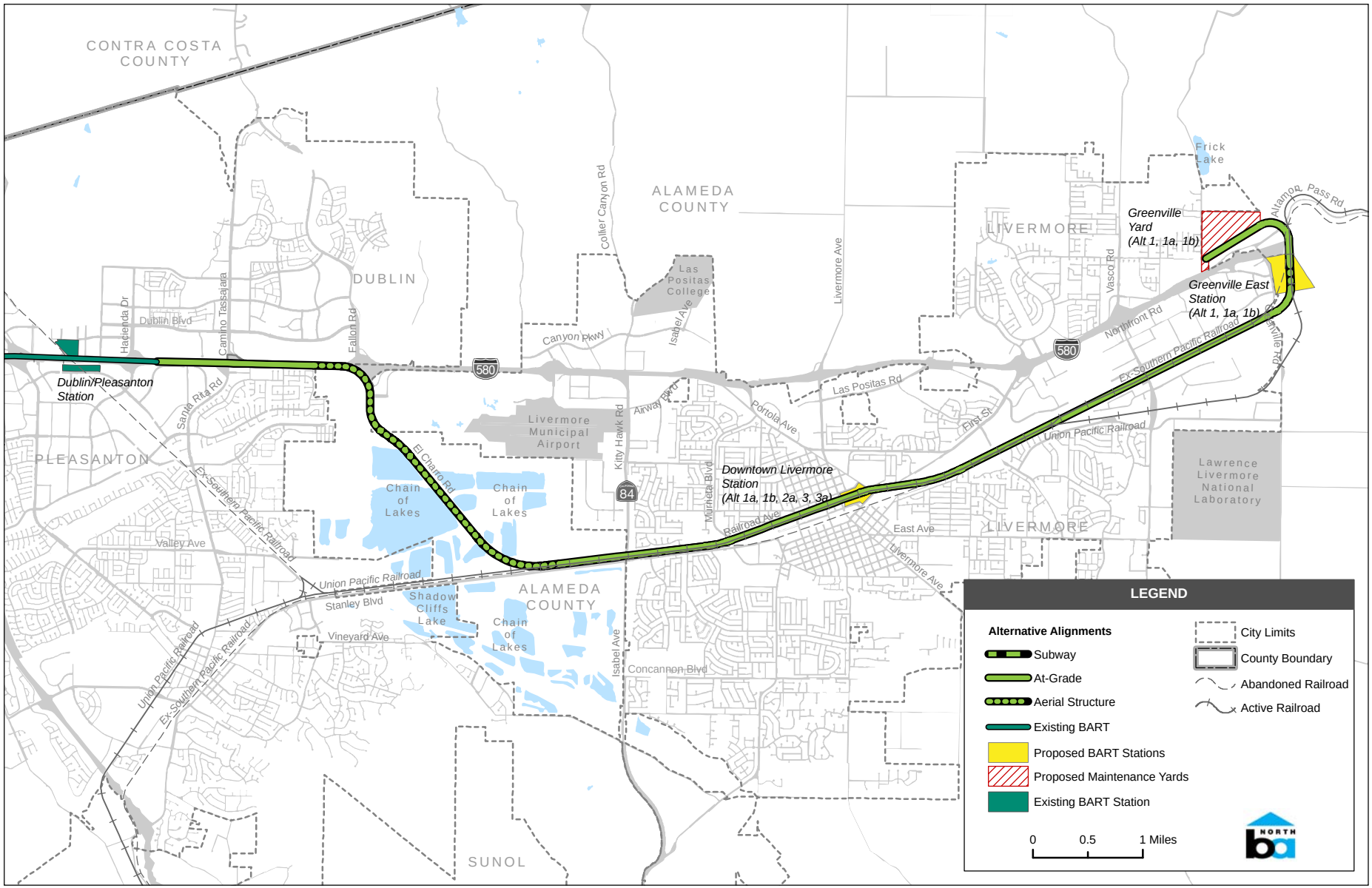
Route

On a route similar to both Alternative 1 and 1a, Alternative 1b – Downtown-Greenville East via SPRR would extend approximately 13.2 miles eastward from the existing end-of-track east of the existing Dublin/Pleasanton Station. Alternative 1b would follow an alignment along I-580, El Charro Road, and the UPRR to a Downtown Livermore Station. The alignment would share the UPRR right-of-way to a point east of the Arroyo Las Positas, where the alignment would diverge onto the right-of-way of the former Southern Pacific Railroad (SPRR) and follow this alignment to the Greenville East Station. This use of the SPRR right-of-way instead of the UPRR constitutes the primary difference between Alternative 1a and 1b. Figure 2-8 depicts the alignment for Alternative 1b. Features of the horizontal and vertical alignment of this alternative between the end-of-track east of existing Dublin/Pleasanton Station and the Arroyo Las Positas are described above under Alternative 1a. The following vertical/horizontal alignment discussion pertains only to the section of Alternative 1b between the Arroyo Las Positas and Greenville East Station.

- The alignment would depart the existing UPRR right-of-way at 9.1 miles from the point of origin, and would transition to an at-grade alignment 0.2 miles thereafter. The alignment would then parallel existing spur tracks within the SPRR right-of-way to the point where the right-of-way approaches Greenville Road.
- A new roadway underpass would be constructed at the Vasco Road rail crossing at 10.3 miles from the point of origin. At 11.1 miles from the point of origin, the alignment would ascend on retained fill and then transition into an aerial structure prior to crossing Greenville Road.
- Beyond Greenville Road, the track would angle toward the north, passing through retained cuts, fills, and a box structure to become parallel with the existing UPRR tracks where the Greenville East Station platforms would be sited within an aerial structure, which might partially be within the UPRR right-of-way.
- North of the station, the track would continue through a series of cuts and fills and two box structures to provide passage beneath the freeway lanes of I-580 before transitioning to surrounding ground elevation. The entrance to the proposed yard would occur at 13.2 miles from the point of origin.

Stations

Alternative 1b would have two stations, Downtown Livermore and Greenville East, and would use the same configuration for these facilities as described under Alternative 1a.



Source: AECOM, May 4, 2009.

ALTERNATIVE 1B - DOWNTOWN-GREENVILLE EAST VIA SPRR

FIGURE 2-8

Projected Ridership

Similar to Alternative 1a, Alternative 1b is estimated to attract approximately 35,300 daily, one-way passenger trips (entrances and exits) to the Downtown Livermore and Greenville East Stations by the Year 2035. Of these trips, more than 30,900 would be made by new BART riders.

Operational Characteristics

Travel Times. The travel time would be 13.5 minutes from the existing Dublin/Pleasanton Station to the Greenville East Station, including a 30-second stop at the Downtown Livermore Station.

Interface with Existing Transit Service. The stations proposed in this alternative would interface with transit in the same manner as those proposed under Alternative 1a.

Maintenance/Storage Facilities

This alternative would employ a new BART yard to be constructed on the same Greenville Yard site as described under Alternatives 1 and 1a. The yard lead would extend from the mainline tracks through two box structures to permit crossing beneath the freeway lanes of I-580, then extend on retained fill to the yard, where the tracks would terminate at-grade. Additional details regarding the functions and activities at the BART Greenville Yard are described under Alternative 1.

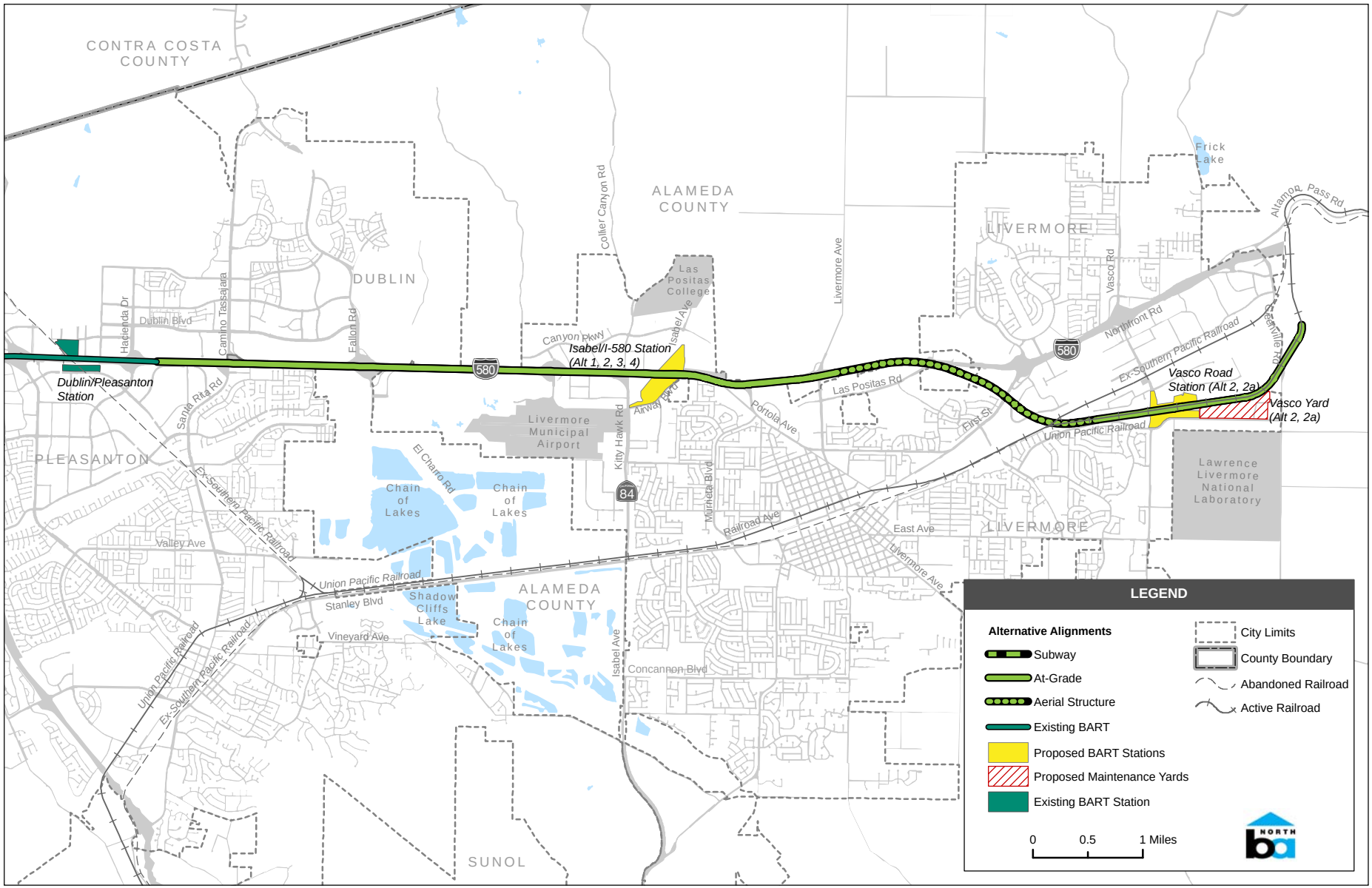
Estimated Cost

The estimated capital cost for Alternative 1b, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,650 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 2 – Las Positas

Route

The approximately 10.0-mile Alternative 2 – Las Positas would originate at the end-of-tracks east of the existing Dublin/Pleasanton Station and proceed eastward in the median of I-580 to a station at Isabel/I-580. The alignment would continue east in the median of I-580 before exiting the median to parallel Las Positas Road and the UPRR to the Vasco Road Station (see Figure 2-9). This alternative would include two stations: one at Isabel/I-580 and one on a site surrounding the existing Vasco Road ACE Station. A description of the horizontal alignment and the vertical profile of Alternative 2 is provided below.



Source: AECOM, May 4, 2009.

ALTERNATIVE 2 - LAS POSITAS

FIGURE 2-9

- Departing the existing end-of-track at the existing Dublin/Pleasanton Station, the extension would proceed eastward 4.6 miles at-grade within a widened freeway median to the proposed Isabel/I-580 Station immediately east of the proposed Isabel Avenue (SR-84) overpass/interchange.
- Proceeding eastward at-grade and within the freeway median, at 6.0 miles the alignment crosses Livermore Avenue and ascends on retained fill and then in an aerial structure. The alignment remains in an aerial structure and turns southward, crossing over the eastbound lanes of I-580, near the Las Colinas Road overpass.
- The aerial structure continues along the centerline of Las Positas Road, turning south and crossing First Street. The proposed alignment then traverses an existing vacant parcel in the Pell Neighborhood Plan area.
- At 7.9 miles from the existing Dublin/Pleasanton Station, the aerial structure begins to turn toward the east to become aligned immediately south of the existing UPRR. At 8.5 miles from the existing Dublin/Pleasanton Station, the alignment's eastward turn would be complete and approximately one-half mile west of Vasco Road the tracks would descend on retained fill into the UPRR right-of-way.
- The track continues eastward within the UPRR right-of-way to a terminus station on the site of the existing Vasco Road ACE Station. The BART platform would be located at 9.3 miles from the point of origin and would be constructed on retained fill or similar grade separation from the adjoining UPRR/ACE tracks.
- The alignment would proceed farther east from the station platform within and along the southern edge of the UPRR right-of-way. At 10.0 miles from the point of origin, the mainline track would end at the entrance to a proposed Vasco Yard.
- Approximately 6.3 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor for BART operations. Additional width would be required at the Isabel/I-580 Station.

Stations

Alternative 2 would have two stations, Isabel/I-580 and Vasco Road.

Isabel/I-580 Station. The Isabel/I-580 Station would be similar to the station proposed in Alternative 1.

Parking. The station would contain 4,475 commuter parking spaces distributed between a combination of surface lots and a multi-story parking structure. All parking facilities would have the same configuration and layout as the facilities described in Alternative 1.

Vasco Road Station. As seen in Figure 2-10, the Vasco Road Station would be situated on an approximately 60-acre site bounded to the north by the Brisa Neighborhood Plan area and the south by Patterson Pass Road. On the west, the station would border an existing park and an industrial parcel. The eastern station boundary is defined by industrial parcels. The station would be bisected by the east-west running UPRR/ACE tracks, and the station area would encompass the existing Vasco Road ACE Station.

Access. The Vasco Road Station site would allow vehicular access on both the north and south sides of the UPRR/ACE and proposed BART tracks. On the west side of Vasco Road north of the UPRR tracks, an existing driveway would extend from Vasco Road and south into the existing Vasco Road Station bus and parking area. East of Vasco Road on the north side of the station site, access would be provided from Brisa Street by a connection through the Brisa Neighborhood Plan area. The south side of the station, east of Vasco Road and north of Patterson Pass Road, would be accessed from Patterson Pass Road. Passenger pick-up and drop-off facilities would be located adjacent to the train platforms on both the north and south sides of the tracks.

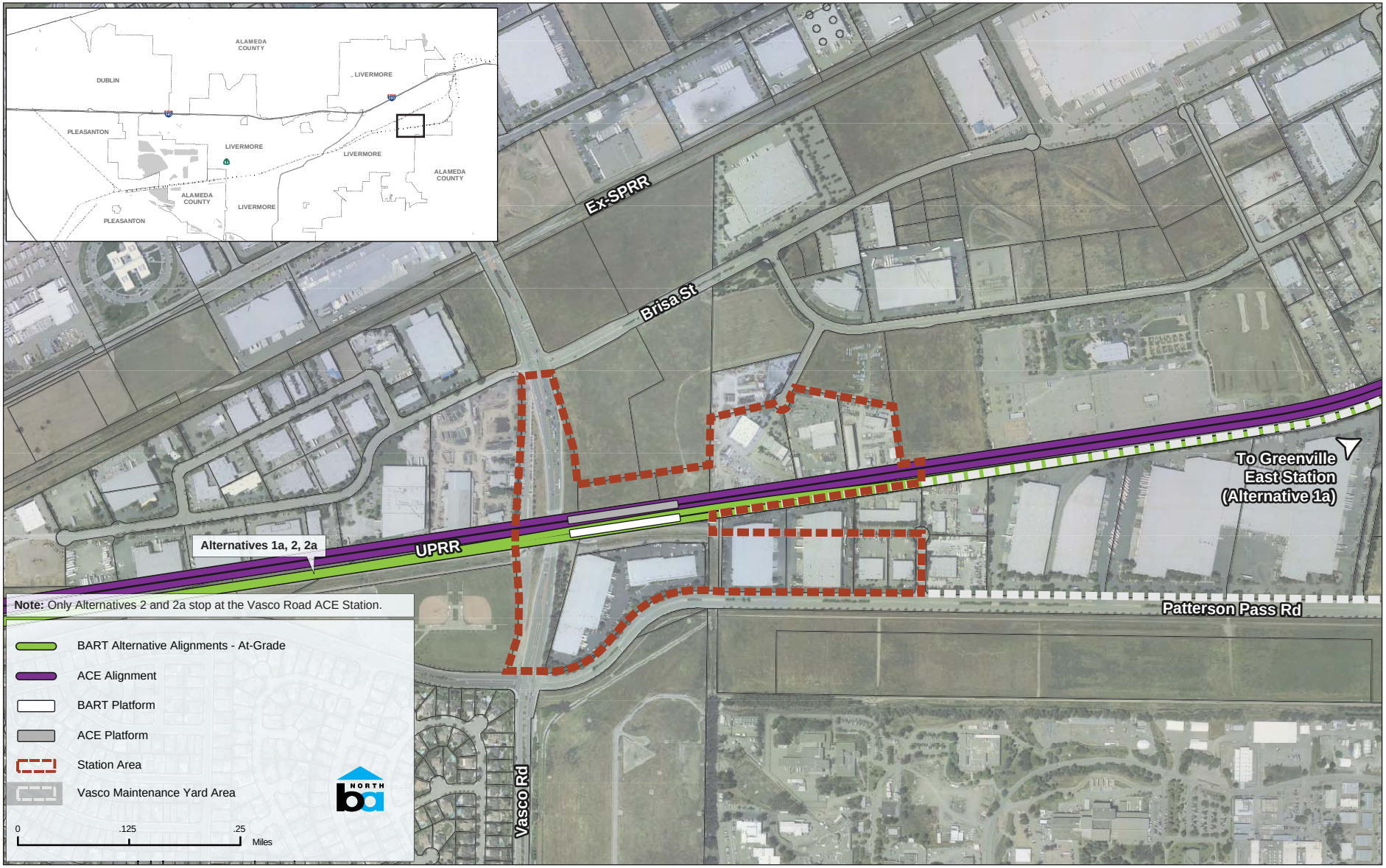
Sidewalks would be located along access roads and would facilitate pedestrian access. Bicycle lanes along access roads would allow cyclist access to the station. A walk/bicycle connection would be provided to connect station platforms with the intersection of Vasco and Patterson Pass Roads. Pedestrians could then use the existing path along the east side of Vasco Road to access the Lawrence Livermore National Laboratory via the Westgate Drive entrance.

The station would serve as a multimodal transfer point between BART, ACE, and regional bus service. The station would include parallel BART and ACE platforms as well as a bus transfer area located near the train platforms.

Parking. The Vasco Road Station would contain 4,000 new commuter parking spaces distributed between a combination of surface lots and a parking garage. A parking garage would be located east of Vasco Road, and would include between four and six levels of parking, with a maximum structure height of approximately 45 feet above surrounding ground elevations. Bicycle racks and storage lockers would also be provided.

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, Alternative 2 is estimated to attract approximately 35,400 daily, one-way passenger trips (entrances and exits) to the Isabel/I-580 and Vasco Road Stations by the Year 2035. Of these trips, more than 29,800 would be made by new BART riders.



Source: WSA, 2009.

VASCO ROAD STATION AREA

FIGURE 2-10

Operational Characteristics

Travel Times. The travel time would be 9.7 minutes from the existing Dublin/Pleasanton Station to the Vasco Road Station, including a 30-second stop at the Isabel/I-580 Station.

Interface with Existing Transit Service. Connections between BART and ACE would occur at the proposed Vasco Road Station. The station would include parallel BART and ACE platforms and passengers would be able to change platforms to transfer between trains. Selected local LAVTA routes would be redirected to serve the Isabel/I-580 and Vasco Road Stations. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at either Isabel/I-580 Station or Vasco Road Station/Lawrence Livermore National Laboratory; for ridership modeling purposes, the Isabel/I-580 Station was used. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

A new BART yard, Vasco Yard, would be constructed on an approximately 52-acre site east of the Vasco Road Station. The yard would abut the southerly edge of existing UPRR right-of-way. Tailtracks would run parallel to the south side of the UPRR right-of-way on retained fill and proceed east from the Vasco Road Station to the first of two yard lead tracks providing access to the proposed yard site from the west. A second yard lead would be situated immediately west of Greenville Road and would be used to access the yard site from its eastern side. Figure 2-11 illustrates the location and limits of the proposed Vasco Yard.

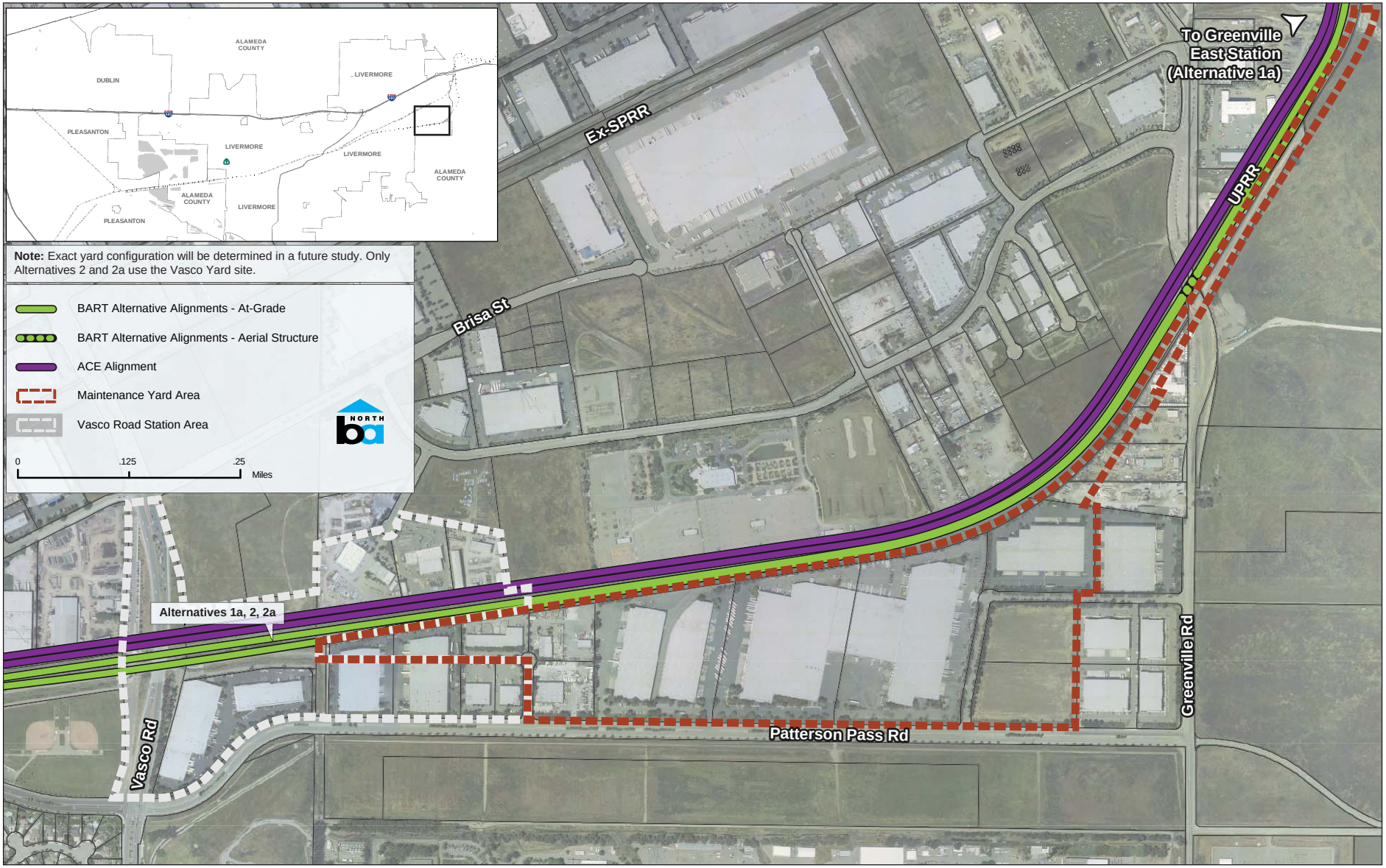
Estimated Cost

The estimated capital cost for Alternative 2, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,280 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 2a – Downtown-Vasco

Route

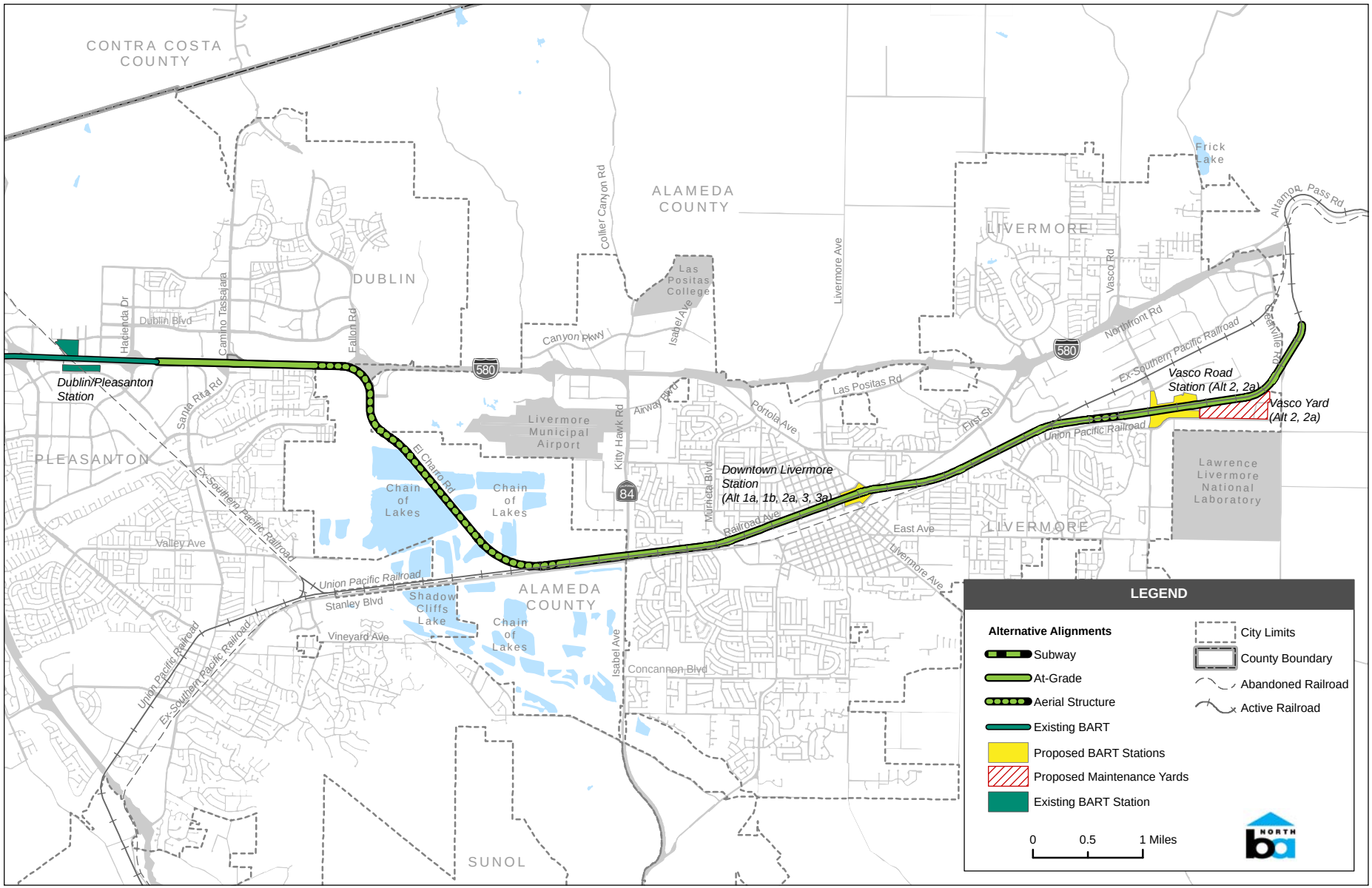
Alternative 2a – Downtown-Vasco would include a total of 12.0 miles of new track and would include a Downtown Livermore Station and terminus station surrounding the existing Vasco Road ACE Station (see Figure 2-12). The alignment would extend from the existing Dublin/Pleasanton Station eastward via an alignment along I-580, El Charro Road, and the UPRR to a Downtown Livermore Station and then continue along the UPRR to the Vasco Road Station. The alignment for Alternative 2a would include some of the same features described earlier for Alternatives 1a and 1b. Alternatives 1a, 1b,



Source: WSA, 2009.

VASCO MAINTENANCE YARD AREA

FIGURE 2-11



Source: AECOM, May 4, 2009.

ALTERNATIVE 2A - DOWNTOWN-VASCO

FIGURE 2-12

and 2a would share a common alignment between the existing end-of-track at the existing Dublin/Pleasanton Station and the proposed Downtown Livermore Station. The following description summarizes this alternative's horizontal route and vertical profile east of the Downtown Livermore Station:

- Departing the Downtown Livermore Station and continuing eastward, the track would remain aligned within the existing UPRR right-of-way and travel on retained fill, crossing beneath First Street and Mines Road. At 9.3 miles from the point of origin, the proposed alignment would cross an existing spur track formerly operated by the Southern Pacific Railroad (SPRR). The effect of this crossing would be to sever the spur track from the UPRR mainline. No activity was observed on this spur track and it may be inactive. If the spur track is in active use, provisions would be made to maintain service to the UPRR customers using the spur track.
- A second existing spur track, departing the corridor near the intersection with Vasco Road, would not be interrupted.
- At 9.4 miles from the point of origin, the alignment would continue on retained fill and then transition to an aerial structure at 9.6 miles. The aerial structure is required to permit BART tracks to move from the north side of UPRR track to the south side within the existing UPRR right-of-way.
- The aerial structure would end at 9.9 miles from the point of origin and then would return to retained fill. The track would cross beneath an existing roadway overpass at Vasco Road. Immediately east of Vasco Road, a station would be sited adjacent to the existing ACE platform within the UPRR right-of-way.
- Immediately east of the proposed Vasco Road Station, the track would become a yard lead for the proposed Vasco Yard situated along the southern edge of the UPRR track. Tailtracks would traverse the yard and parallel the existing UPRR track on retained cut and fill within the UPRR right-of-way, crossing Greenville Road and terminating approximately 2,100 feet farther east at 12.0 miles from the point of origin.
- Approximately 1.7 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor for BART operations.

Stations

Alternative 2a would have two stations, Downtown Livermore and Vasco Road.

Downtown Livermore Station. Whereas the Downtown Livermore Station for both Alternative 1a and Alternative 1b would be at grade, under Alternative 2a, it would be above ground on retained fill. It is anticipated that external access to the station will be similar with minor exceptions to the configuration described under Alternatives 1a and 1b (see Figure 2-7).

Vasco Road Station. The Vasco Road Station would be similar to that presented under Alternative 2 (see Figure 2-10).

Parking The Vasco Road Station would contain 3,775 new commuter parking spaces distributed between a combination of surface lots and a parking garage. The configuration and layout of the parking at this station would be the same as that described in Alternative 2.

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, Alternative 2a is estimated to attract nearly 35,200 daily, one-way passenger trips (entrances and exits) to the Downtown Livermore and Vasco Road Stations by the Year 2035. Of these trips, an estimated 31,600 would be made by new BART riders.

Operational Characteristics

Travel Times. The travel time would be 11.8 minutes from the existing Dublin/Pleasanton Station to the Vasco Road Station, including a 30-second stop at the Downtown Livermore Station.

Interface with Existing Transit Service. Both the proposed Downtown Livermore and Vasco Road Stations could provide intermodal connections between BART and ACE, with passengers being required to change platforms to transfer trains at either location. LAVTA service would likely remain unchanged at the Downtown Livermore Station, where transfers between multiple LAVTA routes are already possible. Additional LAVTA routes would likely be rerouted to serve the Vasco Road Station. Regional bus service from the east would likely be routed to the Vasco Road Station given its proximity to the Lawrence Livermore National Laboratory; however, this bus service could also serve the Downtown Livermore Station. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

This alternative would include a maintenance facility, Vasco Yard, with the same configuration as described under Alternative 2.

Estimated Cost

The estimated capital cost for Alternative 2a, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,800 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 3 – Portola

Route

Similar to previously described alternatives, Alternative 3 – Portola would originate from the existing end-of-track at the existing Dublin/Pleasanton Station and proceed eastward within the median of I-580 to a station at Isabel/I-580. The alignment would then proceed southeast along Portola Avenue to a Downtown Livermore Station. Alternative 3 would include a total of 7.2 route miles of new track (see Figure 2-13). Below is a description of the horizontal route and vertical profile of this alternative.

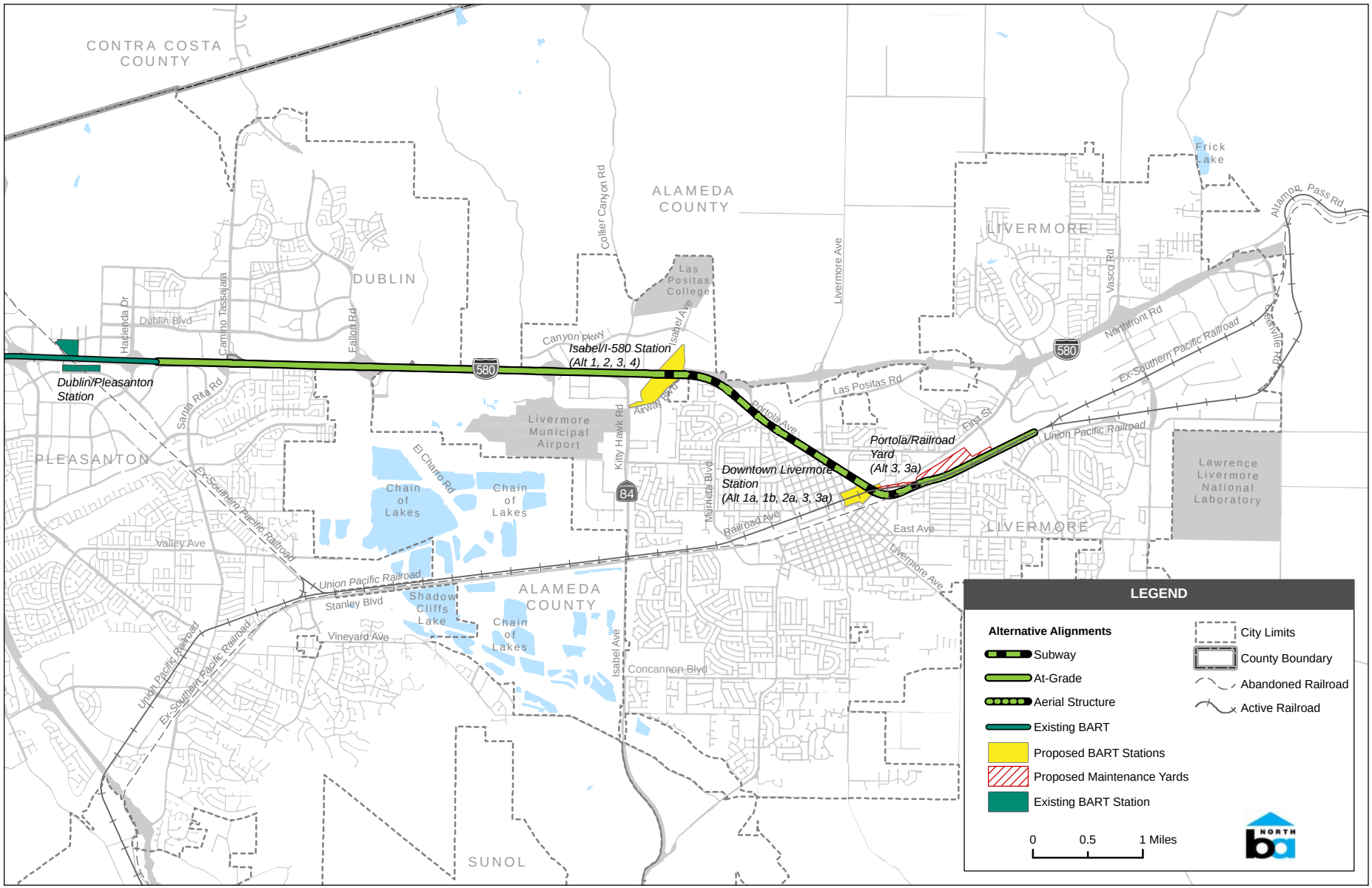
- Departing the existing end-of-track from the existing Dublin/Pleasanton Station, the alignment would proceed eastward 4.6 miles. The alignment would be mostly at-grade within the I-580 median, but would enter a retained cut as it approaches the proposed Isabel/I-580 Station which would be located immediately east of the proposed Isabel Avenue (SR-84) overpass/interchange. Under Alternative 3, the proposed platform at the Isabel/I-580 Station would be positioned below grade in order to transition to a subway configuration described below.

- Departing the Isabel/I-580 Station, the alignment would immediately proceed into a subway configuration and pass under the eastbound lanes of I-580. At 4.8 miles from the point of origin, the track would angle southward to become aligned with Montecito Circle and would proceed underground beneath the intersection with Portola Avenue.

- The alignment would then proceed beneath Portola Avenue in subway, crossing to Junction Avenue to a terminal underground station at Downtown Livermore. This subway station would be accessed from street level, and the platform would be 6.7 miles from the point of origin.

- Beyond the station, the track would remain in a subway. The alignment would cross beneath the UPRR right-of-way and would angle sharply to the east to align with First Street near its intersection with Inman Street. The alignment would proceed east to become aligned within the UPRR right-of-way, would pass underneath the UPRR, and would resurface on the north side of the UPRR tracks and within the UPRR right-of-way. BART tracks would continue eastward along the UPRR tracks on a retained fill and would terminate in a new BART yard, the Portola/Railroad Yard.

- Approximately 4.9 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor for BART operations. Additional width would be required at the Isabel/I-580 Station.



Source: AECOM, May 4, 2009.

ALTERNATIVE 3 - PORTOLA

FIGURE 2-13

Stations

Alternative 3 would have two stations, Isabel/I-580 and Downtown Livermore.

Isabel/I-580 Station. The Isabel/I-580 Station under this alternative would require a below-grade platform in the median of I-580 to accommodate the alignment's transition from at-grade to subway. With this exception, the station is otherwise similar to the layout described under Alternative 1.

Parking. The Isabel/I-580 Station would contain 4,375 commuter parking spaces distributed between surface lots and parking garages. The configuration and layout of the parking at this station would be similar to that describes in Alternative 1.

Downtown Livermore Station. Much of the Downtown Livermore Station site encompasses the existing Livermore Transit Center/Livermore ACE Station. As previously shown in Figure 2-7, the Downtown Livermore Station would be on an approximately 27-acre site bounded by I Street to the west, residential properties and Ladd Avenue to the north, Junction Avenue School, Ladd School and residential parcels to the east, and the boundary created by Old First Street, First Street, Maple Street, and Railroad Avenue to the south. East-west UPRR/ACE tracks would bisect the station site. The station facility would include a BART platform that would extend northeast underneath Junction Avenue to just beyond Chestnut Street, with all platform access situated within the station area boundaries as previously identified. Unlike the other BART extension alternatives with this station, under Alternative 3, the Downtown Livermore Station would be underground and function as a terminus station. As a result, the platform configuration and passenger access points would be different under this alternative; other aspects related to station parking and surface access would be similar to those described for Alternatives 1a, 1b, and 2a.

Access. The Downtown Livermore Station for this alternative is underground. It is anticipated that passengers will need to change levels from grade via elevator, stairways or escalator in order to access the BART platform. Similar to Alternatives 1a, 1b, and 2a, the Downtown Livermore Station under this alternative would allow vehicular access on both the north and south side of the UPRR/ACE and proposed BART tracks. Passenger pick-up/drop-off facilities, sidewalks, and bicycle lanes would be provided. The Downtown Livermore Station would remain a regional transit hub that provides connections between ACE and LAVTA. The station would include connections between the below-grade BART platforms and the at-grade ACE platforms as well as to bus transfer area located south of the existing ACE platform.

Parking. The station would contain 2,500 commuter parking spaces distributed between a combination of surface lots, an existing 375-space parking garage, and additional multi-level parking structures. New parking structures would include between four and six levels of parking, with a maximum structure height of approximately 45 feet above surrounding ground elevations and would be on both the north and south sides of the station site. Bicycle racks and storage lockers would also be provided.

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, Alternative 3 is estimated to attract nearly 34,300 daily, one-way passenger trips (entrances and exits) to the Isabel/I-580 and Downtown Livermore Stations by the Year 2035. Of these trips, nearly 29,900 would be made by new BART riders.

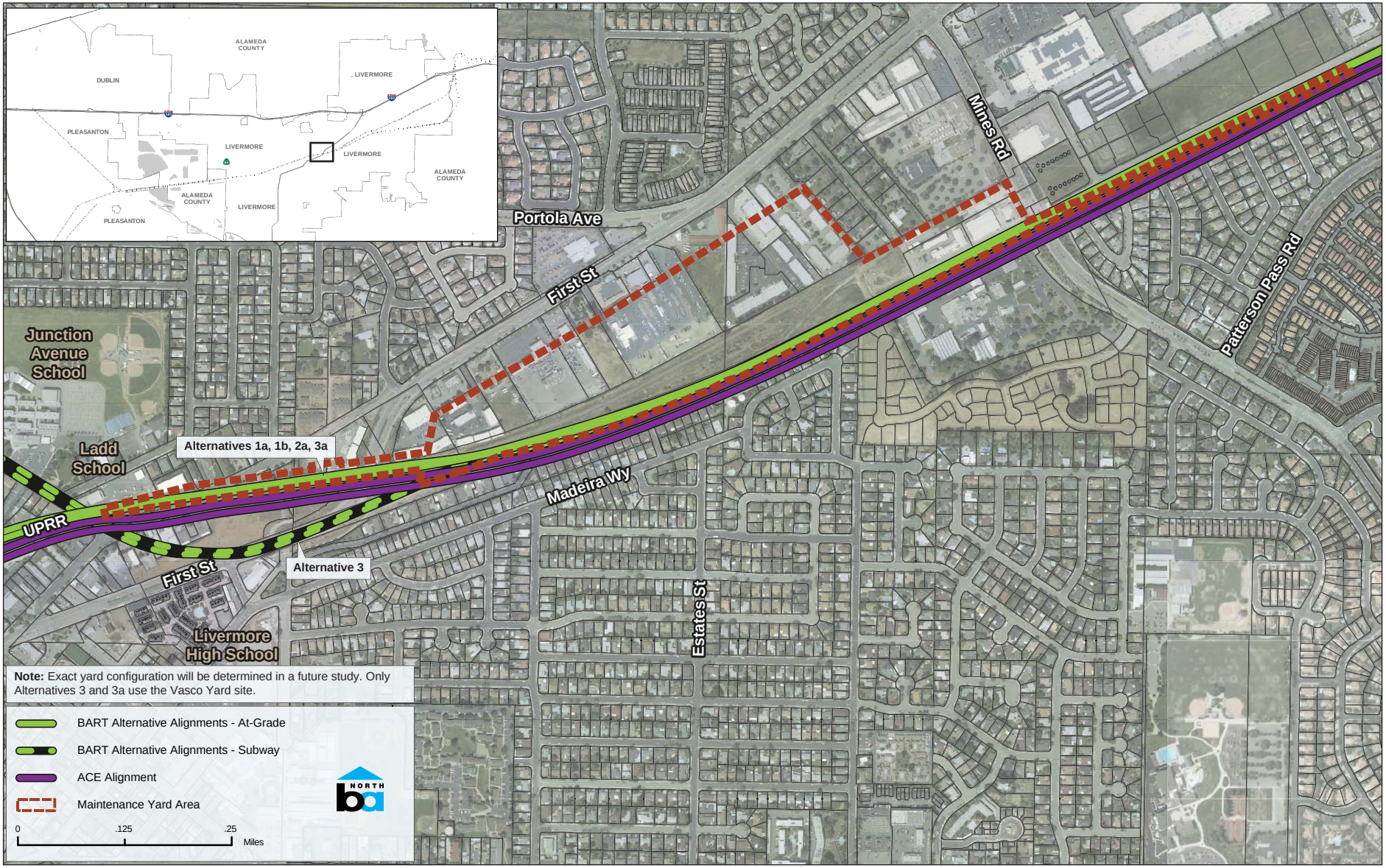
Operational Characteristics

Travel Times. The travel time would be 7.7 minutes from the existing Dublin/Pleasanton Station to the Downtown Livermore Station, including a 30-second stop at the Isabel/I-580 Station.

Interface with Existing Transit Service. Connections between BART and ACE would occur at the Downtown Livermore Station. The station would include adjacent BART and ACE platforms and passengers would be required to change platforms to transfer between trains. The Downtown Livermore Station would remain a regional hub for LAVTA bus routes. Selected local LAVTA routes would be redirected to serve the Isabel/I-580 Station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at either Isabel/I-580 Station or Downtown Livermore Station; for ridership modeling purposes, the Isabel/I-580 Station was used. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

A new BART yard, the Portola/Railroad Yard, would be constructed on an approximately 47-acre site east of the Downtown Livermore Station. The yard would be immediately north of the existing UPRR right-of-way. Immediately southeast of the Downtown Livermore Station platform, tailtracks would cross under the UPRR right-of-way and become one of two yard lead tracks. Still in a subway, this first yard lead would turn east beneath existing residential and undeveloped parcels. The yard lead would then cross under First Street and again cross under the UPRR right-of-way. The yard lead would resurface on the north side of the UPRR right-of-way and then parallel existing UPRR/ACE tracks east to the yard site. A second yard lead would enter the proposed yard site from the east toward the end of proposed tailtracks. This second yard lead would be sited near the intersection of Mines Road. Figure 2-14 depicts the Portola/Railroad Yard limits.



Source: WSA, 2009.

PORTOLA/RAILROAD MAINTENANCE YARD AREA

FIGURE 2-14

Other Facilities

Because Alternative 3 proposes a subway configuration, there would be other facilities required that are not associated with the at-grade and elevated configurations of the other BART extension alternatives. In particular, the underground design would require ventilation shafts, some of which would operate full time to provide necessary tunnel ventilation, and others which would provide emergency ventilation in the event of a fire in the tunnel. These shafts would extend from the subway facilities below upward onto the street. Along Portola Avenue and Junction Avenue, where the alignment would be a subway, a total of seven ventilation shafts, approximately 20 feet by 20 feet and at least 8 feet above grade, would be located 1) on both sides of the underground platform, 2) at least 1,000 feet from a portal, and 3) no further than 3,000 feet apart.

Estimated Cost

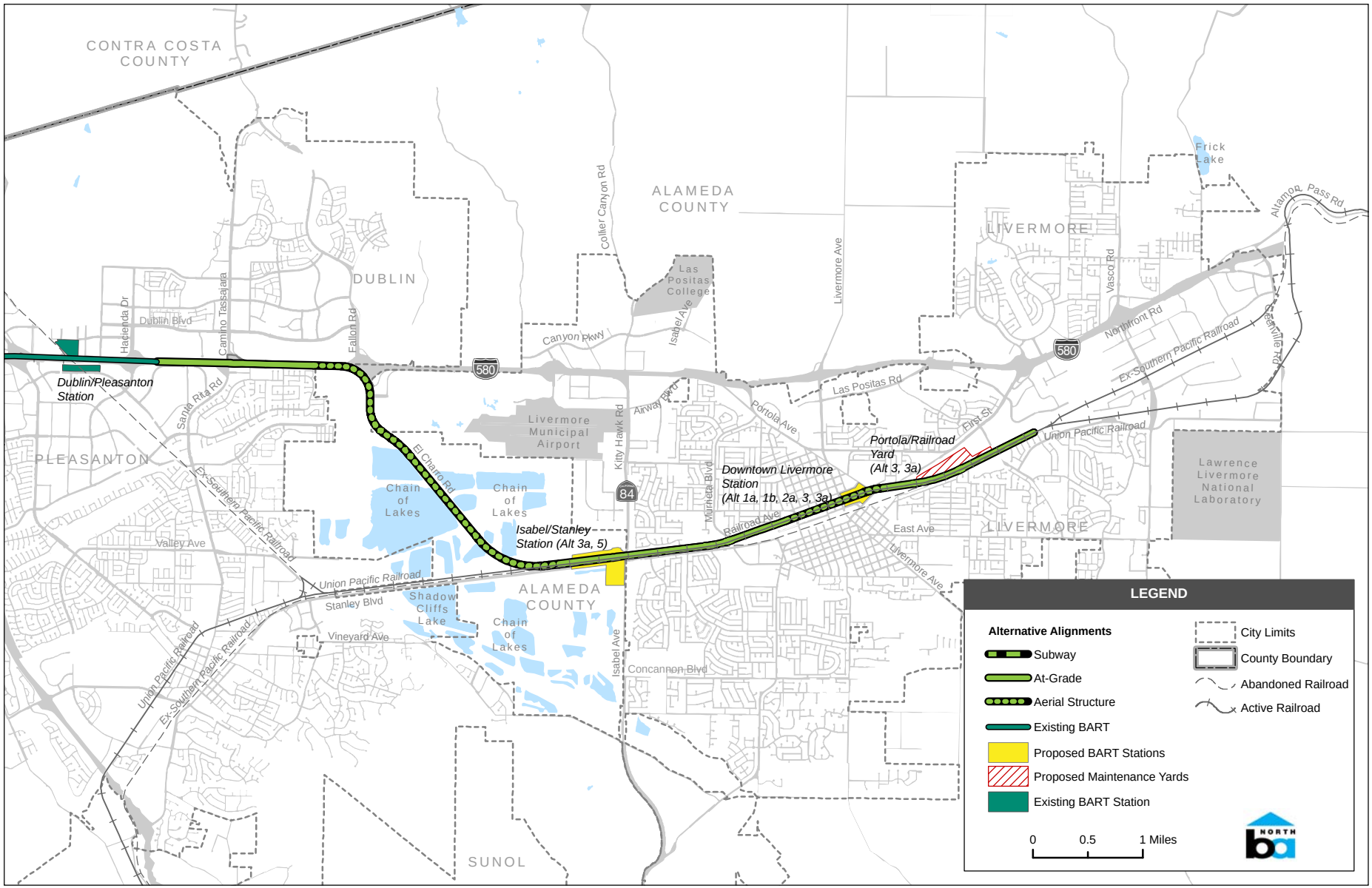
The estimated capital cost for Alternative 3, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,470 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 3a – Railroad

Route

As with all of the other BART extension alternatives, Alternative 3a – Railroad originates at the existing end-of-track of the existing Dublin/Pleasanton Station and proceeds eastward within the median of I-580. The alignment parallels El Charro Road and the UPRR to a station at Isabel/Stanley and then continues along the UPRR to a Downtown Livermore Station. (The route to the Downtown Livermore Station is identical to Alternatives 1a, 1b, and 2a, except that none of these alternatives include an Isabel/Stanley Station.) Alternative 3a includes a total of 7.9 route miles of new BART track (refer to Figure 2-15). Notable features of the horizontal route and vertical profile of Alternative 3a are summarized below.

- Departing the existing end-of-track from the existing Dublin/Pleasanton Station, the alignment would proceed 1.2 miles at-grade before ascending first on retained fill and then transitioning to an aerial structure at 1.4 miles.
- Proceeding in an aerial structure, the alignment would angle southeast and cross over the I-580 eastbound right-of-way to parallel El Charro Road at 2.1 miles from the point of origin.
- Continuing in an elevated guideway, the alignment would proceed southeast along the west side of El Charro Road and pass over existing lands abutting the Arroyo Mocho and the Chain of Lakes Flood Control Project under the management of Zone 7 Water Agency.



Source: AECOM, May 4, 2009.

ALTERNATIVE 3A - RAILROAD

FIGURE 2-15

- At 3.7 miles from the point of origin, the horizontal alignment begins a turn toward the east to parallel the existing UPRR tracks that adjoin Stanley Boulevard, entering the UPRR right-of-way.
- At 4.6 miles from the point of origin, the alignment would descend from an elevated structure onto retained fill and arrive at the proposed Isabel/Stanley Station situated west of Isabel Avenue (SR-84) and within the UPRR right-of-way.
- Departing the proposed Isabel/Stanley Station, the alignment would proceed east atop retained fill within the UPRR right-of-way. The retained fill would provide vertical separation between the BART tracks and freight rail service.
- The alignment would be located within the northern portion of the right-of-way and would parallel tracks shared by UPRR and ACE. The proposed alignment would proceed on retained fill to approximately the intersection of Ventura Avenue and Western Avenue, where the alignment would ascend in an aerial structure, which would extend through the downtown area to the Downtown Livermore Station. This alternative would be the only alternative that involves an aerial structure through the downtown area. The station platform would be sited at 7.3 miles from the point of origin, and tailtracks would continue farther east beyond the platform before becoming a yard lead.

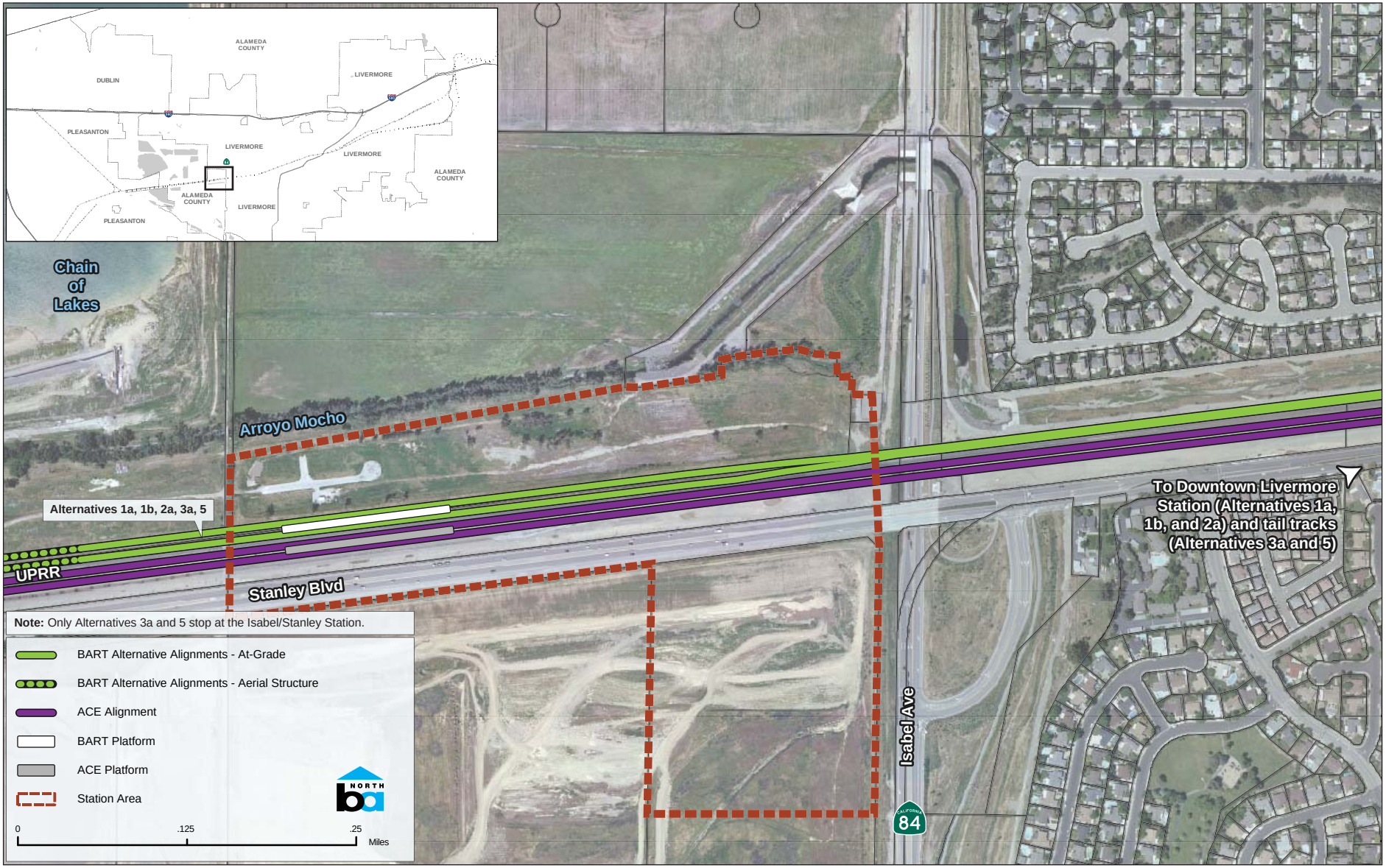
Stations

Alternative 3a would include two stations, Isabel/Stanley and Downtown Livermore.

Isabel/Stanley Station. The Isabel/Stanley Station would be situated within an approximately 33-acre site. East Stanley Boulevard and the UPRR/ACE tracks bisect the site in an east-west direction. The site is bounded on the west by quarry lands, on the north by the Arroyo Mocho, and on the east by Isabel Avenue. Figure 2-16 shows the location and limits of the Isabel/Stanley Station.

Access. Access to the Isabel/Stanley Station would be provided by a roadway extending west from Isabel Avenue opposite an existing intersection that connects Isabel Avenue to Stanley Boulevard. The roadway would be below-grade in a retained cut and would curve north shortly after diverging from Isabel Avenue. The main roadway (and connection to park-and-ride and drop-off facilities) would continue north in a tunnel under Stanley Boulevard and the existing UPRR/ACE and proposed BART tracks. The roadway would then curve west and terminate in a parking structure for BART patrons.

A passenger pick-up/drop-off loop would be located near the station platform. Pedestrian and bicycle access to the station would be provided by the existing walk/bicycle trail running east-west along Stanley Boulevard. A bridge over Stanley Boulevard would connect the walk/bicycle trail and the station facilities south of Stanley Boulevard to the station platforms and parking garage.



Source: WSA, 2009.

ISABEL/STANLEY STATION AREA
FIGURE 2-16

The station would serve as a multimodal transfer point between BART, ACE, and regional bus service. The "Interface with Existing Transit Service" section below describes station transit access in further detail.

Parking. The Isabel/Stanley Station would contain approximately 2,880 commuter parking spaces in a multi-level parking garage on the north side of the existing UPRR/ACE and proposed BART tracks. This parking structure would include up to four levels of parking and a maximum height above grade of about 40 feet. Bicycle racks and storage lockers would also be provided.

Downtown Livermore Station. The Downtown Livermore Station location is the same as described earlier under Alternative 1a; however, the vertical profile would be different since the station platform under this alternative would be elevated instead of at-grade. Access and parking would be similar to the configuration described earlier for Alternative 3. Connections between the at-grade ACE station and the elevated BART platforms would be via stairways, escalators, and/or elevators

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, Alternative 3a is estimated to attract more than 33,600 daily, one-way passenger trips (entrances and exits) to the Isabel/Stanley and Downtown Livermore Stations by the Year 2035. Of these trips, more than 29,700 would be made by new BART riders.

Operational Characteristics

Travel Times. The travel time would be 8.4 minutes from the existing Dublin/Pleasanton Station to the Downtown Livermore Station, including a 30-second stop at the Isabel/Stanley Station.

Interface with Existing Transit Service. Connections between BART and ACE would occur at the Downtown Livermore Station. While both proposed stations could plausibly allow intermodal connections between BART and ACE, it is assumed that since ACE already has a station stop in downtown Livermore, this would be the preferred location for BART-ACE transfers. The Downtown Livermore Station would include adjacent BART and ACE platforms and patrons would be able to change platforms to transfer between services. The Downtown Livermore Station would remain a regional hub for LAVTA bus routes. Selected local LAVTA routes would be redirected to serve the Isabel/Stanley Station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Isabel/Stanley Station or Downtown Livermore Station; however, for ridership modeling purposes, these routes were assumed to continue to serve the existing Dublin/Pleasanton Station. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

Similar to Alternative 3, this alternative would include the Portola/Railroad Yard. The yard would have the same characteristics as those described under Alternative 3.

Estimated Cost

The estimated capital cost for Alternative 3a, inclusive of the guideway, two stations, maintenance yard, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $3,380 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 4 – Isabel/I-580

Route

Alternative 4 – Isabel/I-580 is the shortest alternative being analyzed. Since it does not meet the objective of connecting to ACE, it is envisioned as the first phase of a project with an ultimate connection to ACE at either the Downtown Livermore, Vasco Road, or Greenville East Stations. It would have an alignment similar to the segment of Alternatives 1 and 2 west of the Isabel/I-580 Station. This alternative includes a total of 5.2 route miles of new track within the I-580 median and would terminate at a proposed Isabel/I-580 Station (refer to Figure 2-17). Approximately 5.2 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor for BART operations. Additional width would be required at the Isabel/I-580 Station.

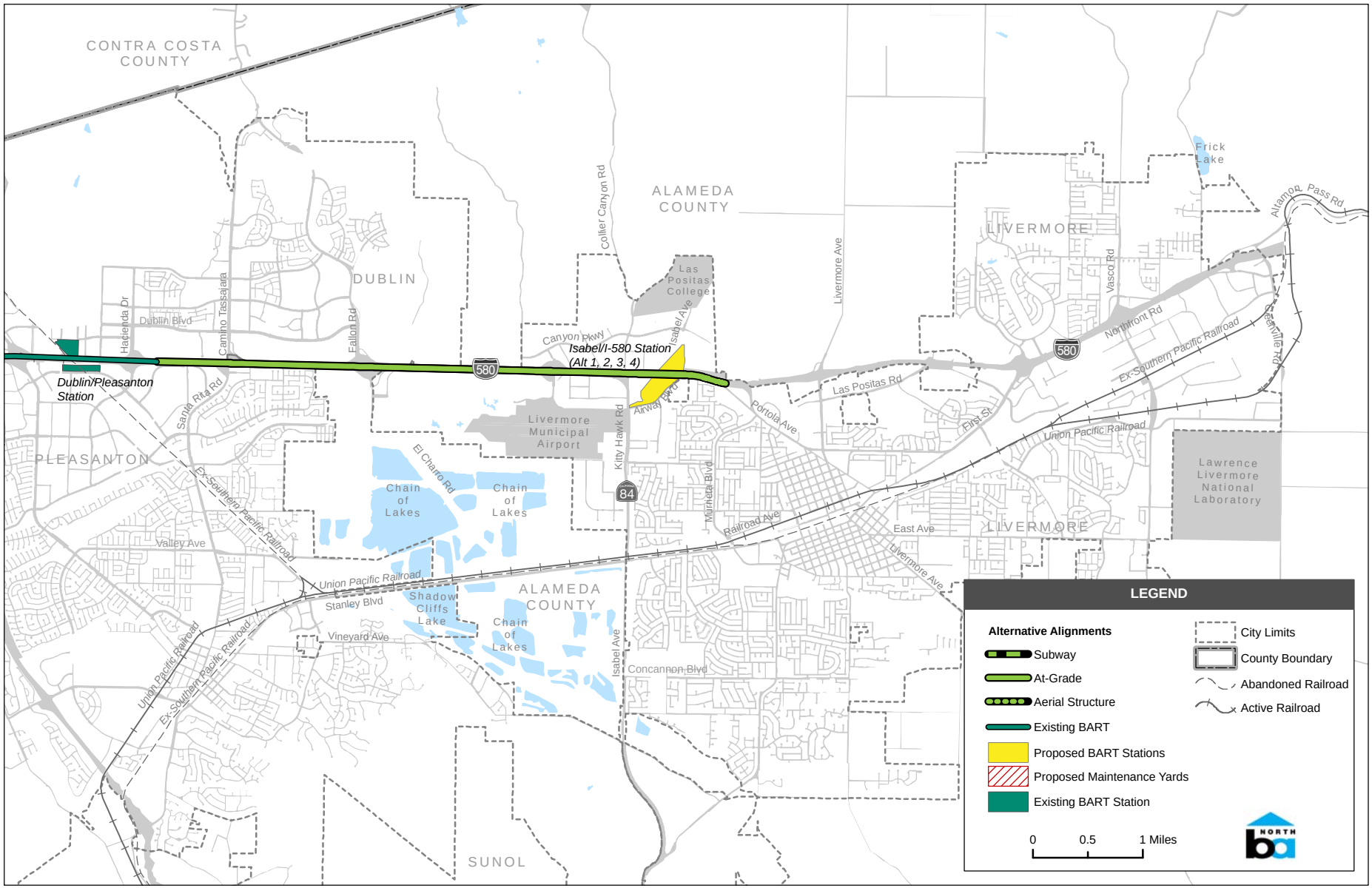
Stations

Alternative 4 would include one station at Isabel/I-580. It is envisioned that this alternative would be the first phase of a two-station extension alternative. This station is similar in configuration, layout, and access to that described earlier under Alternative 1, although as the terminus station for this alternative, it would be designed for more parking than under Alternative 1.

Under Alternative 4, the station would contain 6,625 commuter parking spaces distributed between surface lots and parking garages. The configuration and layout of the parking would be similar to that described for Alternative 1, although the parking supply would be greater, as noted above.

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, the Isabel/I-580 alternative is estimated to attract approximately 25,100 daily, one-way passenger trips (entrances and exits) to the Isabel/I-580 Station by the Year 2035. Of these trips, more than 19,900 would be made by new BART riders.



Source: AECOM, May 4, 2009.

ALTERNATIVE 4 - ISABEL/I-580

FIGURE 2-17

Operational Characteristics

Travel Times. The travel time would be 4.7 minutes from the existing Dublin/Pleasanton Station to the Isabel/I-580 Station.

Interface with Existing Transit Service. The proposed Isabel/I-580 Station would provide an intermodal connection point between BART and regional bus service. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at the Isabel/I-580 Station. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station. Selected local LAVTA routes would be rerouted to serve the Isabel/I-580 Station. This alternative would not provide a connection to ACE service.

Maintenance/Storage Facilities

The Isabel/I-580 alternative would have limited maintenance capabilities. Rudimentary train inspection could be executed on the tailtracks east of the Isabel/I-580 Station. Tailtracks east of the proposed station would be designed to accommodate up to six ten-car trains. More thorough inspection and maintenance would need to occur at one of BART's existing yard facilities within the greater BART network. BART's existing maintenance facilities may not have the space to accommodate these additional vehicles, and BART's current plans to expand and improve its maintenance facilities, do not include provision for the additional vehicles associated with a Livermore extension.

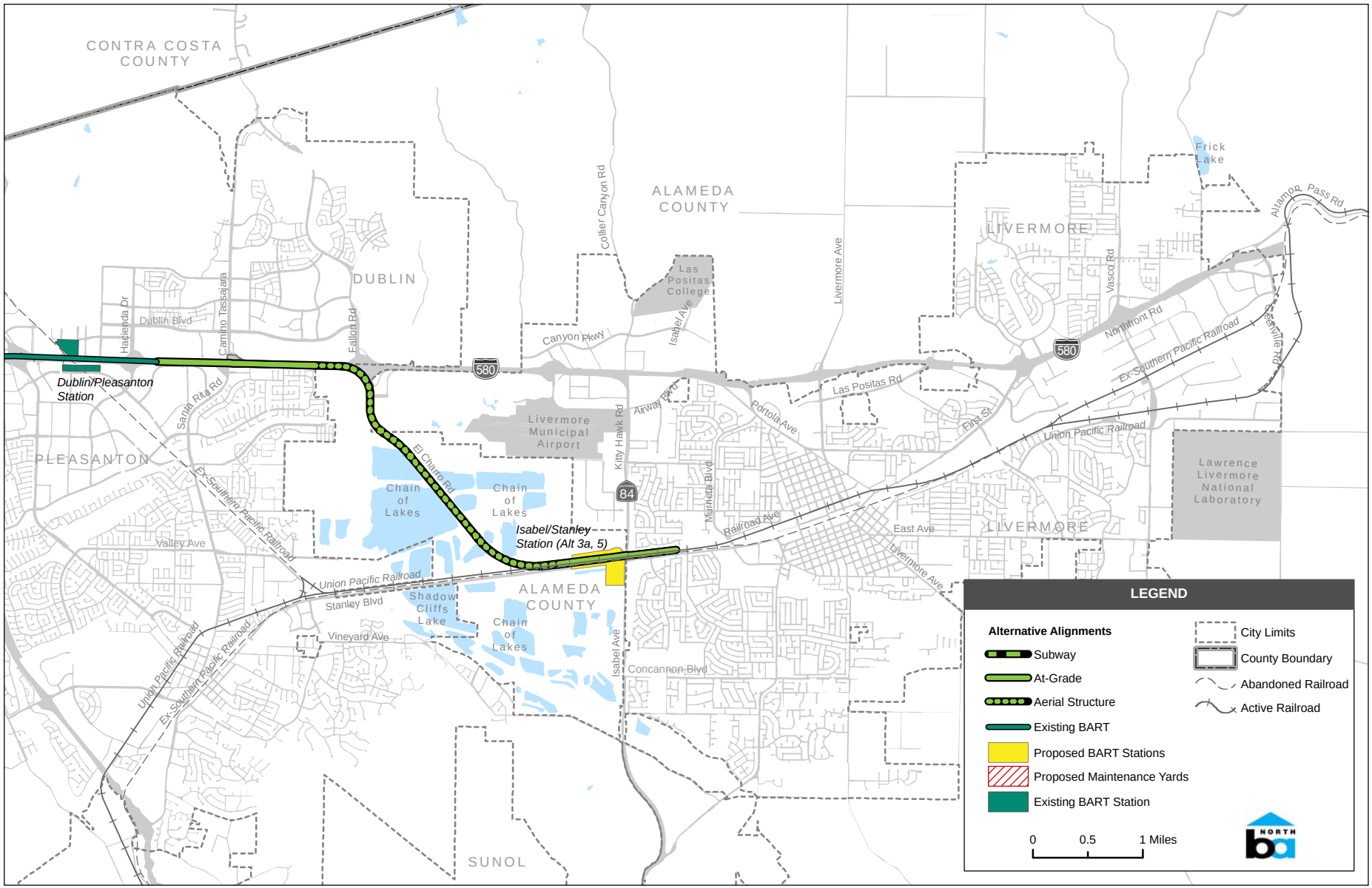
Estimated Cost

The estimated capital cost for Alternative 4, inclusive of the guideway, one station, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $1,120 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Alternative 5 – Quarry

Route

Alternative 5 – Quarry is the second shortest alternative being analyzed with 5.5 route miles of new track. Alternative 5 – Quarry could function as a stand-alone extension offering a connection to ACE. This alternative could also be viewed as the initial phase of an extension along the UPRR corridor. The alternative would support future extensions similar to Alternative 3a – Railroad. Alternative 5 would originate just east of the existing Dublin/Pleasanton Station and proceed eastward within the median of I-580. The alignment would cross over the eastbound lanes of I-580 and proceed south along El Charro Road to the Isabel/Stanley Station (refer to Figure 2-18). Alternative 5 would have a similar alignment to Alternative 3a; however, this alternative would end at the proposed Isabel/Stanley



Source: AECOM, May 4, 2009.

ALTERNATIVE 5 - QUARRY

FIGURE 2-18

Station. Under this alternative, approximately 1.7 miles of I-580 would require widening to provide the necessary 46-foot-wide corridor for BART operations.

Stations

Alternative 5 would have one station at Isabel/Stanley, which was previously described under Alternative 3a (see Figure 2-16 for the station area). This station is similar in configuration, layout, and access to that described earlier under Alternative 3a, although, as the terminus station for this alternative, it would be designed for more parking than under Alternative 3a.

Under Alternative 5, the Isabel/Stanley Station would contain 3,575 commuter parking spaces distributed between a combination of surface lots and structured facilities. The configuration and layout of the parking would be similar to that described for Alternative 3a, although the parking supply would be greater, as noted above.

Projected Ridership

Assuming full completion of programmed roadway and transit improvements within the study area, the Quarry alternative is estimated to attract approximately 23,100 daily, one-way passenger trips (entrances and exits) to the Isabel/Stanley Station by the Year 2035. Of these trips, more than 20,800 would be made by new BART riders.

Operational Characteristics

Travel Times. The travel time would be 5.6 minutes for the nonstop trip between the existing Dublin/Pleasanton and Isabel/Stanley stations.

Interface with Existing Transit Service. The proposed Isabel/Stanley Station would provide intermodal connections between BART and ACE service. The station would include adjacent BART and ACE platforms and passengers would be required to change platforms to transfer between trains. It is also assumed that the existing Vasco Road ACE Station would remain in service, meaning that the Isabel/Stanley Station would represent an additional ACE stop. The traffic analysis assumes reallocation of traffic related to new ACE service at the Isabel/Stanley Station. Selected LAVTA routes would be reconfigured to supplement existing bus service in the vicinity of this station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Isabel/Stanley Station; however, for ridership modeling purposes, these routes were assumed to continue to serve the existing Dublin/Pleasanton Station. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station.

Maintenance/Storage Facilities

Alternative 5 would have limited maintenance capabilities. Rudimentary train inspection could be carried out on the tailtracks east of the Isabel/Stanley Station. Tailtracks east of the proposed station would be designed to accommodate up to seven ten-car trains east of the proposed station. More thorough inspection and maintenance would need to occur at one of BART's existing yard facilities within the greater BART network. BART's existing maintenance facilities may not have the space to accommodate these additional vehicles, and BART's current plans to expand and improve its maintenance facilities, do not include provision for the additional vehicles associated with a Livermore extension.

Estimated Cost

The estimated capital cost for Alternative 5, inclusive of the guideway, one station, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.), would be $1,610 million (in 2009 dollars). Additional information on the components of this capital cost estimate is available in Appendix B.

Common Elements Among the BART Extension Alternatives

The BART extension alternatives each propose different alignments, but all share common characteristics in terms of operating hours, headways, fares, safety requirements, and applicability of BART Facility Standards and sustainable principles.

Conversion of End-of-Line Track to Revenue Service

Each of the BART extension alternatives considered in this Program EIR would require the conversion of existing BART end-of-line track to revenue service. BART's tailtracks east of existing Dublin/Pleasanton Station currently extend east of the Hacienda Drive overpass and are used for train storage. Minor work would be required to eliminate an in-track inspection pit and modify signage. The train control system would be modified from the train control room through the station and existing tailtracks in order to extend controls to the east from this segment.

Interstate 580 Widening

Each of the BART extension alternatives considered in this Program EIR would proceed eastward from the existing system terminus at existing Dublin/Pleasanton, which is situated within the I-580 median. Under Caltrans' improvement scenarios for I-580 through 2035 and described in the regional transportation plan, the freeway median is not sufficiently wide east of the existing terminus to accommodate BART track and/or additional freeway-median stations. BART construction requires a minimum 46-foot width between eastbound and westbound freeway lanes to allow train operation in each travel direction, including allowances for outboard retaining walls where necessary and continuous security fencing.

Therefore, all the alternatives require some degree of freeway widening to permit BART track and/or stations to be constructed within the freeway median. Widening would begin near the end of existing tailtracks east of the Hacienda Drive overpass. The maximum length of freeway widening (10.1 miles) occurs under Alternative 1 – Greenville East, where nearly the entire length of the BART extension would occupy the I-580 median. The widening associated with this alternative would require that three overcrossings of I-580 be rebuilt: Vasco Road, First Street, and Las Colinas Road. Several of the other overcrossings would need their abutments modified, and portions of frontage roads would have to be relocated to the north or south of the freeway: Croak Road, Kitty Hawk Road, Las Colinas Road, Freisman Road, Collier Canyon Road, Airway Boulevard, and Southfront Road. This amount of widening takes into account the current plans for the ultimate lane configuration of the freeway as developed by the Alameda County Congestion Management Agency. This ultimate configuration may not fully consider the implications of additional freeway modifications, such as the proposed eastbound and westbound High Occupancy Toll (HOT) Lane projects, which are currently under consideration. These projects, if programmed and funded, could result in additional right-of-way and widening requirements.

Alternatives 1a, 1b, 2a, 3a, and 5 would require the least amount of widening; the length of freeway would be widened by approximately 1.7 miles.

The I-580 freeway is under Caltrans' jurisdiction. Caltrans, BART, and the Alameda County Congestion Management Agency would all share in the responsibility for the widening that would be required in conjunction with the construction of the widened median for a BART extension. Until the actual timing and phasing of the required widening of the freeway, reconstruction of overpasses, and design of the guideway for the BART extension are fully understood, it is not clear which agency would lead each element of the construction.

Yard and Maintenance Facilities

Seven of nine BART extension alternatives would incorporate construction of new yard and maintenance facilities within the study area. The two shorter, single-station alternatives (Alternative 4 – Isabel/I-580 and Alternative 5 – Quarry) would not include new storage/maintenance facilities, but these activities would need to be accommodated at other yards throughout the BART system. There are three potential yard sites considered in this Program EIR: Greenville Yard (Alternatives 1, 1a, and 1b), Vasco Yard (Alternatives 2 and 2a), and Portola/Railroad Yard (Alternatives 3 and 3a). The specific activities and operations that would be carried out at these facilities are described below.

All proposed maintenance facilities would serve two general purposes: 1) cleaning, maintenance, and storage of BART train cars, and 2) major repair and overhaul functions, involving body damage, wheel and truck assemblies, electromagnetic systems (e.g., door mechanisms, brakes), and electronics (e.g., train control and communications equipment). In order to provide for these functions, several buildings and numerous transfer and storage tracks would be constructed in a yard facility. Typical buildings and facilities would include a car wash building, control tower, inspection pit, blowdown facility, wheel truer, revenue vehicle maintenance facility, vehicle turn table, a possible non-revenue

vehicle maintenance facility, and a material storage area. The structures would vary in height from one to two stories to up to three stories for the yard control tower.

In an effort to manage the existing and future maintenance and storage needs of revenue vehicles, BART has recently initiated a comprehensive Strategic Maintenance Program (SMP) for the BART system. The SMP is a change in BART maintenance scheduling and activities. It will also have an effect on how the BART yard and shop facilities are designed, operated, and expanded in the future.

Depending on the outcome of radio analyses conducted during final engineering, a 100-foot-tall radio communications antenna may be necessary at the storage/maintenance facility to communicate with other facilities in the system. The antenna would most likely be of monopole design.

Operating Hours and Headways

Current BART passenger service to the existing Dublin/Pleasanton Station is provided by the Millbrae – Dublin/Pleasanton (Blue) Line. The Millbrae – Dublin/Pleasanton Line trains operate every 15-minutes on weekdays, on 20-minute headways from 6:00 a.m. to 6:30 p.m. and 15-minute headways from 6:30 p.m. to midnight on Saturdays, and 15-minute headways on Sundays and holidays.[6] BART service to the existing Dublin/Pleasanton Station operates during the following hours:

- Monday through Friday: 4:00 a.m. to midnight;
- Saturday: 6:00 a.m. to midnight; and
- Sunday/holidays: 8:00 a.m. to midnight.

The BART Livermore extension (inclusive of all of the BART extension alternatives) would initially operate with the same hours of operation as current BART service. Because trains serving the BART extension alternatives would operate as an extension of existing BART service between existing Dublin/Pleasanton and Millbrae Stations, they would be run with the same headways. The proposed operating plan assumes one operating service scenario beginning opening day, which would be adjusted to serve demand. For the Year 2035, it is planned that the BART system would operate at 12-minute headways during all hours of passenger (revenue) service. To accommodate operating headways and passenger demand within the expanded system, BART estimates that a one-station alternative would require between 54 and 57 additional railcars and a two-station alternative would require between 74 and 90 railcars.

Fares

BART's existing distance-based fare structure and fare collection technology has been calculated for all the BART extension alternatives. Prospective fares assigned to each alternative would be collected based on the distance-fare formulae in place at the time the service is initiated. A representative

[6] BARTs operating schedule accessed July 22, 2009. BART 20-minute weeknight and weekend headways begin September 1, 2009.

sample of proposed fares between stations considered among the alternatives is provided in Table 2-3. The current fare for trips within the Tri-Valley area would be $1.50 including trips to the new West Dublin/Pleasanton Station.

BART's current fare policy is to increase fares by the consumer price index (rate of inflation) minus 0.5 percent every two years or every other January.

Table 2-3
BART to Livermore Extension Fare Estimates

Origin	Destination	Base Passenger Fare (one-way)
Greenville East	Dublin /Pleasanton	$1.50
Greenville East	Embarcadero	$5.85
Greenville East	San Francisco Airport	$8.25
Downtown Livermore	Dublin /Pleasanton	$1.50
Downtown Livermore	Embarcadero	$5.65
Downtown Livermore	San Francisco Airport	$8.05

Source: WSA, 2009.

Safety Requirements

Federal Railroad Administration (FRA). Several of the alternatives considered in this Program EIR are proposed to share existing rights-of-way with freight/commuter rail tracks and services. Traffic on these existing rail tracks is restricted to only those rail cars that comply with the Federal Railroad Administration's (FRA) standards for crashworthiness and other performance measures. BART trains typically operate in exclusive and fully grade-separated rights–of-way and therefore do not require compliance with FRA safety standards. When rail vehicles of different crashworthiness are proposed to operate within proximity of one another, the FRA has established design and construction requirements to safely segregate these vehicles and limit unexpected intrusions, such as dragging train equipment or derailed vehicles, which could create a dangerous situation.

One general design requirement to elevate operating safety within common corridors is to provide a vertical separation between the track beds of freight/commuter rail and other rail services of lesser crashworthiness. A vertical separation of 6 feet or more may provide protection for lighter train cars should a heavy rail vehicle overturn or derail along the route of travel. This design principle has been applied to all BART alternatives when an alignment is proposed to occupy a shared-use common corridor with existing freight rail tracks.

As an additional measure of protection, BART extension alternatives would incorporate an intrusion detection system to alert BART operations of a potential derailment or other encroachment that could

affect safe travel within a shared-use common corridor. The system consists of two, redundant subsystems that together provide a highly reliable system with low incidence of false alarms.

The first subsystem uses closed-circuit television cameras and special motion detection software to detect an intrusion across the common boundary. The cameras would be installed on poles located along the alignment from approximately 500- to 1,000-foot intervals under each alternative where BART occupies an existing freight rail right-of-way. The poles would be approximately 15 to 25 feet above the top-of-rail, and each pole would support two cameras facing in opposite directions. The cameras would provide a narrow view angle aligned with the railroad right-of-way fence and focused on the BART travel paths. This narrow focus would ensure that areas beyond the railroad right-of-way would not be within view.

The second subsystem uses continuous loops of cable located in the right-of-way fence to determine if there has been an intrusion. Any intrusion by a freight train would change the circuit characteristics of the in-fence loops, triggering an alarm.

Union Pacific Commuter Access Principles. All of the alternatives except Alternative 4 – Isabel/I-580 would potentially involve use of portions of the existing UPRR right-of-way. When contacted regarding about future BART operations near or within the UPRR right-of-way, the UPRR provided a document entitled *Union Pacific Commuter Access Principles*. This document sets forth UPRR guidelines regarding the use of their right-of-way and rail facilities by commuter rail services. The BART extension alternatives will not utilize existing UPRR rail facilities because BART requires its own exclusive rail guideway. However, with the exception of Alternative 4, all of the alternatives would locate the BART guideway and some of the stations partially or entirely on UPRR right-of-way. In these situations, the Union Pacific Commuter Access Principles state:

> Passenger safety is best protected by separating freight and passenger tracks by 50 feet or more. Despite UP's enormous progress in preventing freight train derailments, derailments will occur and could strike or be struck by passenger trains. Research demonstrates that most freight train derailments will remain within a 100-foot corridor.

While the UPRR document is not a state or federal regulation or standard, strict interpretation of this guideline would indicate that a BART extension could not utilize the UPRR right-of-way where the width of the right-of-way is 100 feet or less. While some portions of the UPRR right-of-way in the study area are wider than 100 feet, much of the right-of-way in and around the Downtown Livermore area and between the Vasco Road area to the vicinity of I-580 near Greenville Road is 100 feet or less in width. The design concepts used to develop the alternatives in the UPRR right-of-way involve a cross-section that the UPRR previously approved for the BART Warm Springs Extension Project. These concepts also satisfy all known state and federal requirements for rail safety and operations. However, these concepts do not satisfy the new UPRR principle above which represents an obstacle to the implementation of those alternatives which use the UPRR right-of-way. The environmental implications of responding to the Union Pacific Commuter Access Principles are acknowledged and generally discussed in each of the impact topic areas in Section 3, Environmental Analysis, of this document.

Grade Separation

Given its high speed, frequency of service, and electric third rail propulsion, BART technology requires a fully grade-separated right-of-way. This separation constitutes a physical isolation from all other modes of transportation, including autos, bicycles/pedestrians, other forms of public transit, and freight railroads (as detailed in the Safety Requirements section above). This separation includes such measures as aerial structures, retained cuts/fills, and tunnels, the employment of which has been described throughout the BART extension alternatives discussion, and illustrated in Figure 2-19. Additionally, fencing or walls would be used along at-grade, retained cut/fill, or freeway median segments. It is assumed that in any instance where an at-grade intersection currently exists between a proposed BART right-of-way and an existing roadway, a roadway over/underpass would be constructed or the road would be truncated on either side of the BART right-of-way.

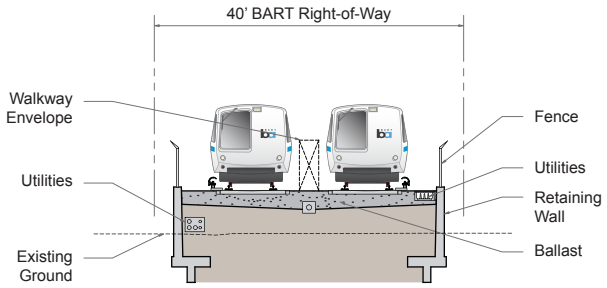
Sustainability

The BART extension alternatives represent an opportunity to implement sustainable design that can take advantage of energy conservation, alternative energy systems, stormwater management, and judicious material selection in innovative ways that were not available when the original BART system was constructed. The proposed station sites and maintenance facilities would incorporate a number of sustainable elements into the design and a variety of other sustainable practices are being considered. Determination of which sustainable practices would be included in the selected alternative would be made during final design.

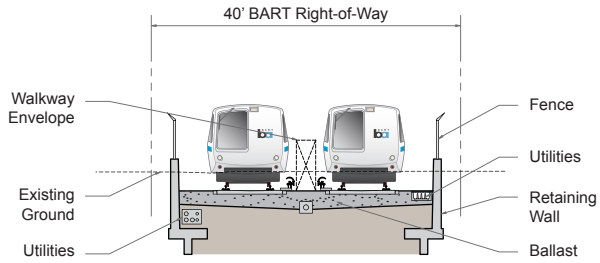
The project design could include the following features:

- High-efficiency lighting and lighting control methods to reduce electricity consumption;
- Reduction in light spillage (and energy) through use of appropriate fixtures and lower lumens;
- Energy efficient systems where feasible, such as solar hot water, more efficient HVAC (heating, ventilation and air conditioning) and vertical transportation; and use of meters to track energy use;
- Sustainable landscaping using xeriscaping and drought-tolerant plants and recycled water where available;
- Swales to treat runoff from parking lots and other hardscape areas;
- Waste management and recycling;
- Use of recycled materials where feasible;
- Electric car charging ports;
- Photovoltaics to generate electricity and reduce reliance on the power grid;
- Lighter color aggregate for parking lots and other paved surfaces to reduce the heat island effect;
- Other cool pavement technologies where feasible;

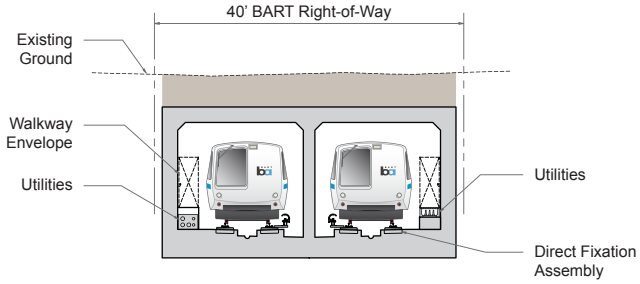
Retained Fill
Ballasted Track



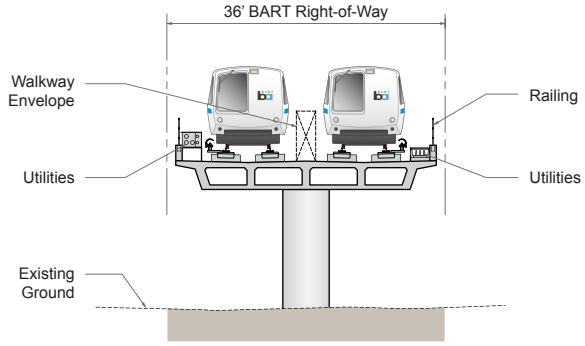
Retained Cut
Ballasted Track



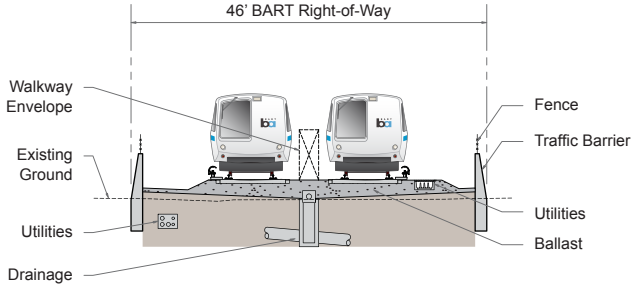
Cut and Cover Tunnel
Direct Fixation Track



Aerial Structure
Direct Fixation Track



At-Grade
Ballasted Track



Source: AECOM/WSA, 2009.

TYPICAL BART GUIDEWAY CROSS-SECTIONS
FIGURE 2-19

- Signage used as an educational tool to indicate that sustainable practices are in use; and
- Other sustainable technologies or practices that become feasible or required by the time the system is in final design.

2.4 ALTERNATIVES CONSIDERED BUT WITHDRAWN

Background

As noted in Section 1, BART has long considered extension of BART services to Livermore. The current effort is the most recent in a long history of extension planning studies. At the outset of the current investigation, BART and its team of transportation planners reviewed these background studies and engaged the public in a scoping process to solicit input into both the issues and alternatives that should be considered in this Program EIR. The result of this exercise was a long list of possible alternative routes and station locations eastward from the existing Dublin/Pleasanton Station through the Livermore Valley. This section describes the alternatives that were considered but were withdrawn from further investigation in this Program EIR, as required by CEQA Guidelines Section 15126.6 which states that:

> The EIR should briefly discuss the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination. Additional information explaining the choice of alternatives may be included in the administrative record. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts.

Alternatives Evaluation Process

Initial ideas for alternatives were subject to a careful screening process, the purpose of which was to identify those alternatives worthy of further study and consideration. The planning team developed a series of evaluation criteria and measures to help with the screening process. These criteria and the corresponding measures are enumerated in Table 2-4.

Each of the alternatives was rated on a scale: High, Medium High, Medium, Medium Low, and Low. The most "viable" candidate alternatives, as determined through this exercise and discussions with BART's local stakeholders, as those described earlier in Section 2.3, BART Extension Alternatives, and evaluated in Section 3, Environmental Analysis, Section 4, Other CEQA, and Section 5, Program Merits, of this document.

Table 2-4
BART to Livermore Extension Program
Alternatives Screening Criteria

Evaluation Criteria	Measures
Costs/Construction	Total Costs Costs/Mile
Environmental	Disturbance to biological resources
Ridership Potential	Surrounding land uses, local access to stations and potential to capture traffic from I-580
Right-of-Way	Availability of right-of-way/land acquisition
Land Use	Land use compatibility
TOD Potential	Supportive General Plan land use policies and land use designation
ACE/High-Speed Rail Connections	Ease of connections and transfers
BART Operations	Satisfies BART operating requirements

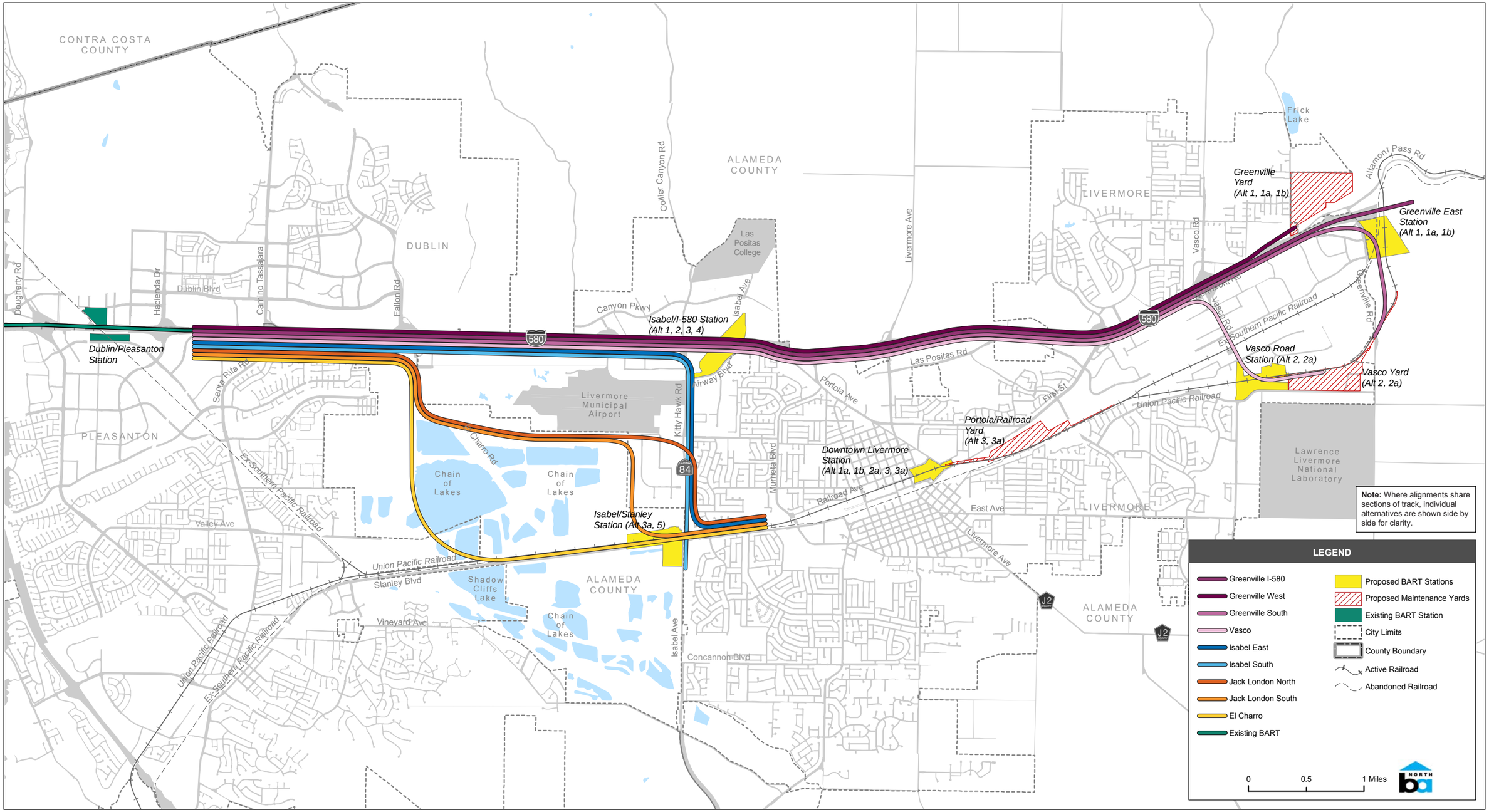
Source: WSA, 2009.

Previously Identified Alternatives and Reasons for Exclusion from Further Consideration in this Program EIR

Those alternatives that were withdrawn from consideration are illustrated in Figure 2-20, and the reasons for finding them to be less effective are presented below. The ratings assigned to these alternatives based on the screening process described above are presented in Figure 2-21.

Greenville I-580

This alternative proposed extending BART approximately 10.8 miles along I-580 to Greenville Road with stations at Isabel/I-580 and a median station at Greenville/I-580. This alternative was rejected on the basis that a median station at Greenville/I-580—which would need to be situated in an elaborately constructed retained cut or tunnel due to the slope of Altamont Pass—would require substantial engineering work, would necessitate a long walk to transfer between BART and ACE, and might be difficult for I-580 commuters to locate from the freeway given its subterranean configuration. Also, the nearby Greenville East Station offered similar levels of accessibility and potential for transit-oriented development and would have a connection between BART and ACE, making it preferable to the Greenville I-580 option.

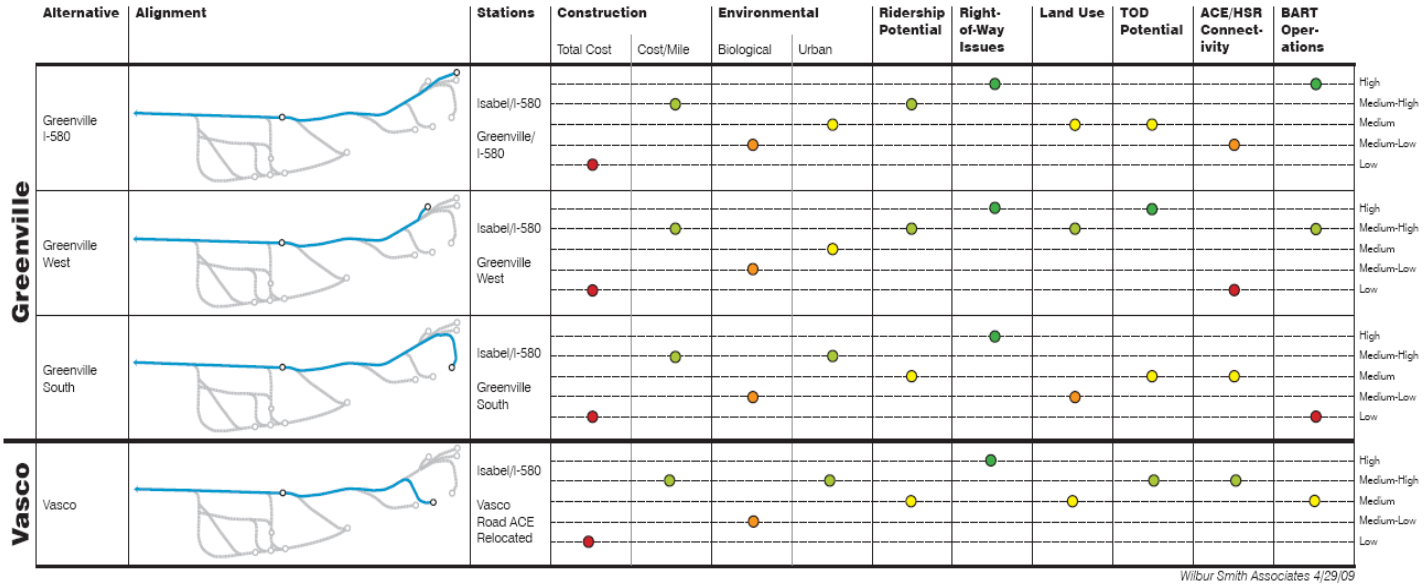


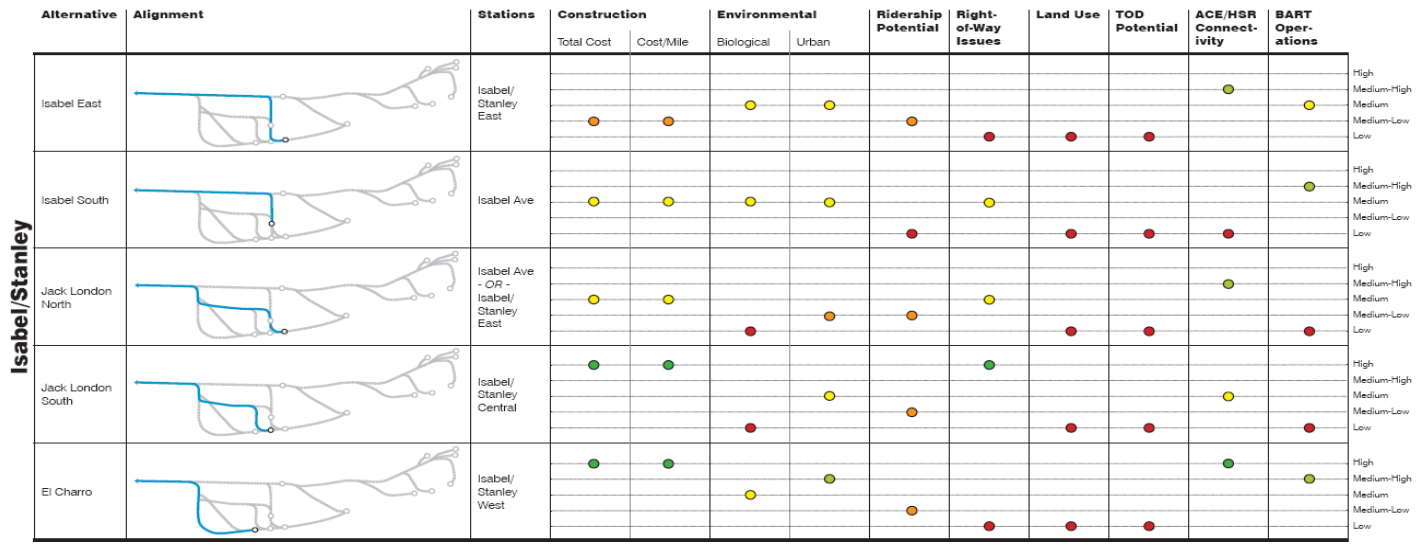
Source: AECOM, May 4, 2009.

BART TO LIVERMORE EXTENSION ALTERNATIVES CONSIDERED AND WITHDRAWN

FIGURE 2-19

Figure 2-21 Screening of Alternatives Considered but Withdrawn





Source: WSA, 2008.

Greenville West

This alternative would extend approximately 10 miles along I-580 to approximately Herman Avenue with stations at Isabel/I-580 and a north-of-freeway station between Herman Avenue and Laughlin Road. This alternative was rejected on the grounds that, while a station between Herman Avenue and Laughlin Road would be well-positioned for transit-oriented development, neither the terminus station nor Isabel/I-580 would allow transfers between BART and ACE. Also, the nearby Greenville East Station offered similar levels of accessibility and potential for transit-oriented development and would have a connection between BART and ACE, making it preferable to the Greenville West option.

Greenville South

This alternative would extend BART along I-580 to Greenville Road, then south along Greenville Road to the UPRR with stations at Isabel/I-580 and Greenville/UPRR. While this alternative would facilitate a connection between BART and ACE, it was rejected because other alignments would offer a similar connection to ACE with a shorter overall constructed length; the Greenville South length of approximately 11.6 miles was one of the longer of the Greenville alternatives considered. The alignment would also have impaired travel speeds for BART trains due to sharp curves. Further, it seemed impractical to extend BART to Greenville Road via I-580 and not provide a station within close proximity to the freeway.

Vasco Road

The approximately 11.2-mile Vasco Alternative would extend along I-580 as far as Vasco Road, and then would follow Vasco Road south to the UPRR. Here, the alternative would veer east and follow the UPRR right-of-way to a station shared with ACE east of the existing Vasco Road ACE Station. The Vasco Alternative would also include an Isabel/I-580 Station. This alternative was rejected because its alignment would interfere with an approved housing development, have impaired travel speeds due to sharp curves, and worsen connections to Lawrence Livermore National Laboratory at the relocated Vasco Road ACE Station.

Isabel East

This alternative, approximately 6.5 miles in length, proposed extending BART along I-580 as far as Isabel Avenue, where the alignment would curve south and follow Isabel Avenue to the UPRR. The alternative would proceed east along the UPRR right-of-way to a station east of the Isabel Avenue/East Stanley Boulevard intersection, at which point connections to ACE would be possible. This alignment was rejected given that it would require considerable tunneling to pass through the Livermore Municipal Airport's flight paths and to turn between Isabel Avenue and the UPRR right-of-way. This latter tunnel would result in residential displacements. Further, existing roadway and land use configurations as well as adjacent quarry lands severely constrain station area access, parking, and transit-oriented development potential. In general, this station site was found to not perform as well as a station located north of Stanley Boulevard and west of Isabel Avenue.

Isabel South

The 6.2-mile Isabel South Alternative would extend BART along I-580 to Isabel Avenue and then follow Isabel Avenue south to a station along Isabel Avenue between Jack London and East Stanley Boulevards. This alternative was rejected on the grounds that it would require considerable tunneling to pass through the Livermore Municipal Airport's flight paths, and would not allow for convenient transfers between BART and ACE because it is south of Stanley Boulevard and the ACE station would be north of Stanley Boulevard. Additionally, existing roadway and land use configurations as well as adjacent quarry lands considerably inhibit station area access, parking, and transit-oriented development potential. In general, this station site was found to not perform as well as a station located north of Stanley Boulevard and west of Isabel Avenue.

Jack London North

The Jack London North Alternative, an approximately 6 mile BART extension, would follow I-580 as far as El Charro Road, and then would curve south along El Charro Road and east to Jack London Boulevard, passing between Livermore Municipal Airport and quarry lands. The alignment would proceed south from Jack London Boulevard onto Isabel Avenue and would terminate either at a station along Isabel Avenue between Jack London and East Stanley Boulevards or at a station along the UPRR east of the Isabel Avenue/East Stanley Boulevard intersection. This alignment was rejected because it would traverse lands presently intended or leased for mining purposes. Additionally, if the station east of the Isabel Avenue/East Stanley Boulevard intersection were selected, required tunneling would result in residential displacements. The station on Isabel Avenue between Jack London and East Stanley Boulevards would also not enable convenient transfers between BART and ACE, as the BART and ACE stations would be separated by several hundred feet. Sharp curves would also hinder travel speeds along this alignment. Lastly, existing roadway and land use configurations present significant limitations to station area access, parking, and transit-oriented development potential.

Jack London South

The approximately 5.7-mile Jack London South Alternative would follow I-580 as far as El Charro Road, and then would curve south along El Charro Road and east toward Jack London Boulevard, but, unlike the Jack London North Alternative, would angle south approximately one-half mile before reaching Isabel Avenue. The Jack London South Alternative would follow this alignment and then curve eastward and follow the UPRR to a station at the intersection of Isabel Avenue and East Stanley Boulevard, where transfers to ACE would be possible. This alternative was rejected because it would traverse lands presently intended or leased for mining purposes. Additionally, sharp curves would hinder travel speeds along this alignment and existing roadway and land use configurations would present significant limitations to station area access, parking, and transit-oriented development potential.

El Charro

The approximately 5.5-mile El Charro Alternative would parallel I-580 to the vicinity of El Charro Road. The alignment would then angle south to follow El Charro Road to the point where El Charro Road angles southeast. The El Charro Alignment would proceed south along a north-south trajectory currently occupied by Busch Road. The alternative would then swing east to join the UPRR and would follow this alignment to a station west of the Isabel Avenue/Stanley Boulevard intersection, where BART-to-ACE transfers would be possible. This alternative was rejected because it would traverse lands presently intended or leased for mining purposes and it would conflict with the City of Pleasanton's planned El Charro realignment. This alignment along the currently private Busch Road, which traverses a narrow levee, would not allow ample space for a new four-lane roadway as well as BART. Existing roadway and land use configurations in the Isabel Avenue/East Stanley Boulevard station area would also present significant limitations to station area access, parking, and transit-oriented development potential.

Other Alternatives that were Considered

Prior to the formal scoping of this Program EIR, BART staff met with representatives of the City of Tracy, the San Joaquin Council of Governments (SJCOG), and the San Joaquin Regional Rail Commission (SJRRC) to determine the level of interest in considering a future extension of BART east of Livermore over the Altamont Pass to San Joaquin County as one of the alternatives. Similarly, during the scoping process, there was a suggestion to focus on extending BART directly to the Central Valley rather than devote effort to providing for a BART-ACE connection. While the City of Tracy's representatives expressed some interest in a potential BART extension, the representatives of the SJCOG and the SJRRC noted that their current policies and program objectives all involve efforts to support the continued operation and improvement of the ACE commuter rail service that links San Joaquin County with the Bay Area. In fact, San Joaquin County's 2011-2041 $2.552 billion Measure K transportation sales tax measure only includes a total of $295 million in funding for commuter rail transit (i.e., ACE) related projects and of this total, approximately $20 million could be available as a local match for a potential BART-ACE Intermodal Station in Livermore. It is also important to note that because San Joaquin County is not part of the original BART District, the county would have to pay for the full cost of the extension and the cost of impacts to the existing BART system in order for the extension to be constructed. Because the county agencies did not express interest in altering their objectives to fund a BART extension, a BART extension to San Joaquin County was not included in this Program EIR. It should be further noted that none of the alternatives evaluated in this Program EIR would preclude a future BART extension into San Joaquin County should that be desired in the future and the appropriate agencies could agree on how such an extension could occur and be funded.

During the scoping process, several alternative station sites beyond those already consider at that point were suggested as follows:

- A station close to the North Livermore Avenue exit with shuttle buses to and from the city center of Livermore - this station was considered but rejected because the potential Isabel/I-580 Station is very accessible from downtown via North Livermore Avenue and Portola Avenue.

Bus connections would be provided between downtown and the Isabel/I-580 Station. Also, because the area at North Livermore Avenue (south of the freeway) is developed, the station site would have to be north of the freeway which is outside the City's Urban Growth Boundary that would limit the potential for station area development.

- Stations at Vasco Road, East Livermore, and West Livermore, and North Flynn Road – several of the alternatives under consideration would include a station at Vasco Road at the existing ACE station. A Vasco Road Station at I-580 was considered but this location is very close to the Greenville Road Station site and it would not allow for a connection to ACE, which is one of the primary objectives of a BART to Livermore Extension. The Isabel/I-580, the Vasco Road, or the Greenville East Stations, which are considered in this Program EIR, serve West and East Livermore, respectively. A station at North Flynn Road would require the BART extension to traverse a major portion of the western grade of the Altamont Pass and it would be located on agricultural lands. It would only serve travelers from the east, and would provide no service to Livermore. All of these functions would be better served by the Greenville East Station.

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Section 3
Environmental Analysis

3.1 INTRODUCTION TO ENVIRONMENTAL ANALYSIS

Introduction

This section presents an overview to the environmental analysis chapter, and provides background information that will assist the reader in understanding the analysis. First, the study area is described. Next, the organization of the environmental analysis is described, as well as the methodology used to determine, classify, and present the environmental impacts of the BART extension alternatives.

Study Area

The study area for the BART extension alternatives lies in eastern Alameda County, California; specifically, the study area for the alternatives encompasses the Amador, Livermore, and San Ramon Valleys, collectively known as the "Tri-Valley" area (see Figure 1-2 in Section 1, Introduction).

As shown in Figure 1-2, the study area includes the Interstate 580 (I-580) corridor, running from the east end of the existing Dublin/Pleasanton BART Station, past portions of the cities of Dublin, Pleasanton, and Livermore, to unincorporated Alameda County just beyond the eastern boundary of the City of Livermore. Generally, the northern limits of the study area include the north side of the I-580 right-of-way, and the southern limits include the Union Pacific Railroad (UPRR) right-of-way used by the Altamont Commuter Express (ACE) and freight trains. Figure 1-3 (in Section 1, Introduction) shows the alignments, or routes, of the proposed BART extension alternatives through the study area. All of the alignment alternatives would extend eastward from the existing BART tailtracks east of the Dublin/Pleasanton BART Station in the median of I-580 (just east of the Hacienda Drive interchange). From the I-580 corridor, five of the nine alternatives diverge from I-580 at El Charro Road and follow a southeasterly route toward the UPRR. One of the nine alternatives diverges southeast from I-580 along Portola Avenue, and another alternative diverges southeast from I-580 along Las Positas Road. As shown in Figure 1-1, among the nine alternatives, there are five potential station locations and three potential maintenance yard locations in the study area.

Organization of the Environmental Analyses

This section is organized by environmental issue (e.g., Population and Housing, Community Services, Cultural Resources, etc.). Fifteen separate environmental topics are presented in this section (not including this Introduction), broken down into subsections (i.e., Sections 3.2 through 3.16).

In order to assist the public in identifying particular issues of interest, a page numbering convention has been employed to distinguish each topic. The pagination system consists of three parts:

section-subsection-page; for example, page 3.2-2 signifies Section 3 (Environmental Analysis), Subsection 3.2 (Transportation), and page 2. In addition, the environmental topic is identified in the header at the top of each page for easy reference.

For each environmental topic addressed in Sections 3.2 through 3.16, this Program EIR is organized into the sections described below.

Introduction. The introduction presents the reader with an overview to the topic and the critical issues and concerns that are considered in the analysis. In addition, a brief summary of comments received (if any) in response to the Notice of Preparation (NOP) or to the scoping meeting is provided. Both the NOP and the scoping meeting occurred at the outset of the environmental review process, with the intent of soliciting input on the environmental concerns that should be considered in the Program EIR.

Existing Conditions. The existing conditions section presents setting information for each environmental topic. Most sections focus on the Tri-Valley study area, where impacts from the BART extension alternatives are most expected to occur; however, for more regional topics such as transportation and air quality, the existing conditions include data for a larger study area. Existing conditions describe the environmental setting as of the release of the NOP in June 2008.

A discussion of "Applicable Policies and Regulations" is also included in the description of the existing conditions. This subsection identifies relevant public plans and policies and appropriate federal, State, and local regulations governing the environmental topic under discussion.

As noted in some of the individual sections that follow, under State law (Government Code Section 53090 et seq.), BART is not required to comply with local land use policies and ordinances; however, discussion of these policies and ordinances is provided in some sections to understand the extent to which the BART extension alternatives are consistent with local plans, policies, and ordinances.

Impact Assessment and Mitigation Measures. This section considers how the existing conditions would be affected by the BART extension alternatives. This section is organized in the fashion described below.

Standards of Significance. The "standards of significance" describe the criteria by which an impact is declared significant and therefore in need of mitigation (i.e., actions to reduce or eliminate the effects). These criteria are largely based on suggestions from the State CEQA Guidelines, or where possible, criteria are based on State or federal standards. For example, air quality significance criteria, or thresholds, are based on the State and federal ambient air quality standards; noise significance thresholds are likewise based on criteria defined by the Federal Transit Administration (FTA). In other cases, such as for visual resources, the significance criteria are based on professional standards.

Methodology. The analysis of impacts for some of the environmental topics may warrant use of specialized models, techniques, or methodologies. In such cases, the methodology for analyzing environmental impacts is presented. For example, the air quality analysis, which relies on a number of

meteorological and traffic assumptions and on various air pollutant dispersion models, contains a description of these assumptions and the methodology adopted.

Environmental Analysis. The environmental analysis identifies and describes the effects of the BART extension alternatives on the existing conditions. The analysis of the BART extension alternatives in Sections 3.2 through 3.15 examines the long-term, operational impacts of BART service, stations, and maintenance facilities. Temporary, construction-related impacts are combined into a single section, Section 3.16, Construction Impacts.

Environmental impacts are identified as the changes that would be caused by the BART extension alternatives to the existing, or "baseline," environmental conditions as of the date of the NOP, June 2008. These effects are classified as follows:

- *Significant Impacts (S)* include adverse impacts that exceed the identified standards of significance. For example, air emissions that exceed federal ambient air quality standards would be a significant adverse impact.

- *Potentially Significant Impacts (PS)* include those impacts where it is not precisely clear whether a significant effect would occur; the analysis in these instances conservatively assesses the reasonably foreseeable worst-case effects, but the discussion acknowledges that there is uncertainty regarding the extent of the impact. For example, to determine visual impacts for the BART extension alternatives requires information on the design and architectural treatment of the stations. Lack of information on these details precludes a definitive statement about whether the proposed alignment and facilities would contrast substantially with the surrounding environment, and therefore the analysis assumes that there would be a potential for a significant effect, in the absence of clear evidence otherwise.

- *Less-than-Significant Impacts (LTS)* include adverse effects that do not exceed the identified standards of significance. For example, changes in traffic congestion at an intersection from a free-flowing level of service to one where average delays may be ten seconds would be perceptible but would not represent a significant change in intersection operations. Similarly, if the ambient noise levels increased because of project operations, but the noise levels did not exceed FTA's criteria, the effect would not be considered significant.

- *No Impact (NI)* includes conditions when the BART extension alternatives would not result in any impact at all. For example, if there are no significant historic resources or faults within the study area, impacts to cultural resources or effects from ground rupture, respectively, would not be anticipated.

- *Beneficial Impacts (B)* include effects that enhance or improve the baseline conditions without the program. For example, reduction in fuel consumption in the region due to fewer automobiles on the road with implementation of the BART extension alternatives would constitute a beneficial effect in terms of energy use and conservation.

For each impact identified as being significantly or potentially significantly, this Program EIR suggests mitigation measures to reduce or eliminate the negative effect of the BART extension alternatives. Where possible, specific mitigation measures are identified to reduce the potential effects identified. However, because this is a program-level document and it is premature to define some project details, especially at this stage, where the primary decision is which alignment and station combination is most feasible and practical, mitigation measures are not necessarily always well defined. In some situations, the mitigation recommendation is a preferred strategy covering potential approaches that can be identified at a program level for use to avoid, minimize, or reduce potentially significant environmental impacts. It is anticipated that these mitigation strategies would be refined in a subsequent project-level environmental document if a project is pursued. For each discussion of mitigation measures or strategies, there is an indication whether the mitigation measures individually or collectively would reduce effects to a less-than-significant level. If the significant or potentially significant impact cannot be reduced to less than significant, then either of the following significance conclusions are made:

- *Significant and Unavoidable Impacts (SU)* include those effects for which mitigation measures would not successfully reduce impacts to a less-than-significant level or because it is apparent, even at the Program EIR stage, that no feasible mitigation measures are available to reduce the impact to less than significant.

- *Potentially Significant and Unavoidable (PSU)* include those effects for which mitigation measures would reduce effects but it cannot be determined with certainty that they would lessen the effect to less than significant. In fact, it is conceivable that the impact may be reduced or avoided, when more detailed engineering and environmental analysis is performed at a later stage of project development. In the future project-level EIR, BART will re-evaluate all impacts identified as significant and unavoidable in the Program EIR and will further consider the possibilities for feasible mitigation.

It should be noted that CEQA does not make a distinction between "significant and unavoidable" and "potentially significant and unavoidable." Either condition is interpreted under CEQA as an effect that has not been reduced to less than significant and requires the lead agency to make appropriate findings if it wishes to approve the project or program. This distinction has been made in this Program EIR to inform the reader that there are different degrees of certainty about whether an effect is truly significant and unavoidable.

Cumulative Analysis. To fully understand the environmental implications of a project, the State CEQA Guidelines requires that a project be examined for its cumulative effects in conjunction with other reasonably foreseeable projects, as well as its individual effects on the existing environment. Cumulative effects must be considered because, even if one of the BART extension alternatives has a less-than-significant impact by itself, its small contribution together with the contributions of other projects can add up to an impact that collectively exceeds the standard of significance. On the other hand, if the combination of the BART extension alternatives' contribution, together with those of other projects, would not exceed the significance standard, then the cumulative impact is less than significant. In addition, if the project does not make any contribution to an adverse impact, it does not

have a significant cumulative impact, even though the effects of other projects may be cumulatively significant.

The cumulative context for the BART extension alternatives varies, depending on the environmental topic being discussed. For example, the cumulative context for the cultural resources analysis is the Tri-Valley area, which includes Amador Valley, Livermore Valley, and San Ramon Valley and the cities of Pleasanton, Livermore, Dublin, San Ramon, and Danville. This varies from the Population and Housing subsection, which considers the potential for the BART extension alternatives, in combination with the projected growth in the City of Livermore, because induced growth is anticipated to occur around the stations, all of which would be in the City. However, while the cumulative context for the BART extension alternatives does vary depending on the environmental topic being discussed, reference to development in the eastern portion of the County is most commonly discussed throughout the cumulative analysis in this document. This includes growth in accordance with the General Plans of the cities of Pleasanton, Dublin, and Livermore and Alameda County; and the Staples Ranch, El Charro, and East Dublin Specific Plans. Where appropriate, other foreseeable projects in the area such as the I-580 Widening and HOV Lanes and the Iron Horse Trail along the UPRR tracks are also considered. A description of these other plans and projects that could cumulate with the effects of the BART to Livermore Extension Program is provided at the end of this section.

Enumeration of Environmental Analysis and Mitigation Measures

Each discrete environmental issue within a topic is enumerated and italicized. These issues include, for example, exposure to hazardous materials, wildland fire hazards, and airport safety within the Public Health and Safety topic. These topics are enumerated using an alpha-numerical system that helps identify the environmental issue. For example, Impact LU-1 denotes the first impact discussion in the Land Use subsection. The letter acronyms used to identify the environmental topics discussed in this section are as follows:

- TR for Transportation;
- LU for Land Use;
- PH for Population and Housing;
- VQ for Visual Quality/Aesthetics;
- CR for Cultural Resources;
- GEO for Geology, Soils, and Seismicity;
- HY for Hydrology and Water Quality;
- BIO for Biological Resources;
- NO for Noise and Vibration;
- AQ for Air Quality;
- HS for Public Health and Safety;
- CS for Community Services;
- UT for Utilities;
- EN for Energy; and
- CI for Construction Impacts

Cumulative impacts are distinguished from project impacts and are denoted by the letters “CU” in the alpha-numerical system.

The mitigation measures are also numbered and are prefixed to link them with the impact they address; e.g., Mitigation Measure CR-2.1, refers to the first mitigation for Impact 2 in the Cultural Resources subsection. A brief title is also included to easily identify the mitigation measure (e.g., *CR-2.1 Conduct Project-Level Archaeological Resources Investigation*). In some instances, the proposed mitigation measure does not apply to all of the BART extension alternatives. In these cases, the relevant alternatives are identified in parentheses after the mitigation title. If the proposed mitigation measure would effectively reduce the significant or potentially significant impact to less than significant, this result is explicitly noted. On the other hand, if the proposed mitigation measure would not reduce the significant or potentially significant effect to less than significant, the analysis specifically notes that the impact would remain "significant and unavoidable" or "potentially significant and unavoidable."

Foreseeable Development included in the Cumulative Analysis

The cumulative context for the proposed program considers regional and local growth forecasts. These projects include growth in the study area as forecast by the Association of Bay Area Governments, the East County Area Plan, the Livermore General Plan, the El Charro Specific Plan, the Downtown Livermore Specific Plan, the Arroyo Vista Neighborhood Plan, the Brisa Neighborhood Area Plan, the Livermore Municipal Airport Rezoning, the Dublin General Plan, the East Dublin Specific Plan, the Pleasanton General Plan, and the Stoneridge Drive/Staples Ranch Specific Plan. The timeframe for these planning documents and projections is 2035, which is the planning horizon for the BART to Livermore Extension Program.

East County Development

Association of Bay Area Government's (ABAG) Growth Forecasts for 2035. The ABAG forecasts have been used to define future growth in the project corridor and study area. These growth forecasts generally encompass a number of specific development projects that are planned, approved but not yet constructed, or under construction. As a result, these projections are particularly useful in travel demand forecasting and anticipating future traffic conditions in the study area. Table 3.1-1 presents population and employment growth projections prepared by ABAG for Alameda County, and the cities of Dublin, Pleasanton, and Livermore.

East County Area Plan. The East County Area Plan (ECAP) was adopted by the Alameda County Board of Supervisors in May 2002. The purpose of the ECAP is to present a clear statement of the County's intent concerning future development and resource conservation within East County.[1] When Alameda County voters approved Measure D, which established an Urban Growth Boundary (UGB) around the cities of Dublin, Pleasanton, and Livermore in November 2000, the provisions of that public initiative measure became the applicable land use policy for the unincorporated areas of Alameda County, including the unincorporated areas within the study area. Passage of the initiative

[1] Alameda County Community Development Agency Planning Department. 1994. East County Area Plan.

indicated residents' desire to further preserve agricultural lands, maintain the natural environment, and protect local wildlife and habitat areas.

Table 3.1-1
Growth Projections for the Study Area, 2010, 2025, and 2035

	Year	Alameda County	Dublin	Pleasanton	Livermore
Population	2010	1,571,400	50,000	73,600	88,200
	2025	1,776,900	69,200	85,400	107,300
	2035	1,938,600	82,600	94,500	120,900
Households	2010	564,880	16,600	26,700	31,160
	2025	643,030	23,770	31,170	38,090
	2035	700,090	28,720	34,400	42,820
Jobs	2010	781,520	22,910	64,260	53,650
	2025	968,590	36,590	76,020	71,240
	2035	1,099,550	49,810	81,270	82,990

Source: Associated Bay Area Governments, Projections 2007, December 2006.

City of Livermore

Livermore General Plan. In 2003, the City of Livermore updated its General Plan to guide development and conservation in the City through 2025. The 2003 General Plan establishes a buildout estimate for the City through the planning horizon. This estimate is updated on an annual basis to reflect amendments to the General Plan that affect buildout population and job estimates. Based on amendments processed through 2008, the buildout estimate of the City through 2025 is 38,449 dwelling units and 86,904 jobs.[2] These buildout figures represent growth of about 8,445 housing units, 23,100 persons, and 54,500 jobs. The General Plan was developed with the understanding that BART may extend service to the City and assuming that if it did, BART would extend service to Livermore by adding one station at I-580/Isabel and a second station near Greenville Road north of I-580.[3]

El Charro Specific Plan. The El Charro Road Specific Plan, adopted by the Livermore City Council in July 2007, covers approximately 250 acres of mostly non-urbanized land south of I-580 at the western edge of Livermore (immediately east of the SDSP described above). The goal of the Specific Plan is to create a regional retail destination that takes advantage of the proximity to I-580 while also integrating the area's surrounding natural setting. More specifically, the Specific Plan envisions several categories of regional retail development ranging in intensity and focus, including food and entertainment, regional and sub-regional retail, mid-box retail, and lifestyle retail such as general merchandise sales, outlet stores, home decorating, housewares, clothing and accessories, and mid-size

[2] Roberts, Marc, City of Livermore Community Development Director, Memo to Mayor and Members of the City Council, April 14, 2009.

[3] Bell, Debbie, Assistant Planner, City of Livermore Planning Division, telephone communication with BAE, April 29, 2009.

retailers that sell goods such as electronics sporting goods, or other consumer products. At buildout, maximum allowable densities would permit up to 1.5 million square feet of retail space.[4]

Downtown Livermore Specific Plan. The Downtown Specific Plan covers approximately 272 acres near the geographic center of the City of Livermore. The Specific Plan acknowledges the potential for a BART to Livermore Extension, including the possibility of an alignment through downtown Livermore. Maximizing transit opportunities to Downtown and encouraging the future development of mass transit, including BART, is specified as a revitalization goal of the Specific Plan.

The Downtown Livermore Station is located in the Downtown Transit Gateway Plan area of the Specific Plan, which also includes the ACE/Livermore Amador Valley Transit Authority (LAVTA) and Greyhound stations. Permitted uses in the Downtown Transit Gateway Plan area include multi-family and attached single-family residences, lodging, public and quasi-public uses, public halls, health and exercise clubs, business and professional and government offices, medical and dental offices, and neighborhood serving commercial. Land north of the Downtown Livermore Station falls outside of the Specific Plan area. The Specific Plan identified a capacity for 3,259 new housing units for a total residential buildout of 3,600 units in the Downtown Specific Plan area.[5]

Arroyo Vista Neighborhood Plan. The Arroyo Vista Neighborhood Plan, approved in July 2007, is a policy framework to implement the orderly, compatible development of a residential neighborhood with a density range of 14 to 18 dwelling units per acre. The Plan Area is an approximately 28-acre site composed of six parcels, five of which are vacant. It is located in a predominantly industrial district on the eastern side of the City, bordered to the north by Arroyo Vista Road, to the west and south by Las Positas Road and to the east by Bennett Drive. It is intersected by the Arroyo Seco Channel. The Las Positas alternative (Alternative 2) would bisect this Plan Area.

Brisa Neighborhood Area Plan. In February 2007, the Livermore City Council approved the Brisa Neighborhood Plan for a 37.5-acre vacant site east of Vasco Road and bisected by Brisa Street. The Neighborhood Plan outlines a comprehensively planned, transit-oriented development with 510 new residential units. The proposed Vasco Road BART Station is adjacent to the southeast corner of the neighborhood plan area. Transit-oriented development is already planned for in the Vasco Road ACE Station area in conjunction with the existing ACE station.

Livermore Airport Rezoning and General Plan Amendment. The Livermore Municipal Airport is located in the northwestern portion of Livermore and is generally bound by Club House Drive and Airway Boulevard to the north; parcels bordering Rutan Drive and the Water Reclamation Plant on the east; the Water Reclamation Plant and Jack London Boulevard on the south; and agricultural lands and the Las Positas Golf Course on the west. The Livermore Municipal Airport is currently zoned for Education and Institution (E) and Planned Development (PD). The City of Livermore is proposing to rezone the 395-acre Livermore Municipal Airport to the proposed Airport (AIR) zoning district, and would consist of two zoning subdistricts: 1) the Airport Operations (AIR-OP) zoning subdistrict and 2)

[4] City of Livermore, *El Charro Road Specific Plan,* July 2007, p. 2-2.

[5] City of Livermore, *Downtown Specific Plan*, February 2004, p. 4-17.

the Airport Service (AIR-SE) zoning subdistrict. Uses that would be permitted in the AIR-OP district include runways, taxiways, run-up aprons, airfield lighting, signage, and similar uses. The AIR-SE district would allow the development of access taxi lanes, aircraft hangars, aircraft manufacturing and research uses, aircraft sales, ancillary support services, and similar uses. The project does not include changes to the current runway environment; thus, there would be no changes to flight operations. The project would allow for future proposals such as a full-service fixed-base operator facility, a new hangar facility, and the replacement of the existing administration building. Specific development projects would be subject to independent design and environmental review.

The General Plan Amendment (GPA) would remove references to the 1975 Airport Master Plan, which is proposed to be rescinded in a separate action. The GPA would include updated forecasts for flight operations and based aircraft. The City of Livermore issued an NOP for the project in October 2008 and an amendment to the NOP was distributed in May 2009. The Draft EIR for the project was released for public review in September 2009. The comment period ended November 2, 2009.

City of Dublin

Dublin General Plan. The Dublin General Plan, adopted in 1986, focuses on three areas – a primary planning area and two extended planning areas. The primary planning area includes the 1982 City boundaries and the developable land immediately to the west. Dublin's Eastern Planning Area is located east of the City's built-up area (as defined in the early 1980s), while the Western Planning Area is located west of existing development in the City, north of I-580. These extended planning areas comprise the City's primary lands available to accommodate substantial future growth.

The existing Dublin/Pleasanton BART Station is located in the Eastern Planning Area. The Eastern Planning Area, which covers approximately 4,300 acres, would add 14,000 new housing units, 33,000 new residents, and 26,000 new jobs at buildout.[6] When the Eastern Planning Area was added to the General Plan in the early 1990s, buildout of the Eastern Planning Area was projected to take 30 to 40 years.

East Dublin Specific Plan. The Eastern Dublin Specific Plan was adopted in January 1994 and updated in November 2008. The Plan establishes a framework for the future growth and development of over 4,000 acres in eastern Dublin (described as the Eastern Planning Area of the Dublin General Plan above). The Specific Plan envisions a mixed-use community that will balance employment generating and residential uses. In total, the Plan yields over 10 million square feet of commercial and industrial space and nearly 14,000 dwelling units.

The East Dublin Specific Plan area is composed of 11 planning subareas. The existing Dublin/Pleasanton BART Station is located in the Transit Village Center subarea, which covers the southwesternmost corner of the Specific Plan area. Land use designations in the Transit Village Center are intended to maximize transit opportunities attributable to BART and the associated bus hub by creating a pedestrian-friendly high density mix of office, retail, and residential uses. The development

[6] City of Dublin, *General Plan*, March 2008, p. 19.

potential for the Transit Village Center subarea is two million square feet of office space and 1,500 residential units. At the end of 2008, three residential projects consisting of 674 units had been completed in the Transit Village Center.

City of Pleasanton

Pleasanton General Plan. The Pleasanton General Plan 2005-2025 was adopted in July 2009 and updates the 1996 General Plan, which accommodated a maximum buildout of approximately 29,000 units. The Pleasanton General Plan 2005-2025 retains the 1996 Plan's maximum of 29,000 housing units. In addition, the City could accommodate 600 second units and 1,100 units in congregate living facilities. The City could also accommodate approximately 32 million square feet of commercial, office, industrial, and other employment-generating uses, supporting a total of 88,000 jobs. Projected growth between 2005 and 2025 includes about 3,900 housing units, 10,600 persons, and up to 29,900 jobs.

Stoneridge Drive/Staples Ranch Specific Plan. The Stoneridge Drive Specific Plan (SDSP) was adopted in October 1989. The 293-acre Plan Area is located in the northeast corner of the City of Pleasanton, adjacent to I-580 to the north and El Charro Road to the east. Although the entire Plan Area is within Pleasanton's Sphere of Influence (SOI), 196 acres are within unincorporated Alameda County.

The SDSP designates 128 acres of the Plan Area for residential uses, 78 acres for service commercial/light industrial uses, 30 acres for commercial uses, and 33 acres for parks, schools and institutional uses. The remaining undeveloped portion of the Plan area, the 124-acre Staples Ranch, is the subject of a Memorandum of Understanding between the City and the Alameda County Surplus Property Authority, for future development of a continuing-care retirement community, auto dealerships, additional commercial development, and a public park. The Staples Ranch property is just south of I-580 and west of El Charro Road. In February 2009, a Specific Plan Amendment was approved and an EIR was certified by the City of Pleasanton to facilitate development of an auto mall, a senior care community, retail and commercial uses, and a community park. A four-rink ice center is being considered as part of the community park.

Other Regional Projects

A number of regional infrastructure projects are proposed in the study area and their effects could cumulate with those of the BART to Livermore Extension Program. These projects are identified in the environmental analyses that follow. However, three projects are identified here because they extend along the study area for much of its length.

I-580 HOV Lane Project.[7] The Alameda County Congestion Management Agency (ACCMA), in cooperation with the California Department of Transportation (Caltrans) is currently sponsoring the construction of an Eastbound (EB) HOV Lane along I-580 from Hacienda Drive to east of Greenville Road. The improvements are within the existing right-of-way and construction commenced in September 2008.

In addition, eastbound auxiliary lanes between the El Charro Road and Airway Boulevard interchanges will be constructed. Proposed improvements would all be constructed within the existing right-of-way. The I-580 Eastbound HOV Lane Project is one of the first phases of a multi-phase Tri-Valley Implementation Plan for I-580.

In March 2009, Caltrans released an Initial Study/Mitigated Negative Declaration and an Environmental Assessment for the I-580 Westbound HOV Lane Project. The project consists of construction of a westbound HOV lane in the I-580 median from the Greenville Road undercrossing westward to just west of the San Ramon/Foothill Road overcrossing, a stretch of 13.1 miles. The HOV lane project would occur almost entirely within existing Caltrans right-of-way. The project also calls for the construction of auxiliary lanes, widening of under and overcrossings, and provision for a future High Occupancy Toll lane project.

Iron Horse Trail Project.[8] The Iron Horse Trail is a regional trail that currently spans 28 miles from Marsh Road in Concord, Contra Costa County to Dublin in Alameda County. The regional trail passes through Concord, Pleasant Hill, Walnut Creek, Alamo, Danville, San Ramon, and Dublin. An Initial Study/Mitigated Negative Declaration has been prepared by the City of Livermore to extend the regional trail 6.5 miles through the City of Livermore parallel to and south of the UPRR right-of-way that is currently used for ACE regional rail commuter and for freight service. The multi-use recreational route would provide bicycle and pedestrian non-motorized travel on a surfaced right-of-way from the western city limits at Isabel Avenue to the eastern city limits at Greenville Road. In addition to the paved trail, the project would include landscaped areas, curbs and gutters, fencing and benches, four pedestrian/bicycle grade separation bridges, signs, interpretive panels, and soundwalls where the trail is close to the rail tracks and in the downtown area.

California High-Speed Train. It is acknowledged that there is the potential for a California High-Speed Rail project that could link the Central Valley to the Bay Area through the Tri-Valley area; however, the California High-Speed Rail Authority has designated the preferred connection between the Central Valley and the Bay Area to occur over the Pacheco Pass and through San Jose. The project being developed in the Tri-Valley area by the Authority focuses on improvements and enhancements that could be made to the ACE corridor to potentially accommodate high-speed trains in the future via

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7 Alameda County Congestion Management Agency, Get the Facts: I-580 Eastbound HOV, http://www.i580.info/documents/Fact%20Sheets-rev%2011-27-06%203.pdf, accessed August 4, 2009; Caltrans District 4, Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment for I-580 High Occupancy Vehicle Lane Project, March 2009.

8 City of Livermore Community Development Department, Public Draft CEQA Initial Study for Livermore Iron Horse Trail Alignment, December 11, 2008.

the Altamont Pass. If an Altamont Corridor high-speed rail project is developed, it is expected that the project could be designed to accommodate an intermodal connection to BART in the Livermore vicinity. Nevertheless, at this stage, there are no definable plans, schedules, or improvements for operating high-speed trains through the Tri-Valley area, and, thus, there is no foreseeable high-speed train project that could be included in the cumulative assessment for this Program EIR.

3.2 TRANSPORTATION

Introduction

This section describes the regional and local transportation network serving the Dublin-Pleasanton-Livermore study area under existing and future (year 2035) conditions. The transportation network in the study area is composed of a freeway, roadways, bus and rail transit, parking facilities, as well as pedestrian and bicycle facilities. This section identifies the potential program-level impacts to the transportation system associated with the implementation of the BART extension alternatives under future (year 2035) conditions. The following impacts are analyzed in this section:

- Traffic on Interstate 580 (I-580), State Route (SR 84), arterials, and key intersections;
- Transit operations for San Francisco Bay Area Rapid Transit District (BART), Livermore Amador Valley Transit Authority (LAVTA), Altamont Commuter Express (ACE), Eastern Contra Costa Transit Authority (Tri Delta Transit), San Joaquin Regional Transit District (SJRTD), and Modesto Area Express (MAX);
- Parking availability versus projected demand at the stations; and
- Pedestrian and bicycle circulation.

Projected ridership on the BART to Livermore extension, as well as on the BART system as a whole, is presented and discussed for each alternative including the No Build Alternative. Ridership is a key component in the analysis of transportation changes, as it is the basis for future traffic impacts (or benefits), parking demand, transit connectivity needs, and other infrastructure requirements. Depending on the alternative, it is estimated that a BART extension in the study area would generate between 19,900 and 31,700 additional daily BART riders in 2035.

This traffic and circulation analysis has been prepared in accordance with California Department of Transportation (Caltrans) procedures for State highways, and reflects local jurisdictional standards for all other roads and intersections. In addition, this analysis responds to transportation-related comments received in response to the Notice of Preparation (NOP) from interested parties.

Existing Conditions[1]

Study Area

Figure 3.2-1 illustrates the transportation study area in eastern Alameda County. This study area generally extends from Greenville Road on the east, Dublin Boulevard and North Canyons Parkway on

[1] Data comprising the ridership, fares and hours of operation for all transit operators in the transportation study area were collected from April-July 2009. The Notice of Preparation for the Program EIR was released in 2008 and typically establishes the date for describing existing conditions. However, in some instances, where more current data are available, that information has been provided.

the north, Interstate 680 (I-680) on the west, and Stanley Boulevard on the south. Figure 3.2-2 identifies the key traffic study sites (further discussed below) within the study area.

Study Freeway Segments. Traffic conditions on the freeway serving the project vicinity were part of the analysis. The following mainline segments of I-580 shown in Table 3.2-1 were analyzed for this project. These segments represent the full length of I-580 within the study area.

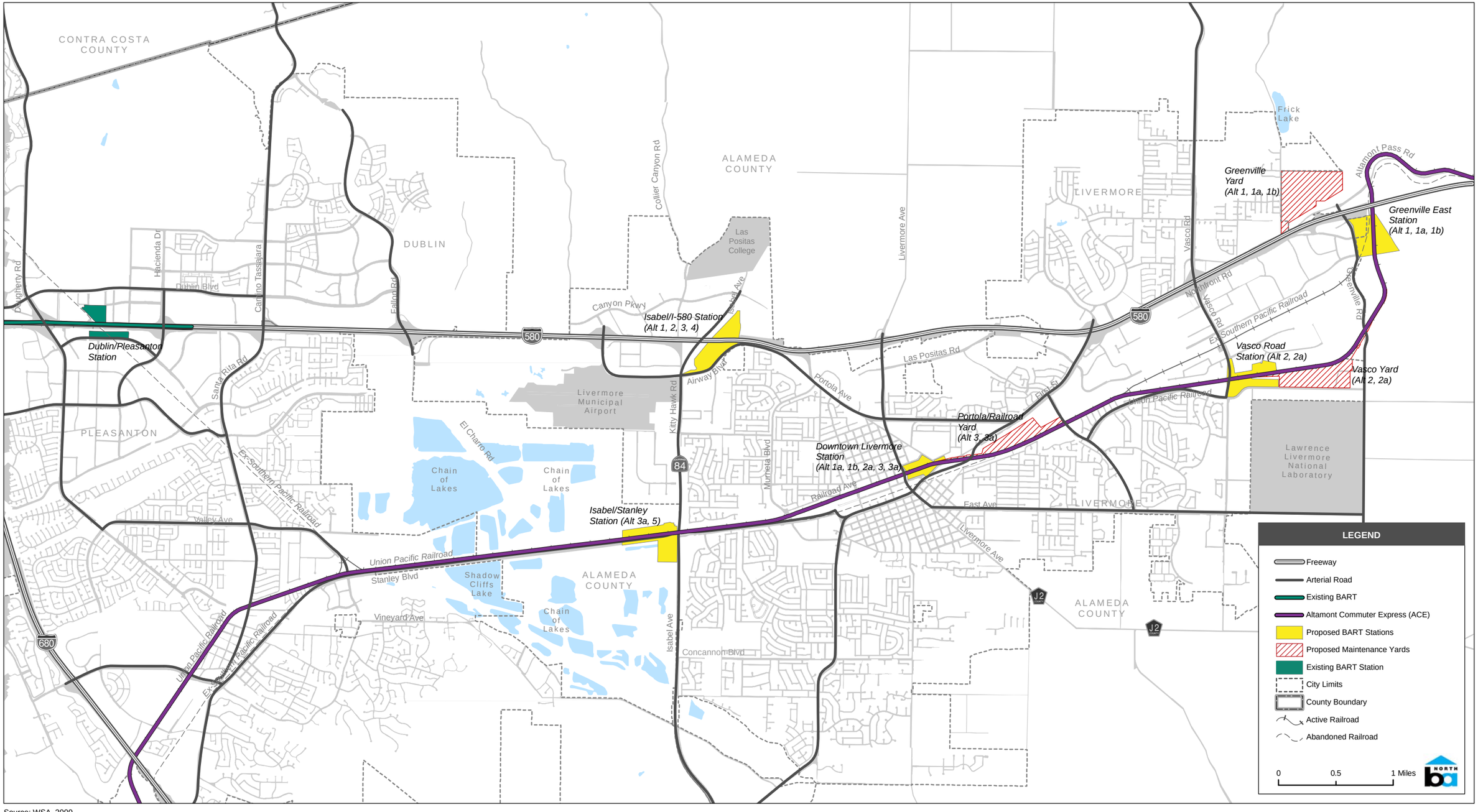
Table 3.2-1
I-580 Mainline Study Segments
in the BART to Livermore Extension Study Area

Mainline	From	To	Location
I-580	Hopyard Road	Hacienda Drive	Dublin/Pleasanton
I-580	Hacienda Drive	Santa Rita Road	Dublin/Pleasanton
I-580	Santa Rita Road	El Charro Road	Dublin/Pleasanton/ Unincorporated Alameda County
I-580	El Charro Road	Airway Boulevard	Dublin/Livermore/ Unincorporated Alameda County
I-580	Airway Boulevard	Isabel Avenue[a]	Livermore
I-580	Isabel Avenue[a]	Livermore Avenue	Livermore/ Unincorporated Alameda County
I-580	Livermore Ave	First Street	Livermore/ Unincorporated Alameda County
I-580	First Street	Vasco Road	Livermore
I-580	Vasco Road	Greenville Road	Livermore
I-580	Greenville Road	East of Greenville Road	Unincorporated Alameda County

Source: Wilbur Smith Associates, 2009.

Notes:

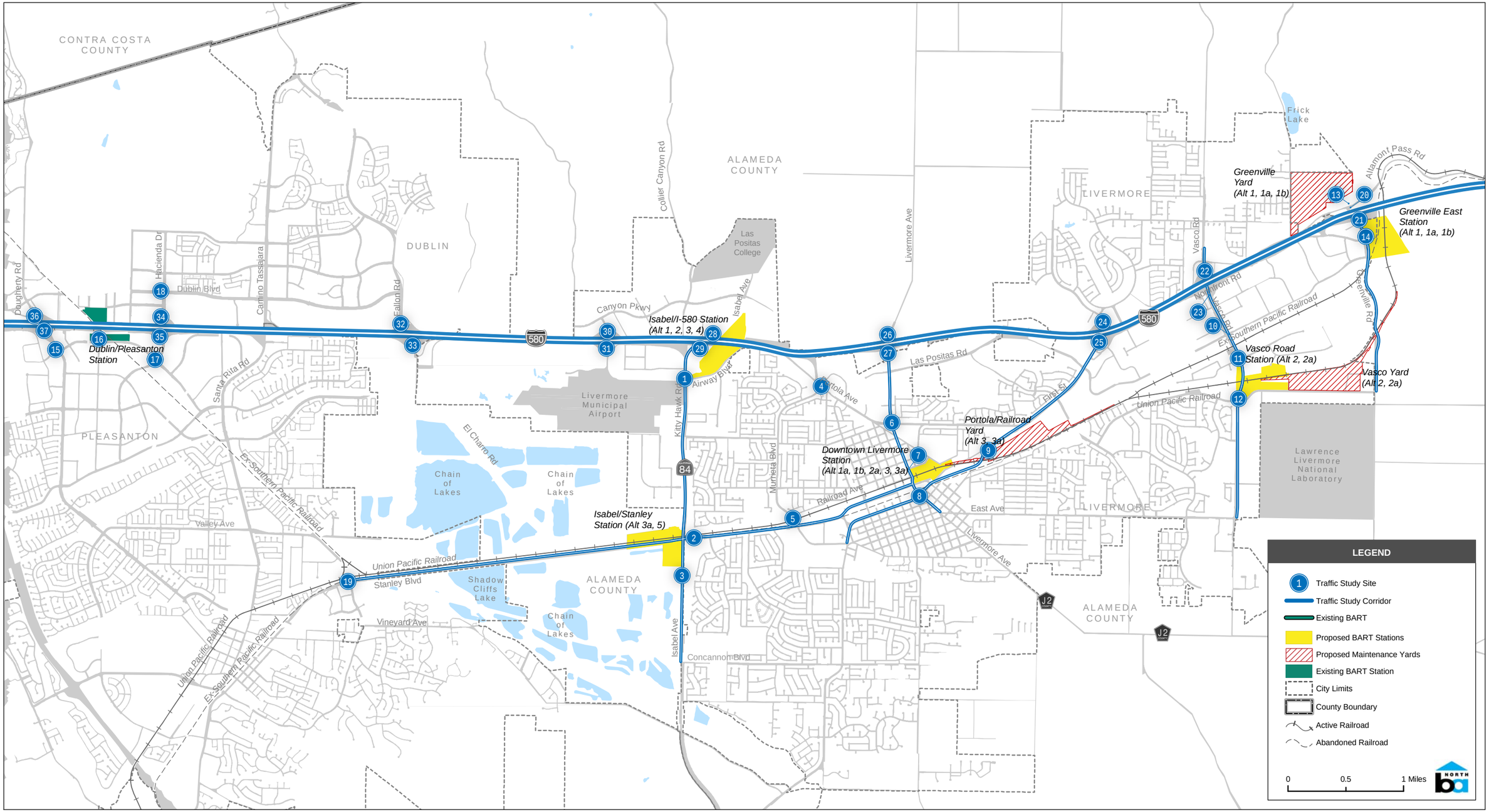
a. This interchange does not currently exist; however, it is under construction and will be analyzed under Year 2035 conditions.



Source: WSA, 2009.

BART TO LIVERMORE TRANSPORTATION STUDY AREA

FIGURE 3.2-1



Source: WSA, 2009.

BART TO LIVERMORE TRAFFIC STUDY SITES
FIGURE 3.2-2

Study Arterials. Traffic conditions on key arterials (listed in Table 3.2-2) in the study area were also analyzed. The arterial roadways studied were selected based on their location along major travel routes serving the potential station locations and on consultations with local jurisdictions.

Table 3.2-2
Arterial Study Segments
in the BART to Livermore Extension Study Area

Arterial	From	To	Location
1. Greenville Road	Altamont Pass Road	Patterson Pass Road	Livermore
2. Vasco Road	Northfront Road	East Avenue	Livermore
3. First Street	I-580 Eastbound Ramps	Scott Street	Livermore
4. First Street	Scott Street	Holmes Street/ Murrieta Boulevard/ College Avenue	Livermore
5. Livermore Avenue	I-580 Eastbound Ramps	Chestnut Street	Livermore
6. Livermore Avenue	Chestnut Street	East Avenue	Livermore
7. Stanley Boulevard	Valley Avenue	Murrieta Boulevard	Livermore/Pleasanton/ Unincorporated Alameda County
8. Stanley Boulevard	Murrieta Boulevard	Livermore Avenue	Livermore
9. Isabel Avenue	I-580 Eastbound Ramp	Concannon Boulevard	Livermore

Source: Wilbur Smith Associates, 2009.

Study Intersections. A total of 37 intersections were analyzed for this study; including 19 local roadway intersections and 18 freeway ramp intersections. Study intersections were selected based on consultations with local jurisdictions and the location of the intersections along major travel routes serving the potential station areas. Local street intersections, freeway ramp intersections, and the location of each intersection are listed below in Tables 3.2-3 and 3.2-4.

Table 3.2-3
Local Study Intersections
in the BART to Livermore Extension Study Area

	Intersection	Location
1.	Airway Boulevard/Isabel Avenue	Livermore
2.	Stanley Boulevard/Isabel Avenue On Ramp	Livermore
3.	Isabel Avenue/Stanley Boulevard On Ramp	Livermore
4.	Portola Avenue/Murrieta Boulevard	Livermore
5.	Murrieta Boulevard/Stanley Boulevard	Livermore
6.	Portola Avenue/Livermore Avenue	Livermore
7.	Livermore Avenue/Chestnut Street	Livermore
8.	First Street/Livermore Avenue	Livermore
9.	First Street/Scott Street	Livermore
10.	Vasco Road/Las Positas Road	Livermore
11.	Vasco Road/Brisa Street	Livermore
12.	Vasco Road/Patterson Pass Road	Livermore
13.	Greenville Road/Altamont Pass Road	Livermore
14.	Southfront Road/Greenville Road	Livermore
15.	Hopyard Road/Owens Drive	Pleasanton
16.	Owens Drive/Willow Road	Pleasanton
17.	Hacienda Drive/Owens Drive	Pleasanton
18.	Hacienda Drive/Dublin Boulevard	Dublin
19.	Stanley Boulevard/Valley Avenue	Pleasanton

Source: Wilbur Smith Associates, 2009.

Table 3.2-4
Freeway Ramp Study Intersections
in the BART to Livermore Extension Study Area

	Intersection	Location
20.	Greenville Road/I-580 Westbound Ramps	Livermore
21.	Greenville Road/I-580 Eastbound Ramps	Livermore
22.	Vasco Road/I-580 Westbound Ramps	Livermore
23.	Vasco Road/I-580 Eastbound Ramps	Livermore
24.	First Street/I-580 Westbound Ramps	Livermore
25.	First Street/I-580 Eastbound Ramps	Livermore
26.	Livermore Avenue/I-580 Westbound Ramps	Livermore
27.	Livermore Avenue/I-580 Eastbound Ramps	Livermore
28.	Isabel Avenue[a]/I-580 Westbound Ramps	Livermore
29.	Isabel Avenue[a]/I-580 Eastbound Ramps	Livermore
30.	Airway Boulevard/I-580 Westbound Ramps	Livermore
31.	Airway Boulevard/I-580 Eastbound Ramps	Livermore
32.	Fallon Road/I-580 Westbound Ramps	Dublin
33.	El Charro Road/I-580 Eastbound Ramps	Unincorporated County/Livermore
34.	Hacienda Drive/I-580 Westbound Ramps	Dublin
35.	Hacienda Drive/I-580 Eastbound Ramps	Pleasanton
36.	Hopyard Road/I-580 Westbound Ramps	Dublin
37.	Hopyard Road/I-580 Eastbound Ramps	Pleasanton

Source: Wilbur Smith Associates, 2009.

Notes:

All freeway-ramp study intersections are currently metered, with the exception of the Fallon/I-580 Westbound Ramps intersection.

a. This intersection does not currently exist; however, it is planned and will be analyzed under Year 2035 conditions.

Regional Transportation Facilities

The main regional routes through Livermore, Pleasanton, and Dublin are I-580, I-680, and SR 84. I-580 connects the Bay Area with San Joaquin County and is a major inter-regional route for commuting, truck commerce, and recreational travel.

Interstate 580. I-580 is an eight-lane freeway that runs east-west from I-5 near Tracy to US 101 in San Rafael. I-580 currently experiences severe congestion during the morning and evening peak traffic hours. The peak commute hour varies for each study segment. Generally, however, the morning (AM) peak hour typically occurs between 7:00 to 9:00 a.m. Similarly, the evening (PM) peak hour typically occurs between 4:00 to 6:00 p.m. Within Livermore's city limits in 2008, I-580 carried an average daily traffic (ADT) volume of 147,000 to 220,000 vehicles.[2]

In 2006, the Metropolitan Transportation Commission (MTC) released its ranking of commute period bottlenecks along freeways in the nine-county Bay Area. This study reported that westbound I-580 (I-680 to El Charro Road) ranks as the third most congested route in the AM peak hour and that eastbound I-580 is the second most congested route in the PM peak hour.

The I-580 crossing of the Altamont Pass just to the east of Livermore is a primary transportation gateway to the Bay Area from the Central Valley including San Joaquin and Stanislaus Counties. A survey of westbound commuters using the I-580 over the Altamont Pass indicated that 34 percent of them were bound for the Livermore Amador Valley area. The remaining 66 percent were bound for destinations further west, passing through Livermore, Dublin, and Pleasanton. Twenty percent of the total commuters were bound for locations in the East Bay from Berkeley to Hayward and 19 percent were bound for the Silicon Valley.[3]

Interstate 680. I-680 runs north-south from I-280 in San Jose to I-80 near Fairfield. It is a six-lane freeway, south of I-580, and a six-lane freeway with additional high-occupancy vehicle (HOV) lanes north of I-580.

I-580/I-680 Interchange Flyover. The interchange of I-580 and I-680 has an ultimate design of four separate flyovers as specified by Caltrans. In February 2002, Caltrans completed Phase 1 interchange improvements with the construction of the I-680 southbound to I-580 eastbound flyover, which alleviated a previous bottleneck and improved safety. Preliminary studies are currently underway for the northbound-to-westbound or westbound-to-southbound flyover.

State Route 84. SR 84 is a two- to six-lane State highway that connects I-580 in Livermore with I-680 in Sunol via Pigeon Pass. SR 84 then continues east through Niles Canyon and Fremont, crosses the San Francisco Bay via the Dumbarton Bridge, and through Redwood City and the Santa Cruz Mountains to SR 1 near the coastal community of San Gregorio. Another segment of SR 84, discontinuous with the aforementioned alignment, runs between SR 12 in Rio Vista and I-80 in West

[2] Caltrans, 2008.
[3] San Joaquin Partnership Altamont Pass Commuter Survey, October 2000.

Sacramento. SR 84 runs along Isabel Avenue in western Livermore. Improvements for SR 84 (Isabel Avenue) include the realignment of SR 84 to Caltrans expressway standards and roadway widening (currently under construction) plus the recently completed truck-climbing lanes over Pigeon Pass. These improvements, in conjunction with a future planned project between I-680 and Pigeon Pass, are intended to alleviate cut-through traffic in Pleasanton and congestion on I-580, between SR 84 and I-680.

Local Roadway Network

The local network for the study area including arterials, collectors, and local streets as designated in the general plan documents for the relevant jurisdiction is described below.

City of Livermore. The existing roadway system follows the form of a radial grid, with major streets, including Livermore Avenue, First Street, East Stanley Boulevard, Holmes Street, Murrieta Boulevard, and East Avenue converging in the Downtown Livermore area. Roads downtown follow a traditional grid pattern, but the downtown streets and the "lettered" streets northwest of it are not oriented on a north-south axis. The major streets and collectors in other areas of the City are on north-south or east-west axis, so these streets intersect with the downtown area grid at a diagonal. The roadways in the downtown area follow a grid pattern; whereas, the majority of local neighborhood streets surrounding the downtown area and near the city boundaries are curvilinear. In 2003, the major streets in Livermore included Collier Canyon Road, Murrieta Boulevard, P Street, Vallecitos Road/Holmes Street, Livermore Avenue, Mines Road, Vasco Road, Springtown Boulevard, and Greenville Road, which provide north-south access through the City. In addition, North Canyons Parkway, Northfront Road, Jack London Boulevard, East Stanley Boulevard, Las Positas Road, Patterson Pass Road, First Street, Railroad Avenue, East Avenue, Altamont Pass Road, Portola Avenue, Fourth Street, Tesla Road and Concannon Boulevard are major streets providing east-west access. All other facilities are classified as Collector Streets, Intercounty Routes, Special Rural Routes, or local streets. For purposes of this Program EIR, six major arterials in Livermore were analyzed; these roadways are described below.

First Street is a primary east-west arterial and typically carries heavy commuter traffic through the City of Livermore. The arterial is primarily a four-lane, divided roadway; however, in the downtown area, traffic is redirected to Railroad Avenue, where First Street is reduced to one lane in each direction through the downtown core. The roadway provides direct connection and access to I-580 and several subareas throughout the City, and extends from Railroad Avenue to north of the I-580 interchange. The speed limit is 40 mph along the majority of the roadway and the speed limit is reduced to 25 mph in the downtown area.

Livermore Avenue is a major north-south arterial, which extends the entire length of Livermore. Traffic flow is moderate and the roadway provides additional north-south linkages through downtown. The arterial is primarily a two-lane, divided roadway; however, near the downtown area, the roadway is reduced to one lane in each direction, with left-turn pockets where applicable. The roadway provides access to I-580 and connects the freeway to several subareas throughout the City. The speed

limit along the roadway is 45 mph near I-580, and the speed limit is reduced to 35 mph and 30 mph closer to the downtown area. The posted speed limit is reduced to 25 mph in the downtown area.

Isabel Avenue is a regional arterial that operates in a north-south orientation. Currently, this roadway is designated as SR 84, and typically carries heavy commuter traffic along the western region of Livermore. The arterial traverses the entire length of Livermore and provides two travel lanes in each direction near I-580 and reduces to one travel lane in each direction south of Jack London Boulevard, with left-turn pockets where applicable; however, at major intersection locations, the roadway is two lanes, with a painted median. The roadway provides direct access to I-580 and connects several neighborhoods and commercial areas in the western region of Livermore. The speed limit is primarily 50 mph along the entire roadway.

Portola Avenue is a major east-west arterial, located in the northern region of Livermore, and operates north of the downtown area. This arterial is primarily a two-lane, divided roadway with left-turn pockets where applicable. The roadway connects several neighborhoods and businesses as well as provides direct connection to other major arterials throughout the northern region of Livermore. Currently, Portola Avenue provides direct connection to I-580; however, the construction of the Isabel/I-580 interchange will no longer allow direct access to I-580 from Portola Avenue. The speed limit is 35 mph along the roadway.

Vasco Road is an arterial that operates in a north-south orientation and typically carries heavy vehicle (truck) traffic along the eastern region of Livermore. The arterial operates along the entire length of Livermore and includes two travel lanes in each direction, with a raised median at most intersections. The roadway provides direct access to I-580 and connects several commercial, industrial, and agricultural areas in the eastern region of Livermore. The arterial connects to eastern Contra Costa County to the north and is a primary commute route. The speed limit is 45 mph along the entire roadway.

Greenville Road is an arterial that operates in a north-south orientation at the eastern edge of the City and typically carries heavy vehicle (truck) traffic along the eastern region of Livermore. The arterial traverses the entire length of Livermore and includes two lanes in each direction, with a raised median and left-turn pockets at most intersections. The roadway provides direct access to I-580 and connects businesses, industrial uses, and agricultural areas in the eastern region of Livermore. The speed limit is 45 mph along the roadway.

City of Pleasanton. The major streets are Bernal Ave, Chabot Drive, Dublin Canyon Road, El Charro Road, First Street, Foothill Road, Gibraltar Drive, Hacienda Drive, Hopyard Road, Johnson Drive, Main Street, Owens Drive, Santa Rita Road, Stanley Boulevard, Stoneridge Drive, Sunol Boulevard, Valley Avenue, Vineyard Avenue, and West Las Positas Boulevard. Vehicles use this network of arterials to access the collector streets that provide access to homes and businesses on the local street network.

In June 2003, the City of Pleasanton in conjunction with Caltrans and the City of Dublin installed eastbound and westbound ramp metering at the Hopyard Road, Hacienda Drive, and Santa Rita Road

interchanges. Metering of vehicles at these locations attempts to limit the number of vehicles taking regional trips on local roadways by discouraging exiting and re-entering from the regional system as well as by improving flow on the regional system. Even with ramp metering, several of the intersections adjacent to local interchanges are approaching capacity.

Regional roadway congestion has extended the peak periods in Pleasanton beyond one hour and they now occur from 7:30 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. The largest volume roadway segments in Pleasanton are on the major arterials approaching the interstate freeway system. Approximately 80 percent of jobs in Pleasanton are held by workers who reside outside of Pleasanton. Conversely, approximately 70 percent of Pleasanton residents work outside of Pleasanton. This dynamic results in the majority of Pleasanton's resident workforce leaving the City in the morning, and being replaced by the working population. This is reversed in the afternoon commute, creating significant trips on the arterial system going to and from the freeways. In addition to morning and evening peak commute hours, the City of Pleasanton has a school-related commute that adds to traffic congestion. In the morning, the school peak coincides with the morning commute peak creating additional congestion on the local roadway system. The afternoon school peak is less extensive because the 3:00 p.m. release time does not coincide with the evening commute peak.

City of Dublin. The major streets are Dublin Boulevard, Hacienda Drive, Dougherty Road, Tassajara Road, and San Ramon Road. Vehicles use this network of arterials to access the collector streets, which provide access to homes, retail centers, transit facilities, and businesses on the local street network.

Tri-Valley Area. Livermore, Pleasanton, and Dublin experience a significant amount of nonlocal, "cut-through" traffic on arterial roads because large numbers of commuters use city streets to bypass the traffic congestion on I-580 and I-680. Cut-through traffic primarily occurs in response to freeway congestion and affects major east-west and north-south routes throughout the cities. Cut-through traffic can occur on arterial streets and also on local and collector streets, and can also be accompanied by problems of excessive speeding.

Congestion on I-580 is predicted to worsen as cities east of the Altamont Pass continue to urbanize. City streets with noted cut-through traffic include Livermore Avenue, Concannon Boulevard, First Street, Vasco Road, Greenville Road, Stanley Boulevard, Isabel Avenue, Northfront Road, Sunflower Court, Bluebell Drive, Southfront Road, and Las Positas Road. Growth in regional commuting, combined with increases in congestion on regional freeways and highways, such as I-580, is anticipated to increase the amount of cut-through traffic in all Tri-Valley cities as motorists seek routes other than the freeway to make regional trips.

Connecting Transit Services

There are several transit services and service providers operating within the Livermore, Pleasanton, and Dublin area. BART, ACE, and LAVTA (or "Wheels") represent the "core" transit service providers within the study area; their existing service structure and future plans are discussed in detail below. Additional transit service to the Livermore-Amador Valley is provided by Tri Delta Transit,

SJRTD, Central Contra Costa Transit Authority (County Connection), and MAX. These transit services play a smaller but critical role within the study area and are examined throughout the document. Existing transit service is presented in Figure 3.2-3.

San Francisco BART. BART operates a heavy rail, or electrified rapid transit, system within Alameda, Contra Costa, San Francisco, and San Mateo counties. BART's Daly City/Millbrae – Dublin/Pleasanton (or Blue Line) provides regional rail access to the Tri-Valley area. The line originates at the Daly City Station on weekdays and the Millbrae BART/Caltrain intermodal station on nights and weekends. The Blue Line extends through San Francisco, reaches Oakland via the Transbay Tube, then proceeds south through San Leandro before turning east to Castro Valley and terminates at the end-of-line Dublin/Pleasanton Station. The new West Dublin/Pleasanton Station, located between the existing Dublin/Pleasanton Station and the Castro Valley Station, is scheduled to be completed and fully operational in 2010. The existing Dublin/Pleasanton Station is regionally significant in that it serves as a primary transfer point between BART and local, regional, and commuter bus services provided by LAVTA, County Connection, Tri Delta Transit, SJRTD, MAX, and Amtrak California. While there is no direct platform-to-platform connection between BART and ACE, LAVTA provides bus service between the two stations.

The average daily weekday and weekend ridership for the existing BART system is summarized in Table 3.2-5. The average weekday ridership now exceeds 360,000 riders, with lower volumes on Saturday and Sunday. The existing Dublin/Pleasanton Station serves nearly 15,000 riders per day entering and exiting the station.

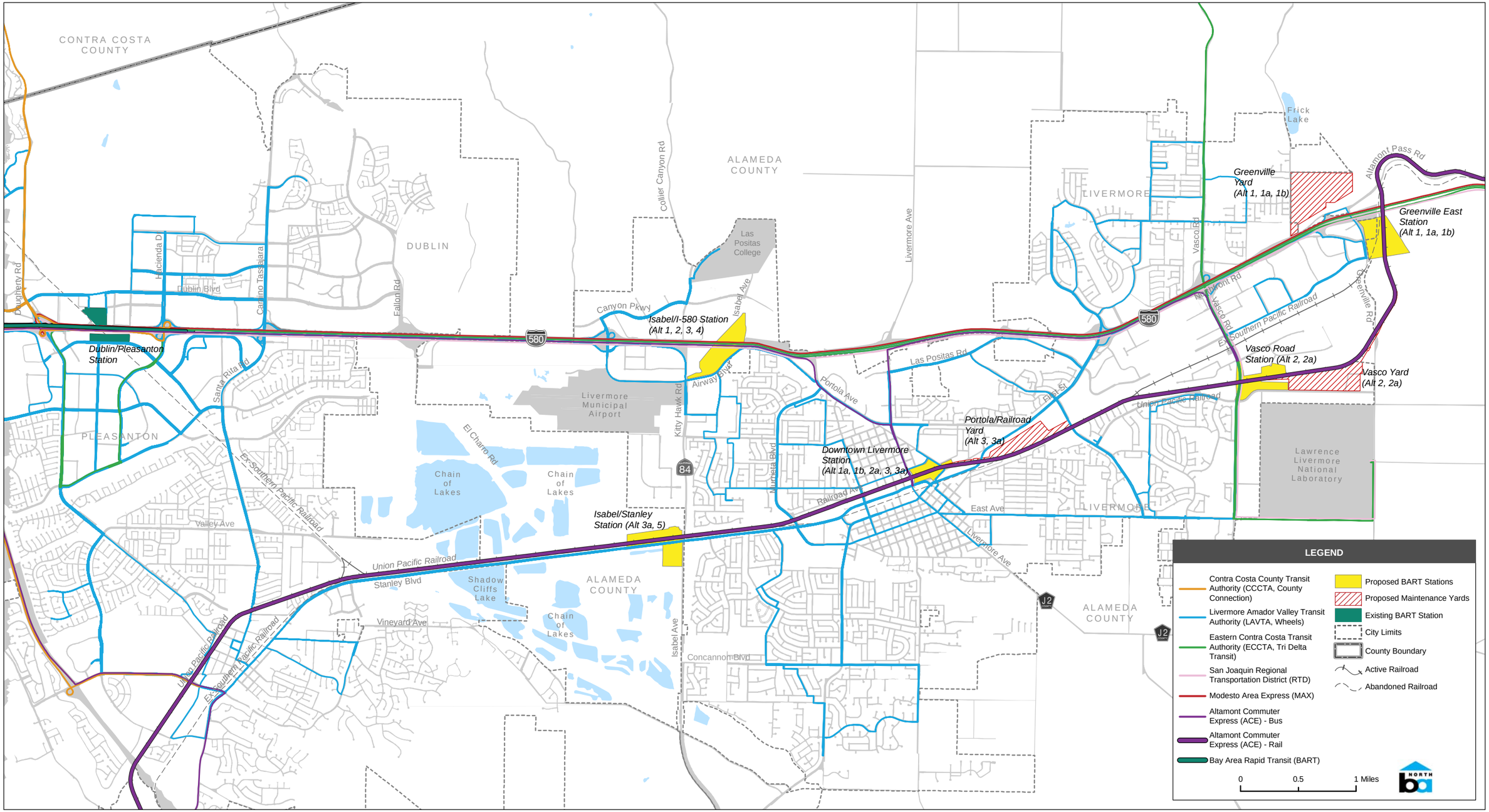
Table 3.2-5
Existing BART Systemwide Ridership

	Total	Entries	Exits
BART Systemwide			
Weekday	361,179	–	–
Saturday	179,624	–	–
Sunday	129,073	–	–
Dublin/Pleasanton Station			
Weekday	14,993	7,519	7,474
Weekend Average	5,852	2,907	2,945

Source: BART, Spring 2009.

Note: BART systemwide riders are counted by exits from the BART system. Trips at a specific station are counted by entries and exits to reflect actual use of the station.

Geographically, BART service currently extends from Millbrae/San Francisco International Airport in the west to Dublin/Pleasanton in the east and from Pittsburg/Bay Point and Richmond in the north to Fremont in the south. BART passengers can make timed transfers between the Millbrae – Dublin/Pleasanton Line and other BART lines at San Bruno, Balboa Park, and Bay Fair Stations.



Source: MTC, April, 2008.

EXISTING TRI-VALLEY TRANSIT SERVICE

FIGURE 3.2-3

BART operates trains to the existing Dublin/Pleasanton Station on a regular schedule, with service seven days per week from 4:00 a.m. to midnight. The existing Dublin/Pleasanton Station has weekday service operating at 15-minute headways in each direction,15 minute headways from 6:00 a.m. to 6:30 p.m. and 15 minute headways from 6:30 p.m. to midnight on Saturdays, and 15-minute headway service on Sundays.[4] Existing and future BART ridership is discussed in detail in the ridership section.

Altamont Commuter Express. ACE provides regional rail service from Stockton to San Jose with Tri-Valley stops in both Livermore and Pleasanton. Running primarily on tracks owned by freight railroads, ACE service is operated using diesel locomotive-powered, bi-level trains that employ push-pull operation. Four westbound trains are operated in the AM peak period with four eastbound trains in the PM peak period. Livermore has two ACE stations: one located on Vasco Road near Brisa Street, the other in downtown Livermore at the Livermore Transit Center on Railroad Avenue east of Livermore Avenue. The Pleasanton Station is located on Bernal Avenue. Shuttles and bus transit connect these stations to surrounding employment centers and other transit systems.

Average daily ridership for the ACE system totals about 3,000 passengers. Average daily ridership at the Vasco Station is 105 getting on the train and 117 getting off; at the Downtown Livermore Station, 121 and 131; and at the Pleasanton Station, 433 and 434, respectively.

Livermore Amador Valley Transit Authority. LAVTA operates the WHEELS service, which provides local public transit to the cities of Dublin, Livermore, and Pleasanton, as well as to the adjacent unincorporated areas of Alameda County. LAVTA was created in 1986 under a Joint Powers Agreement (JPA) between the three cities and the County. The service area is an approximately 40-square-mile area and is home to almost 160,000 residents. LAVTA provides a variety of transportation services, including:

- Fixed Route – These are local and intercity transit services within the Tri-Valley communities. The fixed route service branches out from two primary locations: the Dublin/ Pleasanton BART Station and the Livermore Transit Center. These services operate seven days per week, between the hours of 4:30 a.m. to 12:30 a.m. LAVTA provides fixed-route bus service, consisting of 1 express, 20 local, and 24 supplemental school service routes using conventional 40-foot buses.

- Direct Access Responsive Transit (DART) – This service is provided in the northeastern Livermore area known as Springtown on Sundays and is available on holidays. DART buses use flexible routes, or "Flex Routing," to extend local passenger pick-up and drop-off to areas not served by WHEELS. In general, Flex Routing allows DART buses to follow routes that are more direct and make fewer stops than typical fixed route buses.

- Dial-A-Ride – This service provides an Americans with Disabilities Act (ADA) paratransit service for elderly riders and individuals with disabilities who are unable to use fixed route

[4] BART's operating schedule accessed July 22, 2009. BART 20-minute weeknight and weekend headways begin September 1, 2009.

transportation systems. Dial-A-Ride service is available within three-quarter miles of WHEELS fixed route service areas, and is available weekdays, weekends, and holidays. Weekday service is available from 5:00 a.m. to 1:00 a.m. Dial-a-Ride services are provided using cutaway buses and vans.

- Prime Time – Prime Time provides express bus service for commuters traveling to job sites in the Santa Clara Valley, as well as a commuter express route to Walnut Creek. Bus service is provided on weekdays only.
- Shuttles – LAVTA provides shuttle service in its service area for various employers and special events. Shuttles typically serve the ACE and BART stations, and they shuttle employees directly to their job site. There are currently no shuttles that serve employers within Livermore. Special event shuttles operate from the ACE and/or BART stations directly to the events.

Between December 2008 and April 2009, LAVTA had a system-wide average total daily weekday ridership of just over 7,500 riders. Weekend ridership was lower with a total Saturday average of slightly over 3,100 riders and a total Sunday average of just over 2,100 riders.

Many transit connections can be made at the two main transit centers in the LAVTA system: the Livermore Transit Center and the existing Dublin/Pleasanton Station. The existing Dublin/Pleasanton Station is served on weekdays by 11 routes while the Livermore Transit Center receives service from seven routes.

Tri Delta Transit. Tri Delta Transit has one existing commuter route serving the Livermore area. Delta Express is Tri Delta Transit's express commuter service, and provides service from East Contra Costa County to the Lawrence Livermore National Laboratory. This weekday service picks up passengers in Antioch, Oakley, Brentwood, and Bryon and transports them directly to the gates of the Livermore Laboratory. The agency also runs a line between the existing Dublin/Pleasanton Station and Hillcrest Park-and-Ride Lot with stops at Hacienda Business Park, Brentwood Park-and-Ride Lot, and Discovery Bay Park-and-Ride Lot.

San Joaquin Regional Transit District. The SJRTD provides transit services for the Stockton Metropolitan Areas as well as intercity, interregional, and rural transit services. The weekday San Joaquin Commuter buses serve passengers traveling to the Tri-Valley, San Ramon Valley, South Bay, and Sacramento with specific connections in the study area to the existing Dublin/Pleasanton Station and the Lawrence Livermore and Sandia Laboratories. The interregional service is designed to meet the needs of commuters who travel distances greater than 50 miles one-way. Eight SJRTD interregional routes connect to the Lawrence Livermore and Sandia Laboratories. Three SJRTD interregional routes connect to the existing Dublin/Pleasanton Station.

Central Contra Costa Transit Authority. The County Connection operates a number of routes that provide service to the Livermore Amador Valley area. Route 121 serves the existing Dublin/Pleasanton Station, San Ramon, Danville, and Walnut Creek. Route 221 provides limited service between this station, San Ramon, and Danville, while Route 135 provides service between the

station and San Ramon. Routes 970B/970C provide service between this BART station and Bishop Ranch Business Park.

Modesto Area Express. MAX provides BART Express service via two non-stop trips in the morning from Orchard Supply Hardware store on Sisk Road in Modesto to the existing Dublin/Pleasanton Station, and two return trips in the evening.

Parking Facilities

There are significant supplies of transit-related parking in the study area, as BART and ACE provide park-and-ride parking at their stations in the Tri Valley area.

Dublin/Pleasanton BART Station Parking. The existing Dublin/Pleasanton Station includes off-street surface lots as well as a seven-story parking garage for patrons. In total, there are 4,133 parking spaces with 2,620 spaces in surface lots and 1,513 spaces in the parking garage. Parking is free for patrons who arrive and park after 3:00 p.m.; however, a daily parking fee is charged for patrons who park before 3:00 p.m. ($1.00), use carpool parking ($1.00), or use the lot for long-term/airport parking ($5.00). Parking is limited to 24 hours except with the long-term permit. Monthly reserved parking is also available at a cost of $63.00/month; monthly permits only guarantee a parking space before 3:00 p.m. Two surface lots, a portion of the carpool lot, and the first three levels in the parking garage are designated for permit parking; three surface lots and levels four through seven in the garage are for daily patrons. This terminus station experiences high parking demand, becoming fully occupied by 6:45 a.m., according to the BART website. None of the cities has residential permit parking programs, and there is no residential parking permit zone near the vicinity of the existing Dublin/Pleasanton Station.

West Dublin/Pleasanton BART Station Parking. The new West Dublin/Pleasanton Station is scheduled to be completed and fully operational in 2010. The station area includes two parking garages, one to the north of the station platform and the other to the south of the station platform. According to the BART website, the total parking supply of both parking garages is an estimated 1,200 spaces. Parking rates have not been determined; however, it is assumed that the cost to park at these facilities will be similar to the pricing program at the neighboring existing Dublin/Pleasanton Station.

ACE Parking. There are two ACE stations in Livermore, one located on Vasco Road near Brisa Street, the other downtown on Railroad Avenue adjacent to the Livermore Transit Center. The ACE station on Vasco Road provides a surface parking lot with a total of 216 parking spaces. The downtown Livermore ACE station shares a municipal parking garage with a total of 550 spaces. Parking is free at both parking facilities.

BART Park-and-Ride Lot. The park-and-ride lot is located along Airway Boulevard at Rutan Drive in the northern region of Livermore. The lot is owned by BART and includes 148 regular parking stalls, and six disabled stalls. Currently, the parking lot is free for patrons. The LAVTA WHEELS #12 and #12V bus transit routes serve this location. The lot will be relocated with construction of the new I-580/Isabel Avenue interchange.

Pedestrian Facilities

There are existing sidewalks along most of the study roadway segments within the study area. The sidewalks range from five to 10 feet wide at various locations and are generally in good condition. Crosswalks exist at most of the study intersections, but on many major arterials, pedestrian crossings are only in place along one approach in the north-south or east-west directions to limit pedestrian crossing conflicts and exposure to high traffic areas. Because pedestrian facilities are diffused and continuous throughout the study area, the general character of existing pedestrian facilities in each of the study jurisdictions is discussed below.

Livermore. Existing pedestrian facilities in Livermore consist of a continuous sidewalk network, linking residents and visitors to retail, commercial, and recreational uses. The majority of sidewalks are landscaped, with street trees and planters. In the downtown area, widened sidewalks include sidewalk-dining and street furniture with on-street parking separating pedestrians from vehicle traffic. The majority of major arterials and collector roads provide sidewalks, often separated by planter strips. In the eastern region of Livermore (a mixture of primarily industrial, agricultural, and undeveloped land uses) sidewalks or crosswalks are provided inconsistently. In addition, sidewalks and crosswalks are not present at most I-580 ramp junctions. The majority of other major intersections provide adequate painted crosswalks, with pedestrian signals. Typical sidewalk widths in this area range from five to 10 feet wide. Pedestrian access to existing bus transit service is limited, with bus transit connections primarily along major arterials and collector roads, with minimal access along local roadways. Pedestrian access is available to the existing ACE station in the downtown area that includes sidewalks and appropriate signage for transit patrons walking to the station. There is limited pedestrian access to the ACE station located along Vasco Road (in the eastern region of Livermore) with sidewalk access only to the north side of the station area. There are no existing sidewalks accessing the BART park-and-ride lot located along Airway Boulevard in north Livermore.

Dublin. The existing pedestrian network in the City of Dublin provides adequate sidewalks and crosswalks to accommodate pedestrian movements. Typical sidewalk widths range between six to eight feet wide, with amenities such as planter strips and on-street parking functioning as buffers between pedestrians and vehicular traffic. However, the loop and cul-de-sac layout of much of the residential development often increases the walking distance to reach collector and arterial streets. Sidewalks are present along most major arterials and provide access to major retail centers. Crosswalks are evident at most major intersections and are complemented with pedestrian countdown signals, "chirping"/walking indicators (to indicate walking is permitted), and painted crosswalk lines. Pedestrian crossing signs are located at each I-580 ramp junction; however, pedestrian signalization or countdown signals are not present at all these locations. Existing pedestrian facilities also allow direct connection and access to existing transit services. Sidewalks are present at the existing Dublin/Pleasanton Station, providing access for patrons walking from parking lots, garages, drop-off areas, or surrounding roadways. Bus stops and shelters along major arterials provide pedestrian access to bus transit services.

Pleasanton. The City of Pleasanton's pedestrian circulation system has sidewalks along most roadways linking residents and visitors to a variety of retail, commercial, and recreational uses. On most streets, sidewalks are separated from the roadway by planter strips and street trees. Typical sidewalk widths range between 6 to 10 feet wide. In the downtown area, the streets are laid out in a grid pattern providing convenient pedestrian access. In some downtown locations, the sidewalks are widened for sidewalk-dining and sitting areas; on-street parking separates pedestrians from vehicle traffic. Outside the downtown, streets are laid out with loop roads and cul-de-sacs. This circuitous layout increases the walking distance to surrounding arterials and destinations outside the neighborhood. On freeway overpasses, sidewalks are delineated by concrete barriers that provide a physical separation between pedestrians and traffic. Painted crosswalks are located at most major intersections and many are accompanied by pedestrian countdown signals and "chirping"/walking indicators. Existing pedestrian facilities allow direct connection and access to existing transit services. Sidewalks are present at the existing Dublin/Pleasanton Station, providing station access for patrons walking to and from parking lots, garages, drop-off areas, or surrounding roadways. Bus stops and shelters along major arterials provide pedestrian access to bus transit services.

Trail Facilities

The study area is crisscrossed by a network of existing and future trails along major roadways, canals, creeks, and railroad corridors. These trails, commonly referred to as Class I bicycle paths[5], are generally for the shared use of pedestrians and bicyclists. Some are also open for equestrian use. The existing and future trail network is shown on Figure 3.2-4. Trails in the study area are designated by the cities of Dublin, Pleasanton, and Livermore as well as the East Bay Regional Park District (EBRPD) and Livermore Area Recreation and Park District (LARPD).[6] In addition, many of these trails are considered to be of regional significance and are included in the Alameda Countywide Bicycle Plan and the Regional Bicycle Plan for the San Francisco Bay Area.[7] The existing trails in the vicinity of the BART extension alternatives and of most significance for serving the station sites are:

- Altamont Creek Trail – Sections of this trail are built in the City of Livermore along Altamont Creek between Hartford Road and Laughlin Road.
- Arroyo Mocho Trail – This trail runs east-west from Isabel Avenue to South Livermore Avenue at the Livermore Civic Center and ultimately to the Almond Avenue School in the City of Livermore.
- Collier Canyon Creek Trail – This trail runs north-south in the City of Livermore along Collier Canyon Creek from Las Positas College to I-580.

[5] Class I Bicycle Path is defined by Caltrans as "a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized" in Chapter 1000: Bikeway Planning and Design of the *Highway Design Manual*.

[6] Livermore Bikeways Map, 2008; draft Pleasanton Bicycle and Pedestrian Master Plan, February 2009; the Dublin Bikeways Master Plan, June 2007.

[7] Alameda Countywide Bicycle Plan (2006) and Regional Bicycle Plan for the San Francisco Bay Area (2009) prepared by the Metropolitan Transportation Commission.

- Iron Horse Trail – This trail currently serves the existing Dublin/Pleasanton Station from Concord to the north along the abandoned Southern Pacific right-of-way. This trail is maintained by the EBRPD.
- Isabel Trail –Along the new section of Isabel Avenue from Jack London Boulevard to Alden Lane (south of Concannon Boulevard) in the City of Livermore.
- Las Positas Trail – Sections of this trail are built in the City of Livermore south of I-580 along Las Positas Creek to the west and east of North Livermore Avenue and north of I-580 from west of Springtown Boulevard to Northfront Road at I-580.
- Stanley Boulevard Trail – This trail runs on the south side of Stanley Boulevard from Isabel Avenue extending west. This trail is along the future alignment of the Iron Horse Trail in the City of Livermore.

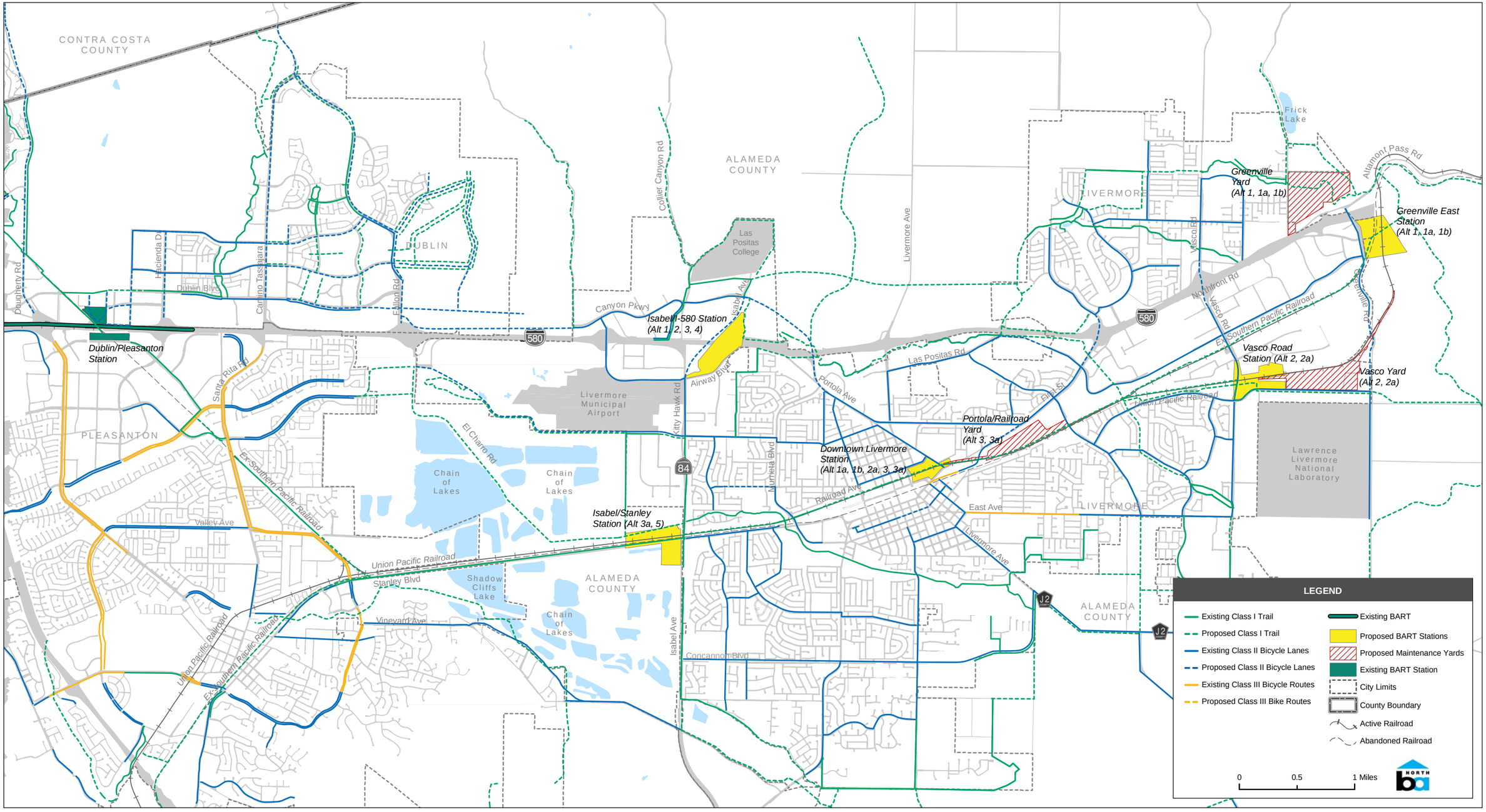
Bicycle Facilities

According to recent relevant plans for the cities of Dublin, Pleasanton, and Livermore, on-street bicycle facilities are designated on the majority of arterial and collector streets in the study area. On-street bicycle facilities fall into two categories as designated by Caltrans: Class II bicycle lanes and Class III bicycle routes.[8] (Off-street facilities – Class I bicycle paths – are discussed in the previous "Trails" section.) Bicycle lanes (Class II) provide a restricted right-of-way for the exclusive use of bicycles with a striped lane on the street or highway. Bicycle routes (Class III) provide a shared facility with pedestrians or motor vehicles designated with signage and/or pavement markings. Existing bicycle routes and lanes are concentrated in the City of Livermore. Existing and future on-street bicycle facilities are shown in Figure 3.2-4.

Of particular significance are the existing on-street bicycle facilities that are in the vicinity of the BART extension alternatives and, together with the trails discussed above, would serve the station sites. These include:

- Airway Boulevard from North Canyons Parkway to Kitty Hawk Road in the City of Livermore.
- Chestnut Street between North P Street in Downtown Livermore with access to the Downtown ACE Station.
- Collier Creek Canyon Road from Portola Avenue to I-580 in the City of Livermore.
- First Street from Las Positas Road to the Downtown ACE Station in the City of Livermore with a short gap (approximately 1,000 feet) west of Portola Avenue.
- Greenville Road near the Greenville East Station site in the City of Livermore.

[8] Caltrans, Chapter 1000: Bikeway Planning and Design of the *Highway Design Manual*.



Source: City of Dublin, 2007; City of Livermore, 2008; City of Pleasanton, 2008.

EXISTING TRI-VALLEY BICYCLE AND TRAIL FACILITIES

FIGURE 3.2-4

- Hopyard Road serving the existing Dublin/Pleasanton Station from the south in the City of Pleasanton.
- Junction Avenue in Downtown Livermore from Portola Avenue to the Downtown ACE Station.
- Las Positas Road from south of I-580 to Greenville Road in the City of Livermore.
- Murrieta Boulevard from Olivina Avenue to west of Holmes Street in the City of Livermore.
- North Mines Road from Las Positas Road to East Avenue in the City of Livermore.
- Patterson Pass Road from North Mines Road to Greenville Road serving the Vasco Road ACE Station in the City of Livermore.
- Portola Avenue from Rincon Street to Junction Avenue in the City of Livermore.
- Stanley Boulevard east of Isabel Avenue in the City of Livermore.
- Vasco Road from city limits to the north to East Avenue to the south serving the Vasco Road Ace Station in the City of Livermore. There is a gap in this facility across the I-580 interchange.

Impact Assessment and Mitigation Measures

Standards of Significance

The analysis of potential project impacts relies on standards of significance established by the jurisdictions within the study area. The standards of significance are the thresholds used to determine whether a project would result in a significant impact and to indicate a need for mitigation measures. This section describes the standards of significance used in the following impact analysis for the BART system, freeways, arterial roadways, local intersections, transit services, parking, pedestrians, trails, and bicycles as established by the relevant jurisdiction(s). In the absence of established thresholds, alternative criteria were set that are consistent with applicable policies and regulations and the study purpose.

BART System. An extension of BART service to Livermore would generate additional ridership and usage of the existing BART "core" system. In order to accommodate the additional ridership BART may have to add additional vehicles beyond those required to service the extension. Adding more vehicles to the system may exceed the car storage and maintenance capacity that is available. BART has various efforts underway to increase the operating capacity of the system, to expand and modernize its vehicle fleet, and to increase storage and maintenance efforts. Until these efforts are better defined, it is not clear how much future capacity would be available to address the needs of a BART to Livermore Extension. Given these considerations, an extension alternative would have a potentially significant impact on the BART core system if it required that more BART vehicles be purchased to prevent passenger crowding on the existing BART system. These would be vehicles in excess of those required to service the actual BART to Livermore Extension. Similarly, an extension alternative would

also generate a potentially significant system-wide impact if it required more cars than can reasonably be accommodated at existing BART storage/maintenance facilities.

Freeways, Arterials, and Intersections. Depending on the type of roadway and the jurisdiction of the study intersection or roadway/highway segment, the traffic analysis uses criteria from the City of Livermore General Plan 2003-2025 (February 2004), City of Pleasanton General Plan Draft EIR (August 2008), City of Dublin General Plan (November 2008), the Alameda County Congestion Management Agency (ACCMA) 2007 Congestion Management Program (CMP), and/or the Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) to assess the potential impact of a project. Level of Service (LOS) is the established criteria for assessing traffic impacts as a qualitative description of performance. There would be a significant traffic impact if the LOS resulting from the project is worse than the acceptable threshold or significance criteria established by the agency with jurisdiction over the subject freeway, roadway, or intersection. A more detailed description of LOS can be found in the following "Methodology" section.

Tables 3.2-6, 3.2-7, and 3.2-8 identify the jurisdiction and significance criteria for freeway segments, arterial routes, and intersections in the study area, respectively.

Descriptions of the different significance criteria by jurisdiction are presented below.

City of Livermore. An extension alternative would have a significant traffic impact if it would conflict with the City of Livermore General Plan policy to maintain traffic mid-LOS D (with average delay of 45 seconds per vehicle) or better for all intersections, except for those intersections located in the Downtown Specific Plan area, which are exempt, and intersections near freeway ramps as indicated in the General Plan as allowing LOS E.

City of Pleasanton. Based on the City of Pleasanton General Plan DEIR, an extension alternative would have a significant traffic impact if it would:

- Conflict with the City of Pleasanton General Plan DEIR policy to maintain traffic LOS D or better for all intersections and roadways.
- For both signalized and unsignalized intersections, change LOS from LOS D or better to LOS E or F. For the intersections already operating at unacceptable level of service (LOS E or worse) conditions, add new trips that would increase the V/C ratio by 0.01 or more.[9]

[9] Under the existing General Plan, intersections located in the Downtown area are currently exempt from operating at LOS D or better. Traffic at these intersections may exceed LOS D standard if no reasonable mitigation exists or if the necessary mitigation is contrary to other goals and policies of the City.

Table 3.2-6
Standards of Significance – Freeway Segments

Freeway	From:	To:	Jurisdiction	LOS
I-580	Hopyard Road	Hacienda Drive	Caltrans/ACCMA	E
I-580	Hacienda Drive	Santa Rita Road	Caltrans/ACCMA	E
I-580	Santa Rita Road	El Charro Road	Caltrans/ACCMA	E
I-580	El Charro Road	Airway Boulevard	Caltrans/ACCMA	E
I-580	Airway Boulevard	Isabel Avenue[b]	Caltrans/ACCMA	E
I-580	Isabel Avenue[a]	Livermore Avenue	Caltrans/ACCMA	E
I-580	Livermore Avenue	First Street	Caltrans/ACCMA	E
I-580	First Street	Vasco Road	Caltrans/ACCMA	E
I-580	Vasco Road	Greenville Road	Caltrans/ACCMA	E
I-580	Greenville Road	East of Greenville Road	Caltrans/ACCMA	E

Source: Wilbur Smith Associates, 2009.

Notes:

a. This interchange does not exist; however, the interchange is planned for the Year 2035.

Table 3.2-7
Standards of Significance – Arterial Study Segments

Arterial	From	To	Jurisdiction[a]	LOS
1. Greenville Road	Altamont Pass Road	Patterson Pass Road	MTS	E
2. Vasco Road	Northfront Road	East Avenue	MTS	E
3. First Street	I-580 EB Ramp	Scott Street	CMP-MTS	E
4. First Street	Scott Street	Holmes Street/Murrieta Boulevard/ College Avenue	MTS	E
5. Livermore Avenue	I-580 Eastbound Ramps	Chestnut Street	MTS	E
6. Livermore Avenue	Chestnut Street	East Avenue	MTS	E
7. Stanley Boulevard	Valley Avenue	Murrieta Boulevard	MTS	E
8. Stanley Boulevard	Murrieta Boulevard	Livermore Avenue	MTS	E
9. Isabel Avenue	I-580 Eastbound Ramps	Concannon Boulevard	CMP-MTS	E

Source: Wilbur Smith Associates, 2009.

Note:

a. The City of Livermore does not have an established standard of significance criteria for arterials. The arterial LOS threshold of LOS E set forth by the Alameda County Congestion Management Agency (ACCMA) has been applied to the study segments. Within the Congestion Management Program (CMP) roadway network, these "regionally significant" routes (CMP routes and Metropolitan Transportation System [MTS] routes) have a LOS threshold LOS E.

Table 3.2-8
Standards of Significance – Study Intersections

	Study Intersections	Jurisdiction	Control	LOS
1.	Airway Boulevard/Isabel Avenue	Caltrans[a]	Signal	C/D[c]
2.	Stanley Boulevard/Isabel Avenue On Ramp	Livermore[b]	Signal	D
3.	Isabel Avenue/Stanley Boulevard On Ramp	Caltrans[a]	Signal	C/D[c]
4.	Portola Avenue/Murrieta Boulevard	Livermore[b]	Signal	D
5.	Murrieta Boulevard/Stanley Boulevard	Livermore	Signal	E[g]
6.	Portola Avenue/Livermore Avenue	Livermore[b]	Signal	D
7.	Livermore Avenue/Chestnut Street	Livermore[b]	Signal	D
8.	First Street/Livermore Avenue	Livermore	Signal	E[f]
9.	First Street/Scott Street	Livermore	SSSC	n/a
10.	Vasco Road/Las Positas Road	Livermore[b]	Signal	D
11.	Vasco Road/Brisa Street	Livermore[b]	Signal	D
12.	Vasco Road/Patterson Pass Road	Livermore[b]	Signal	D
13.	Greenville Road/Altamont Pass Road	Livermore	Signal	E[e]
14.	Southfront Road/Greenville Road	Livermore	Signal	E[e]
15.	Hopyard Road/Owens Drive	Pleasanton	Signal	D[d]
16.	Owens Drive/Willow Road	Pleasanton	Signal	D
17.	Hacienda Drive/Owens Drive	Pleasanton	Signal	D[d]
18.	Hacienda Drive/Dublin Boulevard	Dublin	Signal	D
19.	Stanley Boulevard/Valley Avenue	Pleasanton	Signal	D
20.	Greenville Road/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
21.	Greenville Road/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
22.	Vasco Road/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[cc]
23.	Vasco Road/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
24.	First Street/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
25.	First Street/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
26.	Livermore Avenue/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
27.	Livermore Avenue/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
28.	Isabel Avenue[a]/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
29.	Isabel Avenue[a]/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
30.	Airway Boulevard/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
31.	Airway Boulevard/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
32.	Fallon Road/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
33.	El Charro Road/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
34.	Hacienda Drive/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
35.	Hacienda Drive/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]
36.	Hopyard Road/I-580 Westbound Ramps	Caltrans[a]	Signal	C/D[c]
37.	Hopyard Road/I-580 Eastbound Ramps	Caltrans[a]	Signal	C/D[c]

Source: Wilbur Smith Associates, 2009.

Notes:

Signal – Traffic Signal

SSSC – Side-Street Stop-Controlled

Delay presented in seconds per vehicle.

a. Intersections fall under Caltrans jurisdiction.

b. City of Livermore intersection threshold LOS mid-D (delay less than 45 seconds per vehicle).

c. Represents a target LOS at the transition between LOS C and LOS D under Caltrans jurisdiction.

d. Gateway intersections where the LOS can exceed target LOS D

e. LOS standard is LOS E for intersections near interchanges per General Plan.

f. Intersection in the Downtown Area is exempt from the threshold LOS D.

g. Intersection where LOS standards can be exceeded per General Plan.

n/a No established LOS standard.

City of Dublin. Based on the City of Dublin General Plan, an extension alternative would have a significant traffic impact if it would:

- Conflict with the City of Dublin General Plan policy to maintain traffic LOS D (V/C <0.91) or better for all intersections and roadways.
- For both signalized and unsignalized intersections, change LOS from LOS D or better to LOS E or F. For the intersections already operating at unacceptable level of service (LOS E or worse) conditions, add new trips that would increase the V/C ratio by 0.01 or more.

Alameda County. Based on the ACCMA 2007 CMP, the extension alternatives would have a significant traffic impact on CMP roads if it would:

- Conflict with the ACCMA policy that in no case shall the level of service standards for roads established be below the LOS E or at the current level, whichever is further from LOS A.

The study arterial segments are under the jurisdiction of the ACCMA. The ACCMA, in collaboration with the Metropolitan Transportation Commission (MTC), designated Metropolitan Transportation System (MTS) routes to link land use decisions with CMP routes. CMP and MTS routes have been declared "regionally significant" and have been adopted into the CMP network. The LOS standard is LOS E, except where LOS F was the LOS when originally measured in the CMP in 1991 for specific routes.[10] None of the study arterial segments were measured at LOS F in 1991; therefore, the LOS significance threshold of LOS E is applicable to both MTS and CMP routes within the study area. For major arterials, the LOS is based on the average travel speed for the segment or entire arterial and the intersection approach delay. For study purposes, if a study arterial segment is operating at LOS F under the No Build Alternative, and the arterial segment continues to operate at LOS F and the average speed would be worse than under the No Build Alternative under one of the BART extension alternatives, a significant impact would result.

Caltrans. Based on the Caltrans' Guide for the Preparation of Traffic Studies, an extension alternative would have a significant impact if it would conflict with the Caltrans policy that endeavors to maintain a target level of service at the transition between LOS C and LOS D on State highway facilities or add trips to facilities already over the target level of service.

Connecting Transit. For the purposes of this Program EIR, a generalized set of significance criteria has been used to evaluate transit impacts across the multiple services available in the Livermore-Amador Valley based on a review of the standards of several different agencies. The specific standards of individual agencies and the precise impacts of the different extension alternatives should be

[10] ACCMA, 2009 Congestion Management Program, July 2009.

considered in the project-level analysis. For the purposes of this Program EIR, a transit impact is considered significant if any of the following were to occur:

- A decrease in transit ridership such that current or planned transit services is no longer viable or productive.
- An increase in transit ridership that exceeds the capacity of existing or planned transit services.

Parking. There are no established criteria for the assessment of parking impacts. For the purposes of this Program EIR, potential parking impacts are measured by comparing the planned supply with the demand based on ridership travel demand estimates to the proposed stations. A BART extension alternative would have a significant impact on a station area if sufficient parking supply could not be provided to meet demand at a proposed station.

Pedestrian, Trail, and Bicycle. There are no established criteria for the assessment of pedestrian, trail, or bicycle impacts. For purposes of this Program EIR, a significant impact would result if the extension alternatives eliminated pedestrian and bicycle access to adjoining areas. In addition, a significant pedestrian, trail, or bicycle impact is identified if the BART extension alternatives conflict with adopted policies supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Impact Classification. For each transportation impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, TR refers to Transportation.

Methodology

As required by CEQA, impacts are identified as the change to "baseline" conditions which are normally the conditions that exist at the time environmental analysis is commenced. A transportation project includes significant capital infrastructure that takes years to construct and is intended to meet long-term needs. As a result, the effects of transportation projects are, and should be, evaluated based on a longer-term perspective that takes increases in population and programmed changes to the transportation system into account. Since the project is addressing both existing and long-term growth and transportation shortfalls, that longer-term perspective includes projections of reasonably foreseeable other improvements.

For this project the long-term permanent impacts are evaluated against expected condition existing in 2035. This assumes the planned growth (jobs and employment) and related funded transportation improvements as proposed in the MTC RTP.

BART System. The ACCMA countywide transportation model was used to develop the ridership forecasts for each of the extension alternatives and for the No Build Alternative. The latest 2009 version of the model was used and refined to capture travel patterns in the BART to Livermore Extension study area. The projections of population and employment that were input into the model were based on ABAG Projections 2007. The model includes San Joaquin County so that the forecasts include the future travel demand by both auto and transit from San Joaquin County via the Altamont Pass. Validation tests were conducted to assure that the model forecasts were reasonably close to actual traffic and transit ridership counts.

In order to assure a reasonable distribution of ridership to the existing and the potential new stations on each of the BART extension alternatives, an incremental loading technique was used to assign the ridership to the system. Initially each station was assigned a time penalty representing the time required to access the station, park, and walk to the BART platform. Under the theory that the larger a station, the longer this access time, for each 1,000 spaces of additional parking demand, additional time was added to the access penalty. These revised penalties were then used to assign the ridership among the stations. This process was continued until the distribution of riders stabilized. The result is that the ridership estimates represent unconstrained demand (demand to use a particular station without constraints on the availability of parking), but the ridership estimates are reflective of the magnitude of the delay that riders experience when parking in large station parking facilities and then walking to the station platform. Using this process, ridership estimates and parking demands were developed for each of the extension alternatives and for each of the potential new stations.

The estimates of ridership assume that adequate parking will be provided at each of the stations. If parking supply at one or more of the stations was constrained to levels below that indicated by the forecasts, a reduction in ridership and/or a reallocation of ridership to other stations could occur. The ridership estimates are based on land use assumptions which are consistent with the land use policies of the cities and the County in the study corridor. The forecasts do not consider potential additional development that might occur around the stations that could result from new land use policies enacted to take advantage of the increased accessibility offered by the BART extension.

The ridership forecasts developed for each of the extension alternatives were used to estimate the number of BART cars needed to serve the alternative and to provide adequate train capacity on the BART core system. The forecasts were based on the existing BART network plus the BART projects contained in the fiscally constrained Regional Transportation Plan (RTP) prepared by MTC in 2002 and include the new West Dublin/Pleasanton Station (currently under construction), located just west of the I-580/I-680 interchange; the Warm Springs extension (a one-stop extension south from the Fremont BART Station); the Oakland Airport Connector (a people-mover linking Oakland International Airport with the Coliseum/Oakland Airport BART Station); and the eBART extension to eastern Contra Costa County. The Silicon Valley Rapid Transit project, the BART extension from Warm Springs to San Jose, was not included because it is currently not a fully funded project. The estimates of the additional cars associated with each extension alternative were then used to test the ability of each extension alternative to provide adequate car storage and maintenance capacity.

Freeway Analysis. Freeway segment operating conditions were evaluated using the Highway Capacity Manual (HCM) 2000 methodology. This methodology computes LOS for basic freeway segments using vehicle density as the measure of effectiveness, or degree of congestion. Table 3.2-9 presents the LOS criteria for freeway segments using density as the performance measures. Density is measured in vehicles per mile per travel lane. Specific parameters (geometric data, volume, and base free-flow speed) flow rate and speed are determined. Using flow rate and speed, density of the freeway segment is computed and a LOS is determined. Freeway levels of service range from LOS A, which represents free-flow operations and vehicles are almost completely unimpeded in their ability to maneuver the traffic stream, to LOS F, which represents breakdown in vehicular flow, with extensive queuing and significant congestion.

Table 3.2-9
Level of Service Criteria – Basic Freeway Segments

Level of Service	Density (vehicles/mile/lane)
A	0.0 – 11.0
B	11.1 – 18.0
C	18.1 – 26.0
D	26.1 – 35.0
E	35.1 – 45.0
F	> 45.0

Source: Transportation Research Board, Highway Capacity Manual, 2000.

Arterial Analysis. Arterial segment operating conditions were also evaluated using the HCM 2000 methodology. The arterial LOS is based on the average travel speed of all through vehicles for the segment, section, or entire arterial under consideration. The average travel speed is computed from the running time on the arterial segment(s) and the intersection approach delay. LOS values are determined and categorized by four distinct classes, based on the range of free-flow speeds (the average speed a motorist would travel if there were no congestion or other adverse conditions) and typical travel speeds. Arterial levels of service range from LOS A, in which travel conditions are at average travel speeds with minimal delay at signalized intersections, to LOS F, which represents arterial flow at extremely low speeds and long delays at intersections with extensive queuing. Table 3.2-10 presents the LOS criteria for arterial segments using average travel speed and arterial classification as the performance measures.

Table 3.2-10
Level of Service Criteria – Arterial Segments

Urban Street Class	I	II	III	IV
Range of Free Flow Speed	55 to 45 mph	45 to 35 mph	35 to 30 mph	35 to 25 mph
Typical Free Flow Speed	50 mph	40 mph	35 mph	30 mph
LOS	**Average Travel Speed (mph)**			
A	> 42	> 35	> 30	> 25
B	> 34-42	> 28-35	> 24-30	> 19-25
C	> 27-34	> 22-28	> 18-24	> 13-19
D	> 21-27	> 17-22	> 14-18	> 9-13
E	> 16-21	> 13-17	> 10-14	> 7-9
F	≤ 16	≤ 13	≤ 10	≤ 7

Source: Transportation Research Board, Highway Capacity Manual, 2000.

Intersection Analysis. Intersection LOS is a qualitative description of the performance of an intersection based on the average delay per vehicle. Intersection levels of service range from LOS A, which indicates free flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays. The HCM 2000 methodology calculates LOS value based on the average delay in seconds at the intersection. ACCMA guidelines permit this approach to deriving LOS using HCM 2000 methodology (and Synchro 7 traffic analysis software); this approach has been used in this Program EIR.

Signalized Intersections. The average delay for study area signalized intersections was calculated using Synchro analysis software and is correlated to LOS as shown in Table 3.2-11.

Unsignalized Intersections. Unsignalized intersections were evaluated using HCM 2000 methodology. In this case, the LOS is based on the "weighted average control delay" expressed in seconds per vehicle as illustrated in Table 3.2-12. Control delay includes the sum of all the individual movements that a vehicle might go through at an unsignalized intersection, including initial deceleration delay, queue move-up time, stopped delay, and final acceleration.

At two-way stop-controlled (TWSC) intersections, LOS is calculated for each controlled movement, as opposed to the intersection as a whole. For all-way stop-controlled (AWSC) locations, LOS is computed for the intersection as a whole.

Table 3.2-11
Level of Service Criteria – Signalized Intersections

Level of Service	Description of Operations	Average Delay (seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 – 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 – 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume/capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable	35.1 – 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 – 80.0
F	Operations with delays unacceptable to most drivers occurring due to over saturations, poor progression, or very long cycle lengths.	≥ 80.1

Source: Transportation Research Board, Highway Capacity Manual, 2000.

Table 3.2-12
Level of Service Criteria – Unsignalized Intersections

Level of Service	Description of Operations	Average Delay (seconds)
A	Minimal delay for stop-controlled approaches.	≤ 10.0
B	Operations with minor delays.	10.1 – 15.0
C	Operations with moderate delays.	15.1 – 25.0
D	Operations with some delays.	25.1 – 35.0
E	Operations with high delays, and long queues.	35.1 – 50.0
F	Operations with extreme congestion, with very high delays and long queues unacceptable to most drivers.	≥ 50.1

Source: Transportation Research Board, Highway Capacity Manual, 2000.

Parking Demand Forecast. The parking demand forecast for each station per extension alternative was based on unconstrained projections (i.e., not constrained by a fixed number of available parking spaces) which allows a more realistic assessment of the potential parking demand. Furthermore, the parking demand is based on the travel demand and ridership forecasts; primarily the number of riders driving to the stations per extension alternative.[11] If parking supply at one or more of the stations was constrained to levels below that indicated by the forecasts, a reduction in ridership and/or a reallocation of ridership to other stations could occur. In addition, parking spillover into the areas surrounding the station could occur. Furthermore, new transit-oriented development around the stations sites would likely also have constrained parking availability. In this case, parking impacts from the BART station could occur and parking management controls would be likely to prevent spillover parking by BART patrons outside the station site.

Future Transportation Network

BART System Improvement Projects. Projected BART year 2035 systemwide ridership and ridership for the West Dublin/Pleasanton Station (to be completed in 2010) and the existing Dublin/Pleasanton Station is summarized in Table 3.2-13. Systemwide weekday ridership is expected to grow by 82 percent over current levels. Significant ridership increases are also forecast for the existing Dublin/Pleasanton Station, even with the completion of the new West Dublin/Pleasanton Station.

Table 3.2-13
Future (2035) BART Ridership

BART Systemwide (Daily Weekday Riders[a])	658,400
West Dublin/Pleasanton Station (Daily Weekday Trips[b])	17,700
Dublin/Pleasanton Station (Daily Weekday Trips[b])	26,400

Source: Dowling, 2009.

Notes:

a. BART riders reflect the BART patron's journey on the BART system from entry to exit and are counted by exits from the BART system.

b. BART trips are used to measure the actual activity at a station and are counted by entries and exits at that specific station.

[11] Dowling Associates, Inc., Transportation and Parking Demand Analysis, July 2009.

Regional Improvement Projects. ACCMA, MTC, and Caltrans have proposed several improvement projects along the major highways in the area of Dublin, Pleasanton, and Livermore. The goal is to improve traffic flow and mitigate commuter congestion along I-580, I-680, and SR 84. The following projects have been scheduled:

Improvement Projects for I-580

- I-580 Westbound High Occupancy Vehicle lane from Greenville Road to Foothill Road (west of I-680)
- I-580 Eastbound High Occupancy Vehicle lane from Hacienda Drive to Greenville Road
- Segments of I-580 Eastbound and Westbound auxiliary lanes between Tassajara Road/Santa Rita Road to Vasco Road
- I-580 Eastbound truck climbing lane from Greenville Road to summit at North Flynn Road

Improvement Projects for I-680

- I-680 Ramp Metering
- I-680 Northbound HOV lanes from Alameda Creek to Alcosta Boulevard
- I-680 Southbound HOV lanes from Alcosta Boulevard to SR 84

Improvement Projects for SR 84

- SR 84 is planned to be widened to four lanes from Pigeon Pass to I-680
- A southbound auxiliary lane will be added from SR 84 onto I-680
- Other SR 84 improvements in Livermore are described below

Pleasanton Arterial and Intersection Improvement Projects. The Pleasanton General Plan has identified a wide range of street, highway, and intersection improvements that must be constructed in a timely manner. Table 3.2-14 summarizes the intersection and roadway lane improvements required to support full development of the Pleasanton Planning Area. Unlike the list of regional projects identified in the Triangle Study, relatively few new roadways need to be constructed in Pleasanton. The Stoneridge Drive extension, Busch Road, El Charro Road, and the Nevada Street extension are the four remaining segments of roadway that are not yet constructed. Completion of the Stoneridge Drive extension, Busch Road, and El Charro Road are significant and necessary parts of Pleasanton's local circulation system. The extension of Nevada Street has the potential to provide some traffic relief to the Stanley Boulevard/Valley Avenue/Bernal Avenue intersection.

Table 3.2-14
Proposed Improvements for Pleasanton near Study Area

Roadway	Limits	Improvement	Timeframe
Stoneridge Drive	Trevor Pkwy to El Charro Road	Extension	-
Foothill Road	I-580 EB off-ramp	New Traffic Signal	By 2010
El Charro Road	At Stanley Boulevard	New Traffic Signal	By 2015
Hacienda Drive	I-580 EB off-ramp	Interchange reconfiguration	-
Hacienda Drive	Owens Drive	Intersection expansion	-
Hopyard Road	I-580 EB ramp	Interchange reconfiguration	-
Hopyard Road	I-580 WB off-ramp	Interchange reconfiguration	-
Hopyard Road	Owens Drive	Intersection reconfiguration	-
Santa Rita Road	Stoneridge Drive	Intersection reconfiguration	By 2015
Stanley Boulevard	Valley Avenue	Intersection expansion	By 2010
Stoneridge Drive	Hopyard Road	Intersection reconfiguration	By 2010
Hacienda Drive	West Las Positas Boulevard	Signal timing	After 2015
West Las Positas Boulevard	Hopyard Road	Intersection expansion	After 2015

Source: City of Pleasanton Proposed General Plan DEIR, August 2008.

(-) Indicates that the proposed improvement completion date has not been determined.

The timetable for construction of the Stoneridge Drive extension will depend on a regional agreement among Pleasanton, Livermore, Dublin, and Alameda County – for a strategic approach and funding plan for relieving traffic congestion in the Tri-Valley. That agreement will address improvements to I-580, I-680, and SR 84, as well as completion of a regional arterial network that includes Dublin Boulevard, Jack London Boulevard, North Canyons Parkway/Portola Avenue, and Stoneridge Drive. El Charro Road will also provide relief to the Pleasanton network by providing a new roadway with direct freeway access along the eastern edge of Pleasanton.

The City has established a computerized traffic monitoring and signalization system, the Central Traffic Computer and Monitoring System, which is used to produce a regular Baseline Traffic Report that depicts current and projected traffic conditions for all existing plus approved development. These projections of "existing plus approved" are a midway point between existing counts and buildout projections and help determine when new major improvements will be necessary to avoid traffic congestion. In addition to the existing plus approved projections, a five-year projection is made of those developments deemed likely to be built within the next five years.

Livermore Arterial and Intersection Improvement Projects. The Livermore General Plan specifies improvements for local highway segments and interchanges, as well as details roadway segments and intersections requiring improvement in the future. Livermore also details how truck routes in the area will be affected by upcoming construction.

The 2001 RTP for the San Francisco Bay Area (revised in November 2002) was developed by MTC. The following roadway improvement projects are scheduled on regional facilities in and near the City of Livermore area and are identified in the RTP:

- Vasco Road/I-580 interchange improvements
- I-580/First Street interchange improvements
- I-580/Greenville Road interchange improvements (Phase I improvement)
- Rehabilitation and widening of First Street from I-580 to Scott Street (Phase II improvement; widens the Phase I bridge)
- Widening of Isabel Avenue (SR 84) to six lanes from I-580 to Stanley Boulevard, four lanes from Stanley Boulevard to Ruby Hill Drive and other roadway improvements through Pigeon Pass to I-680
- Isabel Avenue/SR 84/I-580 interchange improvements; second bridge to provide six lanes
- Widening of Isabel Avenue to four lanes (along SR 84 alignment) from I-580 south to Vallecitos Road and improvements along SR 84 through Pigeon Pass over I-580 (Phase 2)
- Extension of Las Positas Road between First Street and Vasco Road
- Extension of North Canyons Parkway westerly to Dublin Boulevard
- Extension of Jack London Boulevard from El Charro Road to Isabel Avenue (SR 84)
- Ramp metering along I-580 from I-580/I-680 interchange east to Altamont Pass

There are roadway segments in Livermore where additional roadway capacity will likely be needed to maintain acceptable service levels based on traffic modeling and engineering analysis. On some roadway segments, widening will be required to add one additional lane of travel in each direction. However, on other roadway segments, particularly those near I-580 that serve high percentages of non-local cut-through traffic, additional roadway widening is not proposed. This is due to Livermore's goal to not encourage cut-through traffic and to not create regional by-pass routes on local streets.

The proposed widening improvements in the Livermore area are shown in Table 3.2-15 below. However, there are three roadway segments that have undergone a reduction of lanes. Chestnut Street from North P Street to Junction Avenue, First Street from South P Street to Maple Avenue/Railroad Avenue, and North P Street from Pine Street to Chestnut Street will all be reduced from four lanes to two lanes.

Table 3.2-15
Proposed Roadway Widening Improvements for Livermore

Street	Limits	Existing Number of Lanes	Proposed Number of Lanes
Greenville Road	Northfront to National	4	6
Greenville Road	National to Patterson Pass	2	4
Holmes Street	Wetmore to Alden	3	4
Isabel Avenue	Portola to Airway	0	6
Isabel Avenue	Stanley to Vallecitos	2	4
Isabel Avenue	Airway to Jack London	4	6
Isabel Avenue	Jack London to Stanley	2	6
Jack London Boulevard	Isabel to El Charro	2/0	4
Las Positas Road	East of First to west of Vasco	0	4
Las Positas Road	Vasco to Lawrence	2	4
Las Positas Road	North Livermore to First	2/3	4
Las Colinas Road	Las Colinas to Redwood	0	2
North Livermore Ave	I-580 to Las Positas	4	6
North Canyons Pkwy	Doolan Canyon to Fallon	0	4
North Canyons Pkwy	Airway to Collier Canyon	0	4
Portola Avenue	Isabel to I-580	0	4
Portola Avenue	Murrieta to L	2/4	4
Portola Avenue	Collier Canyon to Isabel	4/0	6
Railroad Avenue	L to First	2	4
Scenic Avenue	East end to Laughlin	0	2
Stanley Boulevard	Western city limits to Murrieta	4	6
Vallecitos Road	Isabel to west of Ruby Hills	2	4
Vallecitos Road	Pigeon Pass	2	4
Vasco Road	Patterson Pass to Las Positas	4	6
Vasco Road	Las Positas to I-580	4	8
Vasco Road	I-580 to Scenic	4	6

Source: City of Livermore General Plan: Circulation Element, 2003.

At some intersection locations, mid-block roadway widening as noted above will not be adequate to maintain desired levels of service. At some locations, however, it is not possible to provide enough lane capacity to achieve mid-level LOS D or LOS E (threshold varies depending on location) because environmental constraints, right-of–way constraints or cut-through traffic volumes or other City policies prevent the implementation of improvements which would achieve mid-level LOS D/LOS E (as applicable) or better. Those locations are:

- First Street/North Mines Road
- Isabel Avenue/Airway Boulevard
- Isabel Avenue/Jack London Boulevard

- Vasco Road/Northfront Road
- Vasco Road/I-580 Eastbound Ramps
- Concannon Boulevard/S. Livermore Avenue
- Holmes Street/Fourth Street
- Stanley Boulevard/Murrieta Boulevard

Connecting Transit Improvement Projects. The future transit improvements expected for the Livermore, Pleasanton, and Dublin area span the multiple transit agencies serving the Livermore-Amador Valley. The "core" transit agencies discussed in the "Existing Conditions" section (BART, ACE, and LAVTA) expect continued operation and completion of a number of programmed system improvements. For the purposes of this Program EIR, it is also assumed that Tri Delta Transit, SJRTD, County Connection, and MAX will continue operation and will complete programmed system improvements.

BART. As a future component of the regional transportation network, BART service is expected to be extended south from Fremont to Warm Springs. BART is also expected to complete the West Dublin/Pleasanton Station, the Oakland Airport Connector, and the eBART extension to east Contra Costa County. Future BART ridership is discussed in detail in the ridership section.

ACE. ACE anticipates a variety of changes to its service in both the near and longer term. In the immediate short term, ACE is not currently anticipating any service cuts, but with the national and California economy in decline, the agency is experiencing reduced ridership and therefore plans to reduce the size of the trains. This will save in fuel costs and storage costs of the cars in San Jose. Additionally, ACE is planning to change their 9:30 a.m. train departure from Stockton to leave around 7:00 a.m. to accommodate more peak hour commuter traffic. In addition, the early afternoon train will shift from departing San Jose at 12:05 p.m. to a later evening departure time of 6:40 p.m. in order to catch a greater share of homebound evening commuters. This plan is currently still in discussion, but is perceived to be a key way to increase ridership while still maintaining similar costs. Also in the short term, ACE plans to extend a shuttle service from its Pleasanton platform to the new West Dublin/Pleasanton Station.

Future plans for ACE are also expressed in the current San Joaquin Regional Rail Commission 2006-2016 Short Range Transit Plan (SRTP) adopted in October 2007. The SRTP identifies $393 million in capital projects, including a $300 million ACE corridor purchase. From this list, ACE has identified $340.5 million in projects for which Measure B funds may be used as a local match. The Alameda County Transportation Improvement Authority (ACTIA) will allocate funds to leverage other funding sources on these projects. Measure B funds have been used to construct a new Livermore parking garage, completed in 2004; expanded surface parking at the Vasco ACE Station in 2007; a tie replacement/grade crossing improvement project between Niles and Santa Clara, completed in 2005; installation of bike racks at stations, completed in 2007; and signal upgrades completed in 2008. The other project planned for implementation is track improvements. No more specific projects have been priced or planned. ACE will likely benefit from the planned developed of the California High-Speed

Rail (HSR) service. The HSR rail network includes a branch line connection between the Central Valley and the Bay Area via the Altamont Pass. This linkage would be accomplished through an upgraded ACE service which would involve an improved track alignment for better speed and reliability and increased train frequencies.

LAVTA. Since the release of their short-range transit plan in May 2008, several service changes are expected due to recent economic changes in California and the nation as a whole. LAVTA has prepared a three-stage process for reducing services in order to cut costs while maintaining as much ridership as possible. Ridership has decreased substantially over the past year, and therefore the agency has decided to cut services. The cuts are planned to occur across some 14 different routes and will primarily impact Saturday and Sunday service but will also include reducing weekday frequencies, shortening routes, and eliminating trips.

LAVTA's main project in their 2008 short range transit plan is improving its current Route 10 service, which carries 50 percent of the agency's fixed route system-wide ridership. This project is planned to continue independent of the service cuts described above. Route 10 connects all three downtowns of the Tri-Valley to the existing Dublin/Pleasanton Station. Various iterations of this project have been studied in recent years. Current plans include two rapid bus routes serving much of the Route 10 service area including 1) a rapid bus route connecting Downtown Pleasanton with the existing Dublin/Pleasanton Station with signal priority, limited stops, and more frequent service, and 2) the 'Tri-Valley Rapid' serving Lawrence Livermore Laboratory, Downtown Livermore, the Dublin/Pleasanton Station, and Stoneridge Mall. This service would also be extended to serve the new West Dublin/Pleasanton Station. In addition to the service improvements for the Pleasanton segment, the 'Rapid' would include enhanced vehicles and stops, real-time information, and headways of 10 minutes (peak) and 15 minutes (off-peak).

LAVTA is not planning on changing other bus services to the West Dublin/Pleasanton Station currently under construction. The agency has several bus routes that pick up nearby including Route 4, Route 5, Route 10, Route 50, and Route 53/54. Depending on the alignment of the BART extension alternative, LAVTA will change its services accordingly. However, it is less likely that LAVTA will increase service to stations distant from major economic hubs.

Tri Delta Transit. Tri Delta Transit published their Short Range Transportation plan in July 2008. For service planned beyond 2010, the agency expects the eBART project currently underway to have significant impacts on the transit network. With more than $2 million annually of Tri Delta Transit's revenue coming from routes servicing the current end-of-line Pittsburg/Bay Point BART Station, and other funds due to the agency's coordination with BART, when the extension is completed, Tri Delta Transit peak service levels will be have to be reduced. No other service changes are expected for Tri Delta in the Livermore, Pleasanton, and Dublin area. The commuter express route is expected to continue operating as it is currently.

SJRTD. SJRTD currently recognizes a demand for expanding current Interregional Commuter Services to the existing Dublin/Pleasanton Station or to whichever new end-of-the-line station would result from the BART extension alternatives.

County Connection. The County Connection routes serving the Livermore-Amador Valley are not programmed or expected to change in the near future.

MAX. BART Express service between the existing Dublin/Pleasanton Station and the Modesto Downtown Transportation Center is not expected to change in the near future.

Parking Improvement Projects. Each of the extension alternatives would provide parking for park-and-ride users at each station area. Only the Downtown Livermore Station would be located in a developed area with expected parking constraints. Recommendations from the Downtown Livermore Parking study were developed to accommodate growth in parking demand due to the full buildout of the Livermore Downtown Specific Plan (2007), including the Livermore Valley Regional Performing Arts Center.[12] The City will implement a parking management plan to optimize the use of their existing parking supply including: making existing private facilities available to the public for extended hours, promotion of valet parking, the implementation of time limits, and parking pricing. However, to fully accommodate downtown specific plan buildout, additional parking supply will be required. The following parking facilities or equivalent parking facilities will be required to meet downtown demand:

- A 500-space parking facility to accommodate the buildout of the Performing Arts Center;
- 40 new on-street spaces in the Livermore Village Site;
- Implementation of angled parking on:
  - First Street between South L and South P Street (add 50 spaces), and
  - Maple Street between First and Railroad Ave (add 10 spaces);
- Implementation of Phase II of Livermore Valley Center Parking Garage (add 300 spaces); and
- Additional parking south of the downtown core area through purchase and public private partnership development.

With the development of a BART station in the downtown, there would likely be parking management measures put in place to control the potential spillover of station parkers and to protect the parking available for existing and new downtown development around the station.

Pedestrian Improvement Projects. There are a variety of pedestrian improvements planned for the cities of Dublin, Pleasanton, and Livermore. The majority of planned improvements include sidewalk widening, enhancing pedestrian crosswalks, installation of additional streetscape amenities, and improvements to pedestrian accessibility to existing and future transit stations. Descriptions of future pedestrian facilities for each of the study area jurisdictions are outlined below.

[12] This complex includes the existing Bankhead Theater and Bothwell Arts Center and future 2,000 seat regional theater scheduled for completion in 2011.

Dublin. The downtown area is the focal point of planned pedestrian improvements. The City of Dublin General Plan (2008) encourages higher density pedestrian-oriented developments, including pedestrian connections between existing and planned retail, commercial, and recreational centers. Infill and parking lot landscaping improvements are to be implemented to create more pedestrian-oriented areas throughout the City. City design standards for future pedestrian facilities have been updated to include minimum sidewalk width standards of 10 feet, and street furnishing to incorporate, at minimum, a coordinated selection of benches and garbage receptacles along with thematic street lighting. Pedestrian crossings at all major intersections are to be treated with enhanced paving material (pavers, brick, or other hardscape material) to accentuate safety and comfort for pedestrians. Lighted crosswalks at major intersections are encouraged. A pedestrian corridor is planned for the downtown area, which will also improve sidewalk access to various regions throughout the City. As developments are planned in the future, sidewalk and crosswalk conditions near the station will be monitored and maintained to design and operating standards as set forth by the City.

Pleasanton. The City of Pleasanton has proposed several improvements throughout its pedestrian network, with emphasis on its downtown as well as other subareas. Future improvements are stipulated by a series of requirements and include a minimum sidewalk width standard of five feet and a requirement for sidewalk separation from the street by a minimum five-foot landscape strip on all roads. In the downtown area (or areas with high pedestrian demand), sidewalk widening, special lighting, signage, and seating areas are to be installed. Future crosswalk treatments are required to be marked with accessible pedestrian signals and for areas with high pedestrian activity, crosswalks are to include high visibility crosswalks, accessible pedestrian signals, increased lateral separation, grade separation, special traffic signaling, pedestrian islands, and raised crosswalks where applicable. Midblock crossings are proposed to reduce walking distances, specifically at major intersections with high pedestrian activity. The expansion of the Iron Horse Trail through the Hacienda Business Park area is planned to increase accessibility for patrons of the trail or transit patrons walking from the existing Dublin/Pleasanton station to the business campus. As developments are planned in the future, sidewalk and crosswalk conditions near the station will be monitored and maintained to design and operating standards as set forth by the city.

Livermore. Future pedestrian improvements in Livermore include a variety of planned projects. Increasing pedestrian connectivity and continuity among several land uses throughout the downtown and other subareas are designated as a high priority for the City. In addition, design standards are to be imposed, prescribing a five-foot minimum sidewalk width and separation from vehicle areas by curbing and trees. Areas with high pedestrian activity are to be clearly demarcated; sidewalks and crosswalks are to be constructed with special paving and surface materials along with special lighting and streetscape amenities. Notable sidewalk improvements also include the planned installation of new streets, primarily in the downtown area. New streets are planned to be developed around the existing railroad tracks, and bounded by Chestnut Street to the north, Railroad Avenue to the south, Livermore Avenue to the east, and Fenton Street to the west.[13] These planned streets will include new sidewalks, ultimately enhancing the pedestrian connectivity throughout the downtown area. These sidewalks will also provide additional access to local retail, commercial, and recreational uses.

[13] City of Livermore, Livermore Downtown Specific Plan, March 2007.

Trail Improvement Projects. Proposed trails and multi-use paths in the study area are included in plans for the cities of Dublin, Pleasanton, and Livermore as well as the County of Alameda and San Francisco Bay Area. Proposed trails in the study area that would provide access to the BART extension alternatives station areas are identified below:

- Altamont Creek Trail – Extension of the Altamont Creek Trail designated by the City of Livermore from Laughlin Road to Altamont Pass Road would provide access from the north of I-580 to Greenville East Station site.
- Arroyo Mocho Trail – Extension of existing trail along El Charro Road from south of I-580 to Isabel Avenue in the City of Livermore connecting to the Isabel/Stanley Station site.
- Arroyo Seco Trail – Extension of existing trail in the City of Livermore from Las Positas Road (Las Positas Trail) to existing segment west of Vasco Road.
- Brushy Peak Trail from Del Valle Regional Park to the Iron Horse trail near the Greenville East Station site designated by the City of Livermore and Alameda County.
- Cayetano Creek Trail – Segment in the City of Livermore along tributary of Las Positas Creek from Portola Avenue to I-580.
- Iron Horse Trail – Designated at the city, county, and regional level through Alameda County from the borders with Contra Costa and San Joaquin counties. Within the study area, the Iron Horse Trail would follow the UPRR (with a short portion along the SPRR) alignment from the existing Dublin/Pleasanton Station to the Altamont Pass. Some portions of this trail currently exist. When completed, it would provide direct access to the Isabel/Stanley, Downtown Livermore, and Greenville East Station sites and within one-third mile of the Vasco Road Station site.
- Los Colinas Road/Lassen Road Trail – New connection in the City of Livermore from Springtown Boulevard to I-580 and future Las Positas Creek Trail.
- Las Positas Creek Trail – Infill to complete existing trail in the City of Livermore from Sutter Street (South of I-580) to Springtown Boulevard.
- Patterson Pass Road Trail – Segment in the City of Livermore connecting future Arroyo Seco and Iron Horse Trails to Brushy Creek Trail along Patterson Pass Road and Arroyo las Positas on the south side of the UPRR. This trail serves the Vasco Road Station.
- Vasco ACE Station trail connection – Connection in the City of Livermore between future Arroyo Seco and Iron Horse Trails, Vasco ACE Station, and Vasco Road on the north side of the UPRR.

Bicycle Improvement Projects. Proposed on-street bicycle facilities as defined at the city, county, and/or regional level that could provide access to the proposed station sites are identified below:

- Dublin Boulevard/Collier Canyon Road/North Canyons Parkway extension – Bicycle lanes along this future roadway from the City of Dublin to Isabel Avenue as designated by the cities of Dublin and Livermore, Alameda County, and MTC.
- Isabel Avenue – Bicycle lanes on a future roadway to fill an existing gap between Portola Avenue and Kitty Hawk Road (will be renamed Isabel Avenue with completion of the interchange and related expressway improvements) designated by the City of Livermore, Alameda County, and MTC. This connection would directly serve the Isabel/I-580 Station as well as fill in gaps for access to the Isabel/Stanley Station.
- Greenville Road – Completion of existing bicycle lanes with infill of the segment north of Patterson Pass Road by the City of Livermore providing access to the Greenville East Station from the south.
- Los Positas Road – Infill of a short segment of bicycle lanes in the City of Livermore adjacent to I-580 between North Mines Road and First Street.
- Portola Avenue – Bicycle lanes along the future roadway extension as designated by the city and county across I-580 to future Isabel Avenue in the City of Livermore.
- Vasco Road – Infill of a gap on the existing bicycle lanes at I-580 that would extend this city and county designated facility from the Contra Costa County line to Mines Road and would serve the Vasco Road Station site.

Environmental Analysis

Each of the nine BART extension alternatives and the No Build Alternative were analyzed for potential transportation impacts. The following regional transportation topics were addressed: BART system, freeways, arterial roadway segments, intersection levels of service, connecting transit service, parking, pedestrians, trails, and bicycle facilities. The following discussion summarizes the primary differences in performance between alternatives under each transportation criterion. Table 3.2-16 and Table 3.2-17 expand upon this discussion.

BART System. All the extension alternatives would generate substantial new transit ridership resulting in a positive benefit. The added ridership for each BART extension alternative would generate a significant impact on BART's core system, as the added ridership from the extension would cause crowding on trains operating on the existing system. BART has plans to replace and modernize its existing railcars, to increase its car fleet, and expand its maintenance/storage capacity to address ridership growth over time. These plans currently do not directly take into account the impacts of the additional ridership associated with the BART extension alternatives. However, because the amount of growth is relatively small compared to needs of the entire BART system, BART expects that these impacts can be reduced to less than significant by incorporating the demand into BART's future fleet and facility procurement efforts. The specific impacts of a BART extension on the system

infrastructure will have to be dealt with in detail at the time that a project-level environmental study is performed.

Freeway. The BART extension alternatives generally result in reduced traffic on the I-580 freeway. However, this reduction in freeway traffic is somewhat offset by the increases in traffic accessing the new BART stations. Under the BART extension alternatives, certain freeway segments would perform at unacceptable conditions due to a reduction in level of service compared with the No Build Alternative. This would be a result of an increase in the number of vehicles traveling within the corridor, due to station traffic. This creates significant impacts for each BART extension alternative. No mitigations are available to improve these conditions; therefore, these impacts to freeway segments constitute significant and unavoidable impacts. However, with the BART extension alternatives, some freeway segments would operate better than under the No-Build Alternative due to the auto trips which are attracted to the BART extension. For these segments, the BART extension alternatives would result in a beneficial impact on the I-580 freeway. For all the alternatives, the number of freeway segments with beneficial impacts exceeds the number of adversely impacted segments.

Arterials. Certain study area arterial street segments would function at unacceptable conditions, thereby creating significant impacts, under all alternatives. These impacts on arterial segments can be mitigated to less-than-significant levels. The alternatives also have a beneficial effect on the operations of some of the arterial segments.

Intersections. Certain study intersections would perform at unacceptable conditions, and thereby create significant impacts, under all alternatives. All impacts to intersections are expected to be mitigated to less-than-significant conditions, except the Portola Avenue/Livermore Avenue intersection under Alternatives 3, 3a, and 4. All alternatives also have a beneficial effect on the operations of some of the study intersections.

Connecting Transit. None of the alternatives are expected to have impacts on supporting regional transit services, including LAVTA, ACE, Tri Delta Transit, SJRTD, and MAX. While ridership on existing bus connections to the existing Dublin/Pleasanton Station and the BART park-and-ride lot in northern Livermore would be expected to decline as riders shift to the BART to Livermore Extension, it is expected that existing bus routes would be reconfigured to respond to changes in demand and to provide service to the BART extension stations. With the exception of Alternative 4 – Isabel/I-580 which has no connection to ACE, all of the alternatives would generate significant new riders on the ACE system consistent with the goals of the BART to Livermore Extension Program. ACE would need additional capacity to accommodate the riders which is consistent with current plans by ACE and California High-Speed Rail Authority (should it occur in the future via the Altamont Pass) to expand and improve service. This impact would be less than significant.

Table 3.2-16
Summary of Transportation Impacts in the BART to Livermore Extension Study Area

Alignment Alternative	BART System		Freeway		Arterials		Intersections[b]		Connecting Transit		Parking		Pedestrian		Trail		Bicycle Facilities	
	Impact	Mitigated to LTS?	Impact[a]	Mitigated to LTS?	Impact[a]	Mitigated to LTS?	Impact[a]	Mitigated to LTS?	Impact	Mitigated to LTS?	Impact	Mitigated to LTS?	Impact	Mitigated to LTS?	Impact	Mitigated to LTS?	Impact	Mitigated to LTS?
No Build	NA	NA	5-S	NA	3-S	NA	12-S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 – Greenville East	PS	Yes	7-B 1- S	No	2-B 1-S	Yes	8-B 4-S	Yes	LTS	Yes	NI	NA	PS	Yes	PS	Yes	PS	Yes
1a –Downtown-Greenville East via UPRR	PS	Yes	7-B 1-S	No	2-B 2-S	Yes	8-B 4-S	Yes	LTS	Yes	S	Yes	PS	Yes	NI	NA	PS	Yes
1b –Downtown-Greenville East via SPRR	PS	Yes	7-B 1-S	No	2-B 2-S	Yes	8-B 4-S	Yes	LTS	Yes	S	Yes	PS	Yes	NI	NA	PS	Yes
2 – Las Positas	PS	Yes	6-B 2-S	No	2-B 1-S	Yes	6-B 7-S	Yes	LTS	Yes	NI	NA	PS	Yes	PS	Yes	PS	Yes
2a –Downtown-Vasco	PS	Yes	7-B 1-S	No	1-B 3-S	Yes	8-B 5-S	Yes	LTS	Yes	S	Yes	PS	Yes	NI	NA	PS	Yes
3 – Portola	PS	Yes	5-B 4-S	No	2-B 2-S	Yes	8-B 4-S	No	LTS	Yes	S	Yes	PS	Yes	PS	Yes	PS	Yes
3a –Railroad	PS	Yes	6-B 2-S	No	2-B 3-S	Yes	7-B 5-S	No	LTS	Yes	S	Yes	PS	Yes	PS	Yes	NI	NA
4 – Isabel/I-580	PS	Yes	5-B 4-S	No	2-B 1-S	Yes	8-B 4-S	No	LTS	Yes	NI	NA	PS	Yes	PS	Yes	PS	Yes
5 – Quarry	PS	Yes	5-B 4-S	No	2-B 1-S	Yes	7-B 5-S	Yes	LTS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact B = Beneficial NA = Not Applicable
Note:
a. Number of segments or intersections impacted or benefited as compared to No Build.
b. The intersection performance summary reported in this table reflects PM peak hour operation only. See Impact TR-4 for a full description of AM and PM operation.

Table 3.2-17
Interaction Between Build Alternatives and Existing/Planned Multimodal Transportation Network

Alternative	Highway	Arterials and Intersections[a]	Connecting Transit	Parking	Bicycle/Pedestrian
1 – Greenville East	More so than other alternatives, a BART extension with a station at Greenville East would attract trans-Altamont commuters and overburden this section of I-580; however, BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on seven segments and it would have an adverse impact on the one segment east of Greenville Road.	Three arterial study segments would be affected. One segment would operate worse under Alternative 1 than under 2035 No Build conditions. One arterial segment would improve to acceptable conditions with this alternative while another would improve but continue to operate at an unacceptable LOS as under No Build conditions. Twelve intersections in the study area would be affected. Four are anticipated to perform worse than the already unacceptable No Build conditions. Six intersections would improve to acceptable levels of service. Two intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels.	A BART station at Greenville East would benefit connecting commuter bus routes from the east, as it would allow for shorter bus trips (and thus a potential reduction in operating costs for these services); however, this station as well as Isabel/I-580 would require supplemental LAVTA bus service. A connection to ACE would be possible at Greenville East Station but may be less likely than other alternatives to provide a connection to future high-speed rail service. This alternative has the highest future ridership of all the alternatives and it would require the greatest number of additional vehicles to prevent crowding on the BART core system.	Adequate parking would be available to serve the demand at both stations. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both proposed stations, although station locations distant from population centers might discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.
1a – Downtown Greenville East via UPRR	More so than other alternatives, a BART extension with a station at Greenville East would attract trans-Altamont commuters and overburden this section of I-580; however, BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area this alternative would have a beneficial effect on seven segments and it would have an adverse impact on the one segment east of Greenville Road.	Four arterial study segments would be affected. Two segments would operate worse under Alternative 1a than under 2035 No Build conditions. Two arterial segments would improve to acceptable conditions with this alternative. Twelve intersections in the study area would be affected. Four are anticipated to perform worse than the already unacceptable No Build conditions. Three intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels. Five intersections are anticipated to improve to acceptable conditions with this alternative.	A BART station at Greenville East would benefit connecting commuter bus routes from the east as it would allow for shorter bus trips (and thus a potential reduction in operating costs for these services); the Downtown Livermore Station would also integrate well with existing/future LAVTA bus service and ACE or future high-speed rail service. This alternative generates a high level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system.	The Downtown Livermore Station would not have adequate parking to serve the anticipated demand. This impact could be mitigated by providing additional parking at the Greenville East Station and using parking management measures to control BART patron parking activities in the downtown area. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both stations. A station in Downtown Livermore would afford convenient access to the town's amenities; however, the Greenville East Station location is distant from population centers and might discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.
1b – Downtown Greenville East via SPRR	The highway issues discussed for Alternative 1a apply to this alternative.	The arterial roadway and intersection issues discussed for Alternative 1a apply to this alternative.	The transit issues discussed for Alternative 1a apply to this alternative.	The parking issues discussed for Alternative 1a apply to this alternative.	The bicycle/pedestrian issues discussed for Alternative 1a apply to this alternative.

Table 3.2-17
Interaction Between Build Alternatives and Existing/Planned Multimodal Transportation Network

Alternative	Highway	Arterials and Intersections[a]	Connecting Transit	Parking	Bicycle/Pedestrian
2 – Las Positas	BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on six segments and it would have an adverse impact on two segments.	Three arterial segments would be affected. One arterial segment would operate worse with Alternative 2 than under 2035 No Build conditions. One segment would improve to acceptable conditions with this alternative while another would improve but continue to operate at an unacceptable LOS as under No Build conditions. Thirteen intersections in the study area would be affected. Seven are anticipated to perform worse than the already unacceptable No Build conditions. Two intersections would improve operations when compared with the No Build Alternative, but would remain at an unacceptable level. Four intersections are anticipated to improve to acceptable conditions with this alternative.	A BART station at Vasco Road would integrate well with connecting commuter bus services from the east as some routes already serve this station area. The station would require LAVTA bus service re-routing or supplemental service. The station integrates well with ACE or future high-speed rail service. The Isabel/I-580 Station would afford less robust transit service and would require that additional lines be re-routed to serve the station. This alternative generates a high level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system.	Adequate parking would be available to serve the demand at both stations. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both proposed stations, although station locations distant from population centers might discourage access by bicycle or foot. This condition is less prevalent at the Vasco Road Station site, where existing/planned housing and employment and potential redevelopment around the station may encourage station access by bicycle and walking. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.
2a –Downtown-Vasco	BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on seven segments and it would have an adverse impact on the one segment east of Greenville Road.	Four arterial segments would be affected. Two segments would continue to operate at an unacceptable LOS as under No Build conditions but would worsen with Alternative 2a. One segment would operate at an unacceptable LOS as compared to No Build. One segment would improve to acceptable conditions with this alternative. Thirteen intersections in the study area would be affected. Four are anticipated to perform worse than the already unacceptable No Build conditions. One intersection would worsen from acceptable to unacceptable conditions. Three intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels. Five intersections are anticipated to improve to acceptable conditions with this alternative.	A BART station in Downtown Livermore would integrate well with existing/future LAVTA bus service and ACE or future high-speed rail service. The Vasco Road Station, although it would require additional LAVTA service, would also integrate well with ACE and connecting commuter bus services from the east; some of these routes already serve this station area. This alternative generates a high level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system.	The Downtown Livermore Station would not have adequate parking to serve the anticipated demand. This impact could be mitigated by providing additional parking at the Vasco Road Station and using parking management measures to control BART patron parking activities in the downtown area. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both proposed stations. A station in Downtown Livermore would afford convenient access to the town's amenities. The Vasco Road Station's location is distant from Downtown Livermore, although existing/planned housing and employment around the station may encourage station access by bicycle and walking. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.

Table 3.2-17
Interaction Between Build Alternatives and Existing/Planned Multimodal Transportation Network

Alternative	Highway	Arterials and Intersections[a]	Connecting Transit	Parking	Bicycle/Pedestrian
3 – Portola	A BART extension with a station at Isabel/I-580 would attract trans-Altamont commuters and overburden this section of I-580; however, this potential may not be as pronounced as alternatives with a station at Greenville East. Additionally, BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on five segments and it would have an adverse impact on four segments.	Four arterial street segments would be affected. One segment would operate at an unacceptable LOS when compared to No Build conditions while another would worsen when compared to No Build conditions but continue to operate at an unacceptable LOS. One segment would improve to acceptable conditions with this alternative, while another would improve when compared to No Build conditions but continue to operate at an unacceptable LOS. Twelve intersections in the study area would be affected. Four are anticipated to perform worse than the already unacceptable No Build conditions. Four intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels. Four intersections are anticipated to improve to acceptable conditions with this alternative.	A BART station at Downtown Livermore would integrate well with existing/future LAVTA bus service and ACE or future high-speed rail service. The Isabel/I-580 Station would afford less robust local transit service and would require that additional lines be re-routed to serve the station. While Isabel/I-580 would be a convenient terminal for commuter bus services from the east, this station would not offer connections to ACE as would be possible in Downtown Livermore. This alternative generates a moderate level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system.	The Downtown Livermore Station would not have adequate parking to serve the anticipated demand. This impact could be mitigated by providing additional parking at the Isabel/I-580 Station and using parking management measures to control BART patron parking activities in the downtown area. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both stations. A station in Downtown Livermore would afford convenient access to the town's amenities. The Isabel/I-580 Station location is distant from population centers and might discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.
3a –Railroad	This alternative does not provide any stations immediately adjacent to I-580, although the Isabel/Stanley Station would be accessible by the upgraded SR 84. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on six segments and it would have an adverse impact on two segments.	Five arterial street segments would be affected. Two segments would operate at an unacceptable LOS when compared to No Build conditions, while another would worsen when compared to No Build conditions but continue to operate at an unacceptable LOS. One segment would improve to acceptable conditions with this alternative, while another would improve when compared to No Build conditions but continue to operate at an unacceptable LOS. Twelve intersections in the study area would be affected. Five are anticipated to perform worse than the already unacceptable No Build conditions. Two intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels. Five intersections are anticipated to improve to acceptable conditions with this alternative.	A BART station at Downtown Livermore would integrate well with existing/future LAVTA bus service and ACE or high-speed rail service. The Isabel/Stanley Station would afford less robust local transit service but would be situated along LAVTA's bus rapid transit line. As a terminal for commuter bus routes from the east, the Isabel/Stanley or Downtown Livermore Stations would not be as effective as a station located adjacent to I-580, but would afford ACE or future high-speed rail connectivity. This alternative generates a moderate level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system.	The Downtown Livermore Station would not have adequate parking to serve the anticipated demand. This impact could be mitigated by providing additional parking at the Isabel/Stanley Station and using parking management measures to control BART patron parking activities in the downtown area. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve both stations. A station in Downtown Livermore would afford convenient access to the town's amenities. The Isabel/Stanley Station location is proximate to housing, although circuitous circulation patterns required to access the station may discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at proposed station/yard sites.

Table 3.2-17
Interaction Between Build Alternatives and Existing/Planned Multimodal Transportation Network

Alternative	Highway	Arterials and Intersections[a]	Connecting Transit	Parking	Bicycle/Pedestrian
4 – Isabel/I-580	A BART extension with a station at Isabel/I-580 would attract trans-Altamont commuters and overburden this section of I-580; however, this potential may not be as severe as alternatives with a station at Greenville East. Additionally, BART service assists in redistributing trips away from highways between Livermore and the inner Bay Area. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on five segments and it would have an adverse impact on four segments.	Three arterial segments would be affected with this alternative. One segment would operate at an unacceptable LOS when compared to No Build conditions. Two segments would improve to acceptable conditions with this alternative. Twelve intersections in the study area would be affected. Four are anticipated to perform worse than the already unacceptable No Build conditions. Two intersections would improve operations when compared with the No Build Alternative, but would remain at unacceptable levels. Six intersections are anticipated to improve to acceptable conditions with this alternative.	The Isabel/I-580 Station would afford less robust local transit service than other alternatives and would require that additional lines be re-routed to serve the station. The alternative would allow no connectivity to ACE and may be less likely than other alternatives to provide a connection to future high-speed rail service. As a terminal for commuter bus service from the east, Isabel/I-580 would be closer and would offer time/cost savings over continuing to the existing Dublin/Pleasanton Station; however, it would not be as effective a transfer point as Greenville East. This alternative generates a low level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system. This alternative would not provide sufficient train storage/maintenance capacity for the number of trains required to operate this extension.	Adequate parking would be available to serve the demand at the Isabel/I-580 Station. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve the proposed station. The Isabel/I-580 Station location is distant from population centers and might discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at the proposed station site.
5 – Quarry	This alternative does not provide a station immediately adjacent to I-580, although the Isabel/Stanley Station would be accessible by the upgraded SR 84. Of the 10 freeway segments in the area, this alternative would have a beneficial effect on five segments and it would have an adverse impact on four segments.	Two arterial segments would be adversely affected with this alternative. Of these two segments that would operate at unacceptable conditions, one segment would operate worse under Alternative 5 than under 2035 No Build Conditions. Two segments would improve to acceptable conditions with this alternative. Twelve intersections in the study area would be affected. Five are anticipated to perform worse than the already unacceptable No Build conditions. Two intersections would improve operations when compared with the No Build Alternative, but would remain at an unacceptable level. Five intersections are anticipated to improve to acceptable conditions with this alternative.	The Isabel/Stanley Station would afford less robust local transit service than other alternatives but would be situated along LAVTA's bus rapid transit route. The station would also allow connections to ACE or a future high-speed rail service. As a terminal for commuter bus routes from the east, Isabel/Stanley would not offer much time/cost savings over continuing to the existing Dublin/Pleasanton Station, but would afford ACE connectivity. This alternative generates a low level of new future ridership compared to the other alternatives and it would require the purchase of additional vehicles to prevent crowding on the BART core system. This alternative would not provide sufficient train storage/maintenance capacity for the number of trains required to operate this extension.	Adequate parking would be available to serve the demand at the Isabel/Stanley Station. Parking demands at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be reduced, although it is the least effective of all the alternatives in this respect, but not below existing levels.	A BART extension would boost demand for bike lane/trail facilities in the station area. Ample facilities, both existing and proposed, exist to serve the proposed station. The Isabel/Stanley Station location is proximate to housing, although circuitous circulation patterns required to access the station may discourage access by bicycle or foot. Some bicycle/pedestrian facilities would need to be realigned to avoid conflicts at the proposed station site.

Source: Wilbur Smith Associates, 2009.

Notes:

Formal statements of impacts and mitigations for each travel mode are found in this Transportation section. See Impact TR-2 for freeways, TR-3 for arterials, TR-4 for intersections, TR-5 for transit, TR-7 for pedestrian, TR-8 for trails, and TR-9 for bicycle

a. The intersection performance summary reported in this table reflects PM peak hour operation only. See Impact TR-4 for a full description of AM and PM operations.

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Parking. Impacts associated with the ability to supply commuter parking at proposed BART stations vary greatly by alternative. The Alternatives 1, 2, 4, and 5 would include parking facilities to accommodate projected parking demand; these alternatives would therefore result in no significant impacts on parking.

Alternatives 1a, 1b, 2a, 3, and 3a would generate significant parking impacts because future parking demand would exceed supply at the Downtown Livermore Station. This condition could be mitigated to less than significant by constructing additional parking facilities at non-downtown stations and by instituting parking management measures in the downtown area.

Pedestrian. All the alternatives could create conflicts with pedestrian facilities, thereby generating potentially significant impacts on pedestrian facilities, although these impacts could be mitigated to less-than-significant levels. This potential to generate significant impacts would be quantified and studied in greater detail in a subsequent project-specific environmental review.

Trail. Alternatives 1a, 1b, and 2a would have no impacts on study area trail facilities. Alternatives 1, 2, 3, 3a, 4 and 5 could result in potentially significant impacts to trails due to widening of I-580 and the location of stations, although these impacts could be mitigated to less-than-significant levels.

Bicycle Facilities. Alternative 3a and Alternative 5 would have no impacts on study area bicycle facilities. Alternatives 1, 1a, 1b, 2, 2a, 3, and 4 could generate potentially significant impacts to bicycle facilities. All impacts however could be mitigated to less-than-significant levels.

TR-1 BART System

Impacts to the BART system resulting from the extension alternatives may potentially affect the BART core system as well as needs for maintenance and storage facilities. Ridership with and without the extension is a key factor in assessing these impacts. Projected BART ridership is discussed below followed by assessment of program-level impacts on the BART core system and maintenance and storage facilities.

BART Ridership. Projected BART ridership for year 2035 is shown in Table 3.2-18. The BART extension alternatives would represent an approximate 3 to 5 percent increase in riders to the BART system. The highest increase in ridership over the No Build Alternative would be experienced with Alternative 1 at 31,700 daily riders. Alternatives 1a, 1b, 2a, and 3 would experience ridership levels only slightly less than those experienced with Alternative 1. Significantly lower ridership would be experienced with Alternatives 4 and 5.

Table 3.2-19 describes the 2035 total daily BART trips for the Tri-Valley area both with and without the BART extension alternatives. The alternatives would decrease demand for the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations by approximately 1,200 to 5,400 trips per day as a result of riders shifting to the new extension stations further east. However, overall BART ridership in the Tri-Valley would increase with the alternatives representing as much as 50 percent of the total projected ridership for the Tri-Valley area.

Table 3.2-18
2035 BART Systemwide Ridership

Alternative	System Ridership	Change from No Build with Extension (New BART Riders)[a]	Percent Change from No Build with Extension
No Build	658,400	NA	NA
1 – Greenville East	690,100	31,700	+4.8%
1a – Downtown-Greenville East via UPRR	689,300	30,900	+4.7%
1b – Downtown-Greenville East via SPRR	689,300	30,900	+4.7%
2 – Las Positas	688,200	29,800	+4.5%
2a – Downtown-Vasco	690,000	31,600	+4.8%
3 – Portola	688,300	29,900	+4.5%
3a – Railroad	688,100	29,700	+4.5%
4 – Isabel/I-580	678,300	19,900	+3.0%
5 – Quarry	679,200	20,800	+3.2%

Source: Dowling Associates, 2009.

Note:

NA = Not Applicable

a. BART riders reflect the BART patron's journey on the BART system from entry to exit and are counted by exits from the BART system.

Table 3.2-19
2035 BART Extension Alternatives Ridership
(Total Daily BART Trips[a])

Alternative	West Dublin/Pleasanton Station	Dublin/ Pleasanton Station	Proposed BART Extension Station(s)	Total Tri-Valley
No Build	17,700	26,400	NA	44,100
1 – Greenville East	16,800	21,900	38,100	76,700
1a – Downtown-Greenville East via UPRR	17,200	23,200	35,300	75,700
1b – Downtown-Greenville East via SPRR	17,200	23,200	35,300	75,700
2 – Las Positas	17,200	22,200	35,400	74,800
2a – Downtown-Vasco	17,200	23,900	35,200	76,300
3 – Portola	17,100	23,700	34,300	75,100
3a – Railroad	17,300	23,000	33,600	73,900
4 – Isabel/I-580	16,800	22,100	25,100	64,000
5 – Quarry	17,100	25,800	23,100	66,100

Source: Dowling Associates, 2009.

Notes:

a. Total Daily BART Trips includes both entries and exits at the respective BART station and measure the actual activity at the station. Patrons who enter and exit in the Tri-Valley area will be counted twice which accounts for variances in Change from No-Build when compared to Table 3.2-18.

NA = Not Applicable

BART patrons from San Joaquin County represent a significant segment of the ridership in the Tri-Valley area. Currently, to access the BART system, these patrons must drive, use a regional bus line, or connect via ACE by local bus. The BART extension alternatives would provide a closer connection to the BART system for San Joaquin County BART patrons by driving, bus, and in some cases as direct connection to ACE. As shown in Table 3.2-20, San Joaquin County patrons represent almost 30 percent of future BART ridership with the extension alternatives.

Table 3.2-20
2035 BART Systemwide Ridership from San Joaquin County
(Total Daily BART Trips)

Alternative	Drive Park-and-Ride	Transfer from ACE	Total San Joaquin County	Percent of Total Tri-Valley Ridership
No Build	7,200	0	7,200	16.3%
1 – Greenville East	15,800	6,800	22,600	29.5%
1a – Downtown-Greenville East via UPRR	17,600	3,800	21,400	28.1%
1b – Downtown-Greenville East via SPRR	17,600	3,800	21,400	28.1%
2 – Las Positas	17,100	5,000	22,100	29.5%
2a – Downtown-Vasco	16,400	4,900	21,300	27.9%
3 – Portola	18,300	2,400	20,700	27.6%
3a – Railroad	16,300	3,900	20,200	27.3%
4 – Isabel/I-580	16,800	0	16,800	26.2%
5 – Quarry	9,500	10,200	19,700	29.8%

Source: Dowling Associates, 2009.

The breakdown of total daily entries plus exits by station is shown in Table 3.2-21. Parking demand is also indicated in parentheses and italics below the station entries and exits. Projected ridership at the stations varies depending on the number of stations and location of the stations included for each extension alternative. As seen in the table, the greatest station activity and parking demand would be under Alternative 4 with its one station at Isabel/I-580. Projected demand at this station would involve 25,100 daily riders arriving and exiting the station, and a parking demand for 8,300 spaces. The station with the least projected activity would be Isabel/Stanley under Alternative 3a with 9,300 daily entries and exits and a parking demand for 3,600 spaces. As described previously, the ridership and parking demand at the West Dublin/Pleasanton and existing Dublin/Pleasanton Stations would be less with the BART extension alternatives.

Table 3.2-21
2035 BART Tri-Valley Station Extension Alternatives: Total Daily BART Trips
(Total Daily Parking Demand)

Alternative	West Dublin/ Pleasanton	Dublin/ Pleasanton	Isabel/ I-580	Isabel/ Stanley	Downtown Livermore	Vasco Road	Greenville East
No Build	17,700 *(3,000)*	26,400 *(5,400)*	NA	NA	NA	NA	NA
1 – Greenville East	16,800 *(3,000)*	21,900 *(4,600)*	16,200 *(5,100)*	NA	NA	NA	21,900 *(5,500)*
1a – Downtown-Greenville East via UPRR	17,200 *(3,000)*	23,200 *(5,000)*	NA	NA	23,000 *(5,100)*	NA	12,300 *(4,500)*
1b – Downtown-Greenville East via SPRR	17,200 *(3,000)*	23,200 *(5,000)*	NA	NA	23,000 *(5,100)*	NA	12,300 *(4,500)*
2 – Las Positas	17,200 *(3,000)*	22,200 *(4,700)*	16,000 *(5,600)*	NA	NA	19,400 *(5,000)*	NA
2a – Downtown-Vasco	17,200 *(3,000)*	23,900 *(5,300)*	NA	NA	18,600 *(4,700)*	16,500 *(4,700)*	NA
3 – Portola	17,100 *(3,000)*	23,700 *(5,400)*	15,100 *(5,500)*	NA	19,200 *(4,900)*	NA	NA
3a – Railroad	17,300 *(3,000)*	23,000 *(5,000)*	NA	9,300 *(3,600)*	24,300 *(5,500)*	NA	NA
4 – Isabel/I-580	16,800 *(3,000)*	22,100 *(5,400)*	25,100 *(8,300)*	NA	NA	NA	NA
5 – Quarry	17,100 *(3,000)*	25,800 *(5,400)*	NA	23,100 *(4,400)*	NA	NA	NA

Source: Dowling Associates, 2009.

Notes:

(0,000) = Total Daily Parking Demand

NA = Not Applicable

Projected mode of access to the stations is shown below in Table 3.2-22. The mode of access reflects how BART patrons are anticipated to arrive at and depart from the station. The modes of access differ between the stations and reflect certain characteristics of the station and station area. For example, stations close to residential and employment population centers would be expected to have a higher walk mode share. This would include the West Dublin/Pleasanton, existing Dublin/Pleasanton, Vasco Road, and Downtown Livermore Stations. Conversely, those stations that are removed from the population centers, such as the Greenville East, Isabel/I-580, and Isabel/Stanley Stations would have a higher rate of drive park-and-ride (patrons who drive and park at the station to ride BART). The availability of parking at the station would also affect the share of drive park-and-ride as well as the number taking transit and/or being dropped off at the station (drive kiss-and-ride). The percentage of transfers from ACE is shown at the stations where an ACE connection would be provided (Greenville East Station (Alternative 1), Vasco Road Station, Downtown Livermore Station, and the Isabel/Stanley Station (Alternative 5 only). It is also important to note that these estimates do not consider potential transit oriented-development that could occur around stations if cities or the County were to change existing land use policies.

Table 3.2-22
2035 BART Tri-Valley Station Mode of Access with Extension Alternatives

Alternative	Drive Park-and-Ride	Drive Kiss-and-Ride	Bus Transfer	ACE Transfer[a]	Walk
No Build					
West Dublin/Pleasanton	37%	43%	5%	0%	15%
Dublin/Pleasanton	45%	18%	25%	0%	12%
1 – Greenville East					
West Dublin/Pleasanton	39%	38%	5%	0%	18%
Dublin/Pleasanton	46%	9%	27%	0%	18%
Isabel/I-580	69%	14%	16%	0%	1%
Greenville East	55%	3%	6%	31%	5%
1a –Downtown-Greenville East via UPRR					
West Dublin/Pleasanton	38%	39%	5%	0%	18%
Dublin/Pleasanton	47%	11%	25%	0%	17%
Downtown Livermore	49%	9%	20%	16%	6%
Greenville East	81%	3%	13%	0%	2%
1b –Downtown-Greenville East via SPRR					
West Dublin/Pleasanton	38%	39%	5%	0%	18%
Dublin/Pleasanton	47%	11%	25%	0%	17%
Downtown Livermore	49%	9%	20%	16%	6%
Greenville East	81%	3%	13%	0%	2%

Table 3.2-22
2035 BART Tri-Valley Station Mode of Access with Extension Alternatives

Alternative	Drive Park-and-Ride	Drive Kiss-and-Ride	Bus Transfer	ACE Transfer[a]	Walk
2 – Las Positas					
West Dublin/Pleasanton	46%	27%	6%	0%	21%
Dublin/Pleasanton	47%	10%	26%	0%	17%
Isabel/1-580	77%	12%	10%	0%	1%
Vasco Road	57%	5%	10%	26%	3%
2a – Downtown-Vasco					
West Dublin/Pleasanton	38%	39%	5%	0%	18%
Dublin/Pleasanton	49%	10%	24%	0%	16%
Downtown Livermore	56%	9%	24%	5%	7%
Vasco Road	63%	5%	8%	25%	0%
3 – Portola					
West Dublin/Pleasanton	39%	39%	5%	0%	18%
Dublin/Pleasanton	50%	9%	24%	0%	16%
Isabel/1-580	80%	9%	10%	0%	1%
Downtown Livermore	56%	8%	20%	12%	4%
3a – Railroad					
West Dublin/Pleasanton	38%	40%	4%	0%	17%
Dublin/Pleasanton	48%	11%	24%	0%	17%
Isabel/Stanley	85%	1%	14%	0%	0%
Downtown Livermore	49%	9%	20%	16%	5%
4 – Isabel/I-580					
West Dublin/Pleasanton	39%	39%	5%	0%	17%
Dublin/Pleasanton	54%	7%	23%	0%	17%
Isabel/I-580	72%	13%	14%	0%	1%
5 – Quarry					
West Dublin/Pleasanton	38%	40%	4%	0%	17%
Dublin/Pleasanton	46%	14%	25%	0%	15%
Isabel/Stanley	42%	3%	11%	44%	0%

Source: Dowling Associates, 2009.

Notes:

a. ACE transfers are defined as direct rail-to-rail transit transfers.

Core System Demands. In June 2009, BART Operations Planning staff conducted an analysis to determine the system-wide impacts of an eastward BART extension to Livermore. BART staff used a number of assumptions to anticipate railcar needs for year 2035 and evaluated scenarios with foreseeable BART extension projects and BART to Livermore Program EIR alternatives.

The projected ridership for each extension alternative was split into net new trips leaving the Tri-Valley area and trips existing entirely within the Tri-Valley, defined as those stations east of and including West Dublin/Pleasanton Station. Trips exiting the Tri-Valley area were assumed to be distributed in time and destination similarly to those in BART's Connetics ridership model forecast for West Dublin/Pleasanton and existing Dublin/Pleasanton Stations for the year 2030. Nineteen percent of trips would occur during the peak hour; 24 percent would occur during the shoulder hour before and after the peak hours. Destinations of new westbound trips out of the Tri-Valley would be split as follows: 58 percent of peak period trips would follow the transbay route into San Francisco; 21 percent of peak period trips would go north into Oakland and/or transfer to another BART line. Service was assumed to be operated at 12-minute headways with additional peak period trains. At any given time, an average of 15 percent of the revenue fleet was assumed to be out of service due to maintenance.

To derive the split between those riders exiting and remaining within the Tri-Valley, station entry/exit patterns were analyzed on BART's Concord Line between Orinda and North Concord, a segment of BART service assumed to be most analogous to service between Dublin/Pleasanton and Livermore. These Concord Line stations were given an "attraction value" classification of high, medium, or low based on proximity to existing and planned activity centers:

- Walnut Creek – high: existing development and close to established downtown.
- Concord – high: close to established downtown.
- Orinda – low: no significant attraction development expected.
- Lafayette – low: no significant attraction development expected.
- Pleasant Hill – low: no significant attraction development expected.
- North Concord/Martinez – low: no significant attraction development expected.

Those stations with a higher attraction value were assumed to command a higher percentage of off-peak and reverse peak trips—which generate additional ridership and lower per capita system expansion costs with minimal additional operational costs—when compared to low attraction value stations, which primarily fulfill a park-and-ride role and remain largely dormant outside of peak travel periods. Based on this classification system, the two existing and five proposed Tri-Valley stations were rated according to their attraction value as shown below:

- West Dublin/Pleasanton – medium: some development expected.
- Dublin/Pleasanton – high: additional development and employment expected.
- Isabel/I-580 – low: no significant attraction development expected.
- Isabel/Stanley – low: no significant attraction development expected.
- Downtown Livermore – high: established downtown, with redevelopment expected.
- Vasco Road – high: Lawrence Livermore Laboratory, a major employer, and planned mixed-use development.
- Greenville East – low: no significant attraction development expected.

Concord Line stations were paired into groupings of two, three, and four to simulate 2035 Tri-Valley service under all build and no build alternatives. Actual October 2008 ridership was then reviewed between the studied Concord Line stations to estimate the likely percentage of trips that would originate and terminate within the Tri-Valley area. The results of this analysis are presented in Table 3.2-23. As shown, the percentage of the total trips associated with each of the extension alternatives that remain in the Tri-Valley area ranged from two to 12 percent. The remainder of the trips would all involve travel on the existing core system of BART.

Table 3.2-23
Percentage of Trips Completed Entirely Within the Tri-Valley Area

Alternative	Total Daily Tri-Valley Trips	Percent of Total Net Trips Remaining in the Tri-Valley
No Build	44,100	2%
1 – Greenville East	76,700	6%
1a –Downtown Greenville East via UPRR	75,700	10%
1b –Downtown Greenville East via SPRR	75,700	10%
2 – Las Positas	74,900	10%
2a –Downtown-Vasco	76,300	12%
3 – Portola	75,000	10%
3a –Railroad	73,900	10%
4 – Isabel/I-580	64,000	5%
5 – Quarry	66,100	5%

Source: BART, 2009.

Notes: The Tri-Valley area is defined as those existing and proposed stations east of and including West Dublin/Pleasanton Station.

Those trips involving travel outside the Tri-Valley area would add to the number of persons already using BART trains. Persons boarding BART trains in the Tri-Valley area and travelling to the west of the Valley would reduce the number of seats available for passengers in the areas currently served by BART. In order to prevent this additional ridership from causing crowding on trains, the number of additional cars required to offset this increased load was calculated.

Table 3.2-24 summarizes the ridership and car requirements for the BART extension alternatives. The car requirements relate to three different types of car needs:

- Extension Impacts – The No Build Alternative assumes that BART trains will arrive and depart the existing Dublin/Pleasanton Station every 12 minutes. In order to extend this frequency of service further to the east, additional cars would be needed. These are the cars required to serve the extension. As shown in Table 3.2-24, the one-station alternatives would require 10 cars (a single train) and the two-station alternatives would require 20 cars (two trains).

- Cars for Peak Load – Those passengers traveling to or from points west of the Tri-Valley will add to the passenger loads on the existing BART system. In order to prevent uncomfortable levels of crowding, additional cars would be needed.

- Spare Vehicles – BART's service policy is to have on hand 15 percent of the total vehicle fleet as spares, in order to allow for vehicles undergoing maintenance and to have backup vehicles available to replace trains which go out of service for mechanical reasons.

The analysis by BART Operations Planning staff indicates that an eastward BART extension to Livermore could have potentially significant core system impacts throughout the BART system, as it would increase ridership on the existing trains. This would place additional demands on BART's overall infrastructure. BART has plans to replace and modernize its existing railcars and to increase its car fleet to address ridership growth over time, these plans currently do not directly take into account the impacts of the additional ridership associated with the BART to Livermore Extension alternatives. However, because the amount of growth is relatively small as compared to needs of the entire BART system, BART expects that these impacts can be reduced to less than significant by incorporating the demand into BART's future fleet procurement efforts. The specific impacts of a BART extension on the vehicle fleet will have to be dealt with in detail at the time that a project-level environmental study is performed.

Table 3.2-24
BART Car Requirements for the BART Extension Alternatives

Alternative	1 – Greenville East	1a – Downtown-Greenville East via UPRR	1b – Downtown-Greenville East via SPRR	2 – Las Positas	2a – Downtown-Vasco	3 – Portola	3a – Railroad	4 – Isabel/ I-580	5 – Quarry
Total trips which begin OR end in the Tri-Valley	76,700	75,700	75,700	74,900	76,300	75,000	73,900	64,000	66,100
Percent of total trips which begin AND end in the Tri-Valley	6%	10%	10%	10%	12%	10%	10%	5%	5%
Trips which begin OR end outside the Tri-Valley	72,098	68,130	68,130	67,410	67,144	67,500	66,510	60,800	65,160
Extension Impact (Cars) [a]	20	20	20	20	20	20	20	10	10
Total Cars for Peak Load [b]	56	48	48	47	47	47	45	36	38
Spare Cars for Maintenance (15%) [c]	13	12	12	12	12	12	11	8	8
Total Cars Needed [d]	89	80	80	79	79	79	76	54	56

Source: BART, 2009.

Notes:

The Tri-Valley area is defined as those existing and proposed stations east of and including West Dublin/Pleasanton Station.

a. Cars needed to operate the extension.

b. Cars needed to serve additional riders on the core system during peak periods with the extension.

c. 15% of Total Cars Needed.

d. Total additional cars needed to serve the extension and to accommodate the added ridership on the core system plus spare vehicles.

Maintenance and Storage Facility Impacts. In an effort to manage the existing and future maintenance and storage needs of revenue vehicles, BART has recently initiated a comprehensive Strategic Maintenance Program (SMP) for the BART system. The SMP is a change in BART maintenance scheduling and activities. It will affect how the BART yard and shop facilities are designed, operated, and expanded in the future.

Each of the two-station extension alternatives would include a new yard facility, which has been sized to meet the needs of the extension. Between the new yard and the SMP program, the two-station alternatives would not have an impact on train storage and maintenance capacity of the core system. The one-station alternatives (Alternatives 4 and 5) would not include a new yard facility, and thus would not have adequate train storage and maintenance capacity to accommodate the trains within the study area. The SMP program by itself may not be enough to address the train storage and maintenance needs of the one-station alternatives. However, because the amount of growth is relatively small as compared to needs of the entire BART system, BART expects that these impacts can be reduced to less than significant by incorporating the demand into BART's future maintenance and storage improvement efforts. For example, BART is currently planning yard and shop expansion at the Hayward Maintenance Complex to handle future ridership growth. The specific impacts of a BART extension on the vehicle maintenance and storage requirements of the system will have to be dealt with in detail at the time that a project-level environmental study is performed.

The program-level impact review of the individual BART extension alternatives on the BART system is discussed below.

No Build Alternative. The No Build Alternative would also include completion of other programmed and funded transit and roadway improvements within the study area and region, including the Warm Springs Extension and the modification of I-580 to accommodate high occupancy vehicle lanes. BART ridership impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects.

Alternative 1 – Greenville East. Alternative 1 would result in the greatest demand for new BART cars. An estimated 89 new cars would be needed to serve the extension, avoid system overcrowding, and provide the desired number of spare cars. In combination with the SMP program, Alternative 1 would provide adequate train storage and maintenance capacity to serve the extension. Therefore, there would be a less-than-significant impact to BART yard and maintenance facilities. It is not clear that system capacity expansion improvement currently planned by BART would reduce these impacts to less than significant. The specific impacts of a BART extension on the vehicle fleet and other elements of the system will have to be dealt with in detail at the time that a project-level environmental study is performed.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would include two stations as well as a new storage and maintenance yard. Alternative 1a would result in a demand for 80 new BART cars to serve the extension, avoid system overcrowding, and

provide the desired number of spare cars. In combination with the SMP program, Alternative 1a would provide adequate train storage and maintenance capacity to serve the extension. As described above for Alternative 1, there would be a less-than-significant impact to BART yard and maintenance facilities. The specific impacts of a BART extension on the vehicle fleet and other elements of the system will have to be dealt with in detail at the time that a project-level environmental study is performed.

Alternative 1b – Downtown-Greenville East via SPRR. Because this alternative would include the same station and yard locations as Alternative 1a, the impacts discussed for Alternative 1a would also apply to this alternative.

Alternative 2 – Las Positas. Because this alternative would include two station locations and a yard facility, similar to Alternative 1a, the impacts discussed for Alternative 1a would also apply to this alternative.

Alternative 2a – Downtown-Vasco. Because this alternative would include two station locations and a yard facility, similar to Alternative 1a, the impacts discussed for Alternative 1a would also apply to this alternative.

Alternative 3 – Portola. Because this alternative would include two station locations and a yard facility, similar to Alternative 1a, the impacts discussed for Alternative 1a would also apply to this alternative.

Alternative 3a – Railroad. Because this alternative would include two station locations and a yard facility, similar to Alternative 1a, and would have a similar ridership demand, the impacts discussed for Alternative 1a would also apply to this alternative.

Alternative 4 – Isabel/I-580. Alternative 4 involves a one-station BART extension. The shorter extension and resulting reduced ridership forecast still demand 54 new BART cars to service the extension, prevent overcrowding on the core system, and provide BART's desired number of spare vehicles. This demand for new vehicles is a potentially significant impact on BART's core system. It is not clear that the system capacity expansion improvements currently planned by BART would reduce these impacts to less than significant. The specific impacts of a BART extension on the vehicle fleet and other elements of the system will have to be dealt with in detail at the time that a project-level environmental study is performed.

In addition, without the inclusion of a storage and maintenance yard, Alternative 4 would not provide adequate train storage and maintenance capacity to serve the extension. Additional yard and storage facilities would be needed to prevent impacts on the core system and to allow efficient operation of the extension. In addition to these needs, this alternative would also require new core system storage capacity to service the additional cars operating on the core system. The storage and maintenance needs of these additional vehicles would need to be accommodated on the West Bay and Fremont/East Bay lines. These needs may be in excess of current BART plans to expand storage and maintenance capacity. For example, BART is currently planning yard and shop expansion at the Hayward Maintenance Complex to handle

future ridership growth. The specific impacts of a BART extension on the vehicle maintenance, storage requirements and other elements of the system will have to be dealt with in detail at the time that a project-level environmental study is performed.

Alternative 5 – Quarry. Because this alternative proposes a one-station extension and no new storage and maintenance yards, Alternative 5 would be similar to Alternative 4, and the impacts discussed for Alternative 4 would also apply to this alternative.

TR-2 Freeways

Congestion on I-580 through the study area follows local and regional commute patterns with unacceptable traffic levels occurring in the westbound direction in the AM peak hour and in the eastbound direction in the PM peak hour. Traffic in the non-commute direction (eastbound in the AM peak and westbound in the PM peak) would operate at an acceptable LOS for both the No Build Alternative and each of the BART extension alternatives. A freeway impact would result from a reduction in level of service due to an increase in the number of vehicles traveling within the corridor. Conversely, a benefit would occur with a reduction in the traffic volume.

There are multiple freeway segments that would operate worse than LOS E during the westbound AM peak hour and eastbound PM peak hour. However, the majority of study segments would operate equal to or better with the BART extension alternatives than with the No Build Alternative as shown in Table 3.2-25 and illustrated in Figure 3.2-5. As a result, the extension alternatives would primarily have a beneficial impact on the freeway operations.

In the westbound direction during the AM peak hour, the following freeway segments would operate at a worse and unacceptable LOS with a BART extension alternative than with the No Build Alternative:

- Isabel Avenue – Livermore Avenue (Alternatives 3, 4, and 5)

Greenville Road – East of Greenville Road (Alternatives 1a, 1b, 2, 3, 3a, and 4) In the eastbound direction during the PM peak hour, the following freeway segments would operate at a worse and unacceptable LOS with a BART extension alternative than with the No Build Alternative:

- First Street – Vasco Road (Alternatives 3, 4, and 5)
- Vasco Road – Greenville Road (Alternative 3)

The program-level review of the impact of each of the BART extension alternatives on the freeway network is discussed below with identification of the individual freeway segments that could potentially be affected.

Table 3.2-25
I-580 Study Freeway Segment Analysis – LOS Summary by Alternative - 2035

			Freeway Segment																			
		From:	Hopyard Road		Hacienda Drive		Santa Rita Road		El Charro Road		Airway Boulevard		Isabel Avenue		Livermore Avenue		First Street		Vasco Road		Greenville Road	
		To:	Hacienda Drive		Santa Rita Road		El Charro Road		Airway Boulevard		Isabel Avenue		Livermore Avenue		First Street		Vasco Road		Greenville Road		East of Greenville Road	
Alternatives	**Direction**	**Peak Hour**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**
No Build	EB	**AM**	29	D	28.8	D	26.4	D	22	C	23.5	C	21.4	C	23.8	C	23.1	C	19	C	22.5	C
		PM	39.6	E	36.9	E	43.4	E	**47.1**	**F**	**60.7**	**F**	**68.4**	**F**	**51.8**	**F**	37.5	E	28	D	**59.8**	**F**
	WB	**AM**	**87.2**	**F**	**90**	**F**	**51.4**	**F**	**62.1**	**F**	**68.7**	**F**	44.2	E	33.1	D	24.9	C	28.3	D	36.6	E
		PM	25.8	C	24.7	C	22.4	C	23	C	25.1	C	24.4	C	22.1	C	19.7	C	16.6	B	18.7	C
1 – Greenville East	EB	AM	27.4	D	27.4	D	26.6	D	21.4	C	23.5	C	20.9	C	23.4	C	22.7	C	18.3	C	21.6	C
		PM	35.8	E	30.3	D	30.9	D	31.6	D	39.5	E	**50**	**F**	**48.9**	**F**	38.6	E	28.4	D	**74.2**	**F**
	WB	AM	**62**	**F**	**46.7**	**F**	35.4	E	36.3	E	40.9	E	37.5	E	29.3	D	23	C	26.6	D	41.3	E
		PM	26.9	D	24.6	C	22.2	C	22.8	C	24.5	C	24.3	C	22.2	C	20.1	C	16.6	B	18.7	C
1a – Downtown Greenville via UPRR	EB	AM	27.3	D	27.3	D	26.4	D	21.3	C	23.4	C	21	C	23.4	C	22.7	C	18.5	C	21.7	C
		PM	36.2	E	30.6	D	33.3	D	33.6	D	41.3	E	**50.2**	**F**	44.1	E	36.5	E	30.2	D	**85.5**	**F**
	WB	AM	**62.5**	**F**	**50.2**	**F**	37.5	E	38.4	E	43.5	E	34.7	D	27.6	D	23	C	28.7	D	**45.7**	**F**
		PM	26.8	D	24.7	C	22.3	C	22.9	C	24.7	C	23.9	C	21.9	C	20.3	C	16.6	B	18.6	C
1b – Downtown Greenville via SPRR	EB	AM	27.3	D	27.3	D	26.4	D	21.3	C	23.4	C	21	C	23.4	C	22.7	C	18.5	C	21.7	C
		PM	36.2	E	30.6	D	33.3	D	33.6	D	41.3	E	**50.2**	**F**	44.1	E	36.5	E	30.2	D	**85.5**	**F**
	WB	AM	**62.5**	**F**	**50.2**	**F**	37.5	E	38.4	E	43.5	E	34.7	D	27.6	D	23	C	28.7	D	**45.7**	**F**
		PM	26.8	D	24.7	C	22.3	C	22.9	C	24.7	C	23.9	C	21.9	C	20.3	C	16.6	B	18.6	C
2 – Las Positas	EB	AM	27.3	D	27.2	D	26.6	D	21.4	C	23.5	C	20.9	C	23.4	C	22.7	C	18.1	C	21.6	C
		PM	35.9	E	30.3	D	32.4	D	32.8	D	40.6	E	**54.9**	**F**	**53.6**	**F**	41	E	30.4	D	**70.5**	**F**
	WB	AM	**63.7**	**F**	**49**	**F**	37	E	38.9	E	42.6	E	40.7	E	31.2	D	24.1	C	28.1	D	**45**	**F**
		PM	27.1	D	24.7	C	22.4	C	23	C	24.8	C	24.3	C	22.1	C	20.3	C	16.9	B	18.6	C
2a – Downtown-Vasco	EB	AM	27.1	D	27.4	D	26.3	D	21.3	C	23.4	C	21	C	23.4	C	22.7	C	18.5	C	21.7	C
		PM	36	E	30.7	D	32.9	D	34	D	42.8	E	**48.4**	**F**	43.3	E	35.8	E	31.1	D	**75.6**	**F**
	WB	AM	**61.2**	**F**	**50**	**F**	36.9	E	37.7	E	42	E	34.8	D	27.6	D	22.9	C	28.5	D	44.3	E
		PM	26.4	D	24.8	C	22.4	C	22.9	C	24.9	C	23.9	C	21.7	C	20.4	C	16.6	B	18.7	C
3 – Portola	EB	AM	27.1	D	27.1	D	26.4	D	21.4	D	23.6	C	21.1	C	23.4	C	22.8	C	18.4	C	21.7	C
		PM	35.6	E	30.2	D	33.3	D	33.8	D	42.9	E	**72.8**	**F**	**70**	**F**	**50.7**	**F**	37.1	E	**95.2**	**F**
	WB	AM	**59.5**	**F**	**51.6**	**F**	37.8	E	38.4	E	43.5	E	**48.4**	**F**	35.5	E	26.6	D	33.3	D	**46.4**	**F**
		PM	27.1	D	24.7	C	22.4	C	23	C	24.8	C	24.4	C	22.3	C	20.6	C	16.9	B	18.6	C

Table 3.2-25
I-580 Study Freeway Segment Analysis – LOS Summary by Alternative - 2035

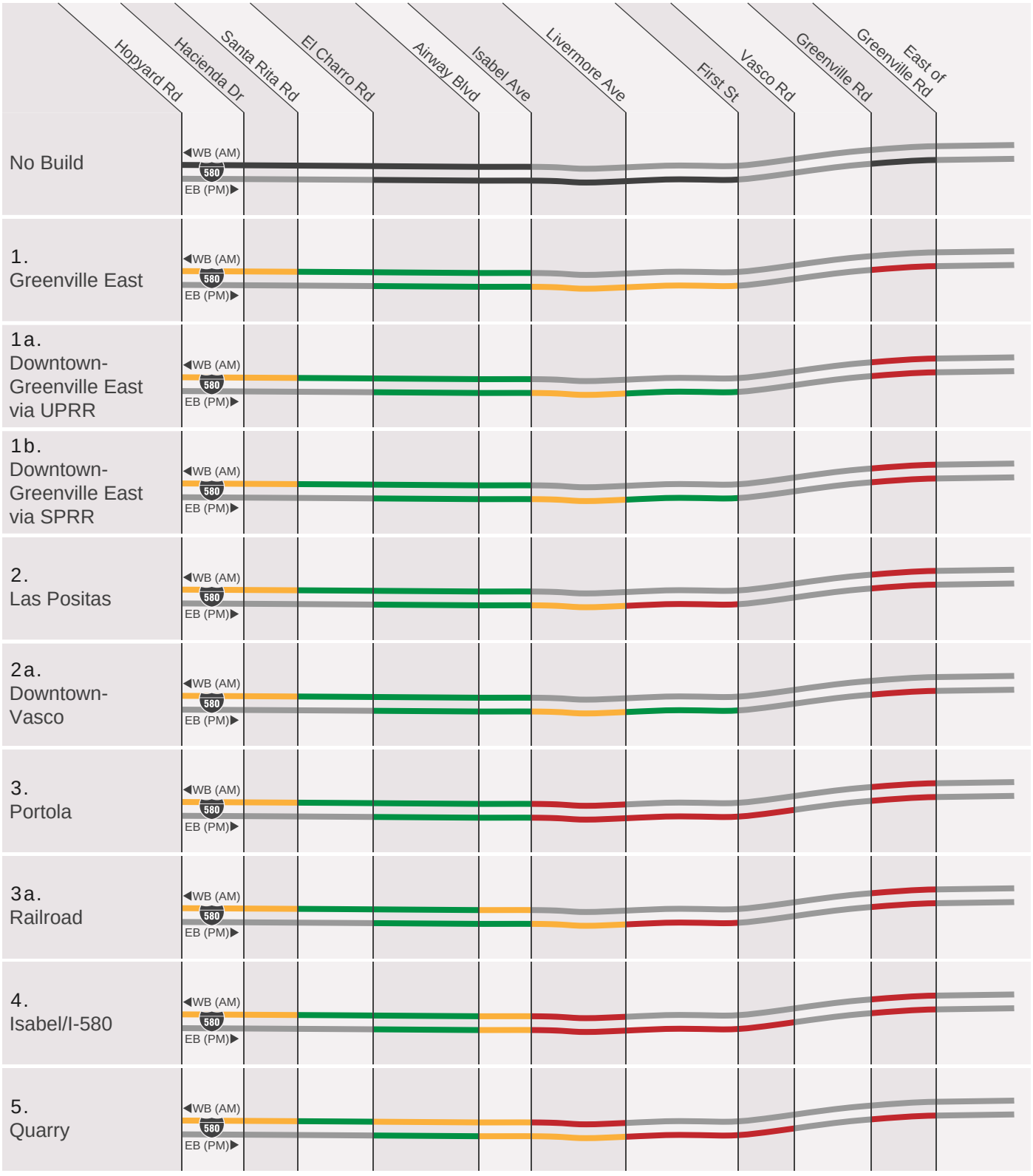
			Freeway Segment																	
		From:	Hopyard Road		Hacienda Drive		Santa Rita Road		El Charro Road		Airway Boulevard		Isabel Avenue		Livermore Avenue		First Street		Vasco Road	
		To:	Hacienda Drive		Santa Rita Road		El Charro Road		Airway Boulevard		Isabel Avenue		Livermore Avenue		First Street		Vasco Road		Greenville Road		East of Greenville Road	
Alternatives	**Direction**	**Peak Hour**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**
3a – Railroad	EB	AM	27.1	D	27.2	D	26.5	D	21.4	C	23.5	C	20.9	C	23.4	C	22.7	C	18.4	C	21.8	C
		PM	35.7	E	30.7	D	34.9	D	35.8	E	44.7	E	**57.2**	**F**	**55.7**	**F**	43.4	E	37.4	E	**96.5**	**F**
	WB	AM	**61.8**	**F**	**55.5**	**F**	39.9	E	40.7	E	**46.4**	**F**	42.1	E	32	D	27.3	D	34.1	D	**47.5**	**F**
		PM	26.8	D	24.7	C	22.3	C	22.9	C	24.7	C	24.2	C	22.1	C	20.5	C	16.8	B	18.6	C
4 – Isabel/I-580	EB	AM	27.8	D	27.9	D	26.5	D	21.3	C	23.1	C	21.5	C	23.9	C	23.1	C	18.3	C	21.8	C
		PM	36.7	E	31	D	35.5	E	36.2	E	**46.7**	**F**	**95.9**	**F**	**90.7**	**F**	**57.4**	**F**	36.3	E	**97.3**	**F**
	WB	AM	**64.7**	**F**	**58.3**	**F**	40.1	E	41.9	E	**48.8**	**F**	**57.9**	**F**	40.1	E	28.7	D	33.5	D	**46.8**	**F**
		PM	26.9	D	24.8	C	22.5	C	23.1	C	24.9	C	24.8	C	22.5	C	20.7	C	16.9	B	18.6	C
5 – Quarry	EB	AM	27.7	D	27.8	D	26.8	D	21.5	C	23.4	C	21.3	C	23.7	C	23	C	18.5	C	21.9	C
		PM	36.4	E	32.5	D	37.8	E	38.7	E	**49.9**	**F**	**64.9**	**F**	**62.8**	**F**	**46.5**	**F**	31.9	D	**68.5**	**F**
	WB	AM	**65.3**	**F**	**63.6**	**F**	43.5	E	**46.6**	**F**	**53.2**	**F**	**45.3**	**F**	33.8	D	25.3	C	29.7	D	38.8	E
		PM	26.7	D	24.8	C	22.4	C	23	C	24.8	C	24.3	C	22.2	C	20.4	C	16.6	B	18.5	C

Source: Wilbur Smith Associates, 2009.

Notes:

Density is represented in passenger cars per mile per lane (pc/mi/ln).

Boldfaced values exceed the desired LOS E standard.



NOTE
Thin black lines represent freeway segment boundaries; red, yellow, green, black,and gray colored lines represent I-580 freeway segments.

Source: WSA, 2009.

I-580 FREEWAY IMPACTS SUMMARY
FIGURE 3.2-5

No Build Alternative. Under the No Build Alternative, during the AM peak hour conditions, five of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

Under the No Build Alternative, during the PM peak hour conditions, five of the ten freeway study segments would operate at an unacceptable LOS in the eastbound direction:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue
- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street

Greenville Road – East of Greenville Road

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

The No Build Alternative would result in unacceptable levels of service along five freeway segments in the AM and PM peak hours. In some cases, the same unacceptable freeway LOS would occur under a BART extension alternative. In such cases, the LOS is not considered an impact of the alternative, since the impact would occur whether the BART extension alternative were constructed or not.

Alternative 1 – Greenville East. During the AM peak hour, two of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road

However, both of these segments would experience improved operation with Alternative 1. In addition, the conditions at three other freeway segments would improve from an unacceptable

LOS to an acceptable LOS with Alternative 1. As a result, this alternative would have a beneficial effect on freeway operations during the AM peak hour in the heavily traveled westbound direction. The freeway segments that would improve with Alternative 1 include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, three of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- Greenville Road – East of Greenville Road

Two of these segments would experience improved operation with Alternative 1. The remaining segment (Greenville Road – East of Greenville Road) would experience worsened operating conditions with Alternative 1. The conditions at two other freeway segments would improve from an unacceptable LOS to an acceptable LOS with Alternative 1. As a result, this alternative would have an overall beneficial effect on freeway operations. The freeway segments that would improve with Alternative 1 include:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of the increased congestion on the segment of I-580 east of Greenville Road in the eastbound direction, a significant impact on freeway operations is projected in the PM peak hour under Alternative 1.

Alternative 1a – Downtown-Greenville East via UPRR. During the AM peak hour, three of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- Greenville Road – East of Greenville Road

Two of these segments would experience improved operation with Alternative 1a while the Greenville Road – East of Greenville Road segment would experience worsened operating conditions. In addition, the conditions at three other freeway segments would improve from an unacceptable LOS to acceptable LOS with Alternative 1a. As a result, this alternative would have an overall beneficial effect on AM peak hour freeway operations. The freeway segments that would improve with Alternative 1a include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, two of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Greenville Road – East of Greenville Road

The Isabel Avenue – Livermore Avenue segment would experience improved operation with Alternative 1a; however, the Greenville Road – East of Greenville Road segment would experience worsened operating conditions. Conditions at three other freeway segments would improve from an unacceptable LOS to an acceptable LOS. Thus, this alternative has an overall beneficial effect on PM peak hour freeway operations. The freeway segments that would improve with Alternative 1a include:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue
- Livermore Avenue – First Street

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of the increased congestion on the segment of I-580 east of Greenville Road in the peak direction, Alternative 1a would have a significant impact on freeway operations in the AM and PM peak hours.

Alternative 1b – Downtown-Greenville East via SPRR. For the AM and PM peak hours, the impacts discussed under Alternative 1a would apply to this alternative. Accordingly, Alternative 1b would likewise have a significant impact on freeway operations in the AM and PM peak hours.

Alternative 2 – Las Positas. For the AM peak hour, the impacts discussed under Alternative 1a apply to this alternative. As a result, this alternative would have an overall beneficial effect on AM peak hour freeway operations, with the exception of the Greenville Road – East of Greenville Road segment.

During the PM peak hour, three of the ten freeway study segments would operate at unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- Greenville Road – East of Greenville Road

The Isabel Avenue – Livermore Avenue segment would experience improved operations with Alternative 2. The Livermore Avenue – First Street and Greenville Road – East of Greenville Road segments would experience worsened operating conditions. The conditions at two other freeway segments would improve from an unacceptable LOS to an acceptable LOS. Consequently, this alternative has an overall beneficial effect on freeway operations. The freeway segments that would experience improved operation with Alternative 2 include:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because congestion would increase along one segment in the peak westbound direction during the AM peak hour and two segments in the peak eastbound direction during the PM peak hour, Alternative 2 would have a significant impact on freeway operations.

Alternative 2a – Downtown-Vasco. During the AM peak hour, two of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road

Two of these segments would experience improved operation with Alternative 2a. In addition, the conditions at three other freeway segments would improve from an unacceptable LOS to acceptable LOS with Alternative 2a. As a result, this alternative would have an overall beneficial effect on AM peak hour freeway operations. The freeway segments that would improve with Alternative 2a include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, two of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Greenville Road – East of Greenville Road

The Isabel Avenue – Livermore Avenue segment would experience improved operation with Alternative 2a; however, the Greenville Road – East of Greenville Road segment would experience worsened operating conditions. Conditions at three other freeway segments would improve from an unacceptable LOS to an acceptable LOS. Thus, this alternative would have an overall beneficial effect on PM peak hour freeway operations. The freeway segments that would improve with Alternative 2a include:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue
- Livermore Avenue – First Street

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of the increased congestion on the segment of I-580 east of Greenville Road in the peak direction, Alternative 2a would have a significant impact on freeway operations in the PM peak hour.

Alternative 3 – Portola. During the AM peak hour, four of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- Isabel Avenue – Livermore Avenue
- Greenville Road – East of Greenville Road

The Hopyard Road – Hacienda Drive and Hacienda Drive – Santa Rita Road segments would experience improved operation with Alternative 3. However, the Isabel Avenue – Livermore Avenue and Greenville Road – East of Greenville Road segments, Alternative 3 would experience worsened operating conditions. Operations at three other freeway segments would improve from an unacceptable LOS to an acceptable LOS, so that this alternative would have

an overall beneficial effect on the AM peak hour freeway operations. The freeway segments that would improve with Alternative 3 include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, four of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- First Street – Vasco Road
- Greenville Road – East of Greenville Road

Conditions at all four of these segments would be worse with Alternative 3. The conditions at two other freeway segments would improve from an unacceptable LOS to an acceptable LOS:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of increased freeway congestion on two segments during the AM peak hour and on four segments during the PM peak hour, Alternative 3 would have a significant impact on freeway operations.

Alternative 3a - Railroad. During the AM peak hour, four of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- Airway Boulevard – Isabel Avenue
- Greenville Road – East of Greenville Road

However, three of these segments would experience improved operation under this alternative; the Greenville Road – East of Greenville Road segment would experience worsened operating conditions. Conditions on two additional segments would improve from an unacceptable LOS to an acceptable LOS. Overall, this alternative would have a beneficial impact on freeway operations during the AM peak hour in the peak westbound direction. The freeway segments that would improve with Alternative 3a include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, three of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- Greenville Road – East of Greenville Road

Conditions at the Isabel Avenue – Livermore Avenue segment would experience improved operation under this alternative; however, the other two segments would experience worsened operating conditions with Alternative 3a. The freeway segments that would improve with Alternative 3a include:

- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of the increased congestion in the AM peak hour direction on the segment east of Greenville Road and the increased congestion in the PM peak hour direction on two segments, Alternative 3a would have a significant impact on freeway operations.

Alternative 4 – Isabel/I-580. During the AM peak hour, five of the ten freeway study segments would operate at unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- Airway Boulevard – Isabel Avenue

- Isabel Avenue – Livermore Avenue
- Greenville Road – East of Greenville Road

Three of these segments would experience improved operating conditions with Alternative 4, but the Isabel Avenue – Livermore Avenue and Greenville Road – East of Greenville Road segments would experience worsened operating conditions. Conditions at two other freeway segments would improve from an unacceptable LOS to an acceptable LOS. Overall, this alternative would have a beneficial effect in the AM peak hour on freeway operations. The freeway segments that would improve with Alternative 4 include:

- Santa Rita Road – El Charro Road
- El Charro Road – Airway Boulevard

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, five of the ten freeway study segments would operate at unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Airway Boulevard – Isabel Avenue
- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- First Street – Vasco Road
- Greenville Road – East of Greenville Road

The Airway Boulevard – Isabel Avenue segment would experience improved operation with Alternative 4 but would continue to operate at an unacceptable LOS. In addition, the El Charro Road – Airway Boulevard segment would improve from an unacceptable LOS to an acceptable LOS. Overall, four out of ten segments would be adversely impacted and two segments would improve during the PM peak hour in the eastbound direction.

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of increased freeway congestion on two segments during the AM peak hour and four segments during the PM peak hour, Alternative 4 would have a significant impact on freeway operations.

Alternative 5 – Quarry. During the AM peak hour, five of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the westbound direction:

- Hopyard Drive – Hacienda Drive
- Hacienda Drive – Santa Rita Road
- El Charro Road – Airway Boulevard
- Airway Boulevard – Isabel Avenue
- Isabel Avenue – Livermore Avenue

Four of these segments would experience improved operation with Alternative 5. The Isabel Avenue – Livermore Avenue segment would, however, experience worsened operating conditions resulting in a significant impact. The Santa Rita Road – El Charro Road segment would improve from an unacceptable LOS to an acceptable LOS. Overall, this alternative would have a beneficial effect on freeway operations in the westbound direction in the AM peak hour, with the exception of the Isabel Avenue – Livermore Avenue segment.

All freeway segments would operate at an acceptable LOS in the eastbound direction during the AM peak hour.

During the PM peak hour, five of the ten freeway study segments would operate at an unacceptable LOS (i.e., worse than LOS E) in the eastbound direction:

- Airway Boulevard – Isabel Avenue
- Isabel Avenue – Livermore Avenue
- Livermore Avenue – First Street
- First Street – Vasco Road
- Greenville Road – East of Greenville Road

Two of these segments would experience improved operation with Alternative 5 but three segments (Livermore Avenue – First Street, First Street – Vasco Road, and Greenville Road – East of Greenville Road segments) would experience worsened operating conditions. Conditions on the El Charro Road – Airway Boulevard segment would improve from an unacceptable LOS to an acceptable LOS. Overall, this alternative would have a beneficial effect on the freeway operations on three segments and an adverse impact on three segments during the PM peak hour in the eastbound direction.

All freeway segments would operate at an acceptable LOS in the westbound direction during the PM peak hour.

Because of increased freeway congestion on one segment in the AM peak hour and three segments in the PM peak hour, Alternative 5 would have a significant impact on freeway operations.

MITIGATION MEASURES. The majority of freeway segments along I-580 would experience improved conditions with the BART extension alternatives; therefore, no significant impacts would result. However, the Greenville Road – East of Greenville Road segment would likely be impacted in the westbound AM peak hour, and segments between Isabel Avenue to Vasco Road would likely be impacted in either direction, during both peak hour periods. These impacts are primarily due to the locations of the stations and the pairing of stations that occurs under Alternatives 3, 4, and 5, which would attract traffic and increase congestion along I-580 between Isabel Avenue and Livermore Avenue in order to gain access to the proposed terminus stations at Isabel Avenue or Downtown Livermore. In addition, increased congestion during the AM peak hour would likely occur between Greenville Road and East of Greenville Road under most alternatives, due to the increased BART-related traffic traveling over the Altamont Pass and traffic activity related to accessing the eastern terminus stations. Coordination with Caltrans and the local jurisdictions could improve or reduce the impacts along several freeway segments along I-580. However, sufficient information is not available at the program level to conclude with certainty that mitigation would reduce this impact to a less-than-significant impact in all circumstances. Therefore, for purposes of this Program EIR, the impact is considered potentially significant and unavoidable. (PSU)

TR-2.1 *Coordinate and Implement Freeway Traffic Management Strategies with Caltrans and Local Jurisdictions*. BART shall coordinate with Caltrans and local jurisdictions to implement freeway traffic management strategies to mitigate potential impacts to I-580. Possible improvements include localized freeway and ramp improvements, such as new or improved auxiliary lanes, improvements in ramp capacity and geometrics, and other operational modifications.

TR-3 Arterials

Impacts to the arterial segments selected for analysis would result from an increase in the number of vehicles traveling along the segment that then caused a reduction in level of service. Conversely, a benefit would occur with a reduction in the traffic volume. Changes to traffic signal coordination and traffic distribution and the location of the BART extension alternative stations and station access points would also effect a change in arterial levels of service.

The following arterial segments would operate at an unacceptable LOS under a BART extension alternative, which depending on the extension alternative would result in a potentially significant impact at these locations:

- #2. Vasco Road in the northbound PM peak under Alternatives 2, 2a, and 3a
- #3. First Street in the southbound AM peak under Alternatives 1a, 1b, and 2a

- #3. First Street in the northbound PM peak under Alternatives 1a, 1b, 2a, and 3
- #4. First Street (downtown) in the northbound PM peak under Alternative 3a
- #6. Livermore Avenue (downtown) in the northbound PM peak under Alternative 5
- #6. Livermore Avenue (downtown) in the southbound PM peak under Alternative 3a
- #8. Stanley Boulevard (downtown) in the westbound AM peak under Alternatives 1, 1a, 1b, 2a, 3, and 4

The program-level review of the BART extension alternatives on the study arterial segments is discussed below. The results of this analysis are presented in Table 3.2-26 and illustrated in Figure 3.2-6.

No Build Alternative. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would operate at an unacceptable level of service.

During the PM peak hour, the following two arterial segments would operate at unacceptable conditions:

- #2. Vasco Road in the northbound direction
- #5. Livermore Avenue in the northbound direction

The No Build Alternative would result in an unacceptable level of service along three arterial segments in the AM and PM peak hours.

Alternative 1 – Greenville East. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would experience worsened operating conditions.

During the PM peak hour, the #2 Vasco Road northbound segment would experience improved operation; however, the segment would continue to operate at unacceptable conditions. The #5 Livermore Avenue northbound segment would improve to an acceptable LOS.

Because of the changes to Stanley Boulevard in the AM peak hour, Alternative 1 would have a significant impact to arterial operations.

Table 3.2-26
Arterial Roadway Analysis – LOS Summary by Alternative – 2035

				Alternatives																			
				No Build		1 – Greenville East		1a – Downtown Greenville via UPRR		1b – Downtown Greenville via SPRR		2 – Las Positas		2a – Downtown-Vasco		3 – Portola		3a – Railroad		4 – Isabel/ I-580		5 – Quarry	
	Arterial Segment	Direc-tion	Peak Hour	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS
#1.	Greenville Road	NB	**AM**	26.30	C	25.50	C	25.50	C	25.50	C	26.10	C	25.80	C	26.00	C	26.20	C	26.20	C	26.10	C
			PM	22.70	C	20.80	D	21.60	D	21.60	D	22.30	C	23.00	C	23.70	C	22.70	C	23.60	C	23.50	C
		SB	**AM**	24.60	C	15.10	E	18.80	D	18.80	D	19.40	D	20.10	D	24.90	C	24.60	C	24.70	C	24.90	C
			PM	22.10	C	23.00	C	23.30	C	23.30	C	22.50	C	22.80	C	23.00	B	22.80	C	22.80	C	23.30	C
#2.	Vasco Road	NB	AM	25.20	C	25.50	C	25.40	C	25.40	C	24.80	C	25.10	C	25.20	C	24.80	C	25.40	C	25.50	C
			PM	**11.80**	**F**	**12.40**	**F**	13.10	E	13.10	E	**11.60**	**F**	**11.70**	**F**	**12.50**	**F**	**11.70**	**F**	**12.50**	**F**	13.00	E
		SB	AM	23.30	C	23.30	C	23.70	C	23.70	C	21.20	D	21.80	D	23.30	C	21.50	D	22.70	C	23.10	C
			PM	21.70	D	22.10	C	22.30	C	22.30	C	22.40	C	22.60	C	22.40	C	21.20	D	22.30	C	22.80	C
#3.	First Street	NB	AM	19.20	D	20.20	D	14.40	E	14.40	E	20.10	D	15.10	E	16.50	E	13.60	E	20.10	D	18.20	D
			PM	16.70	E	15.70	E	**9.60**	**F**	**9.60**	**F**	16.10	E	**11.10**	**F**	**10.70**	**F**	15.40	E	16.40	E	15.90	E
		SB	AM	19.10	D	18.90	D	**10.30**	**F**	**10.30**	**F**	19.00	D	**11.70**	**F**	16.50	E	15.40	E	18.80	D	19.40	D
			PM	17.10	D	16.10	E	17.00	E	17.00	E	16.10	E	17.00	D	15.90	E	16.30	E	16.00	E	17.10	D
#4.	First Street (downtown)	EB	AM	12.40	D	12.60	D	12.10	D	12.10	D	12.50	D	12.10	D	12.30	D	12.50	D	12.50	D	12.60	D
			PM	10.10	D	10.00	D	7.90	E	7.90	E	10.50	D	8.60	E	8.40	E	**6.80**	**F**	10.60	D	10.40	D
		WB	AM	10.10	D	10.00	D	9.30	D	9.30	D	9.60	D	9.30	D	9.10	D	7.20	E	9.70	D	9.70	D
			PM	12.80	D	12.60	D	12.10	D	12.10	D	12.60	D	12.20	D	12.20	D	12.10	D	12.60	D	12.20	D
#5.	Livermore Avenue	NB	AM	17.40	D	17.40	D	17.30	D	17.30	D	17.30	D	17.90	D	17.90	D	17.50	D	16.90	D	17.20	D
			PM	**8.60**	**F**	12.70	E	13.90	E	13.90	D	13.00	E	11.40	E	14.60	D	12.80	E	12.70	E	10.50	E
		SB	AM	16.20	D	16.30	D	16.40	D	16.40	D	16.40	D	16.40	D	16.10	D	16.60	D	16.20	D	15.80	D
			PM	12.80	E	15.00	D	15.50	D	15.50	D	15.20	D	15.50	D	15.90	D	14.10	D	14.90	D	15.60	D
#6.	Livermore Avenue (downtown)	NB	AM	9.90	D	10.80	D	10.30	D	10.30	D	10.50	D	10.20	D	10.50	D	10.20	D	10.70	D	10.60	D
			PM	9.40	D	8.70	E	7.60	E	7.60	E	7.40	E	7.30	E	8.50	E	9.50	D	8.10	E	**5.10**	**F**
		SB	AM	8.80	E	10.40	D	7.70	E	7.70	E	9.90	D	9.80	D	10.00	D	7.30	E	9.80	D	9.30	D
			PM	8.20	E	9.30	D	9.60	D	9.60	D	10.40	D	9.00	E	8.70	E	**6.30**	**F**	9.60	D	9.90	D
#7.	Stanley Boulevard	EB	AM	36.10	A	35.70	A	35.90	A	35.90	A	35.90	A	36.10	A	35.50	A	35.50	A	36.00	A	36.30	A
			PM	23.10	C	22.00	C	22.60	C	22.60	C	23.00	C	22.30	C	23.40	C	21.40	D	23.00	C	19.80	D
		WB	AM	30.40	B	30.50	B	30.20	B	30.20	B	30.70	B	30.20	B	29.80	B	30.20	B	30.00	B	30.40	B
			PM	35.50	A	35.60	A	35.70	A	35.70	A	35.50	A	35.60	A	35.60	A	35.40	A	35.60	A	35.50	A

Table 3.2-26
Arterial Roadway Analysis – LOS Summary by Alternative – 2035

Arterial Segment	Direction	Peak Hour	Alternatives																	
			No Build		1 – Greenville East		1a – Downtown Greenville via UPRR		1b – Downtown Greenville via SPRR		2 – Las Positas		2a – Downtown-Vasco		3 – Portola		3a – Railroad		4 – Isabel/ I-580		5 – Quarry	
			Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS	Avg. Speed	LOS
#8. Stanley Boulevard (downtown)	EB	AM	18.40	C	18.20	C	19.00	C	19.00	C	18.40	C	18.80	C	19.00	C	18.50	C	18.90	C	18.40	C
		PM	17.40	D	17.80	D	17.40	D	17.40	D	17.60	D	17.90	D	17.80	D	17.20	D	17.60	D	17.40	D
	WB	AM	**9.00**	**F**	**8.40**	**F**	**8.50**	**F**	**8.50**	**F**	**9.10**	**F**	**8.20**	**F**	**8.00**	**F**	**9.10**	**F**	**8.70**	**F**	**9.00**	**F**
		PM	16.30	D	17.10	D	16.60	D	16.60	D	16.50	D	16.20	D	16.70	D	15.40	D	16.60	D	16.30	D
#9. Isabel Avenue	NB	AM	21.80	D	19.20	E	23.80	D	23.80	D	19.80	E	24.30	D	22.40	D	21.30	D	20.90	E	21.80	D
		PM	27.00	C	29.10	C	29.60	C	29.60	C	28.70	C	27.50	C	28.90	C	23.10	D	26.40	D	27.00	E
	SB	AM	22.00	D	24.00	D	23.40	D	23.40	D	21.80	D	23.60	D	23.60	D	21.20	D	23.30	D	22.00	D
		PM	34.10	B	32.00	C	34.20	B	34.20	B	32.60	C	34.20	B	34.10	B	33.50	C	33.60	C	34.10	C

Source: Wilbur Smith Associates, 2009.

Note:

Average Speed presented in miles per hour (mph).

Boldfaced values exceed the desired LOS E.

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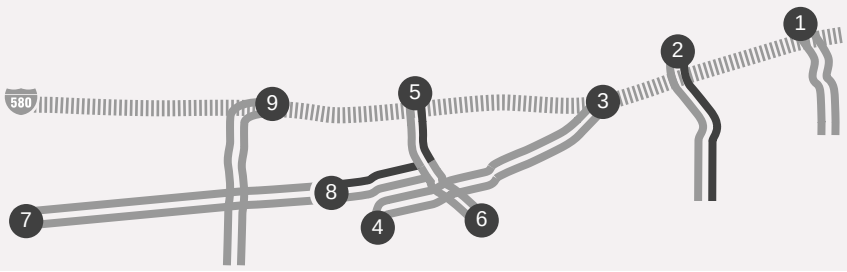
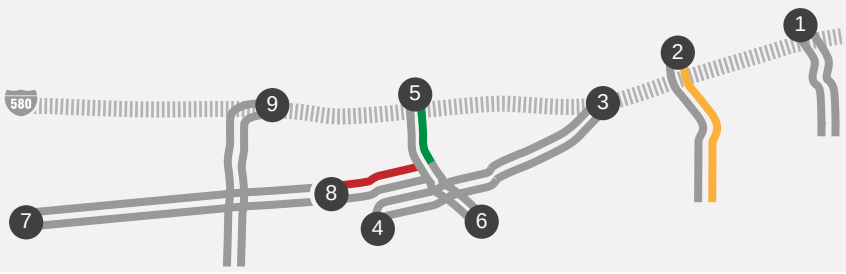
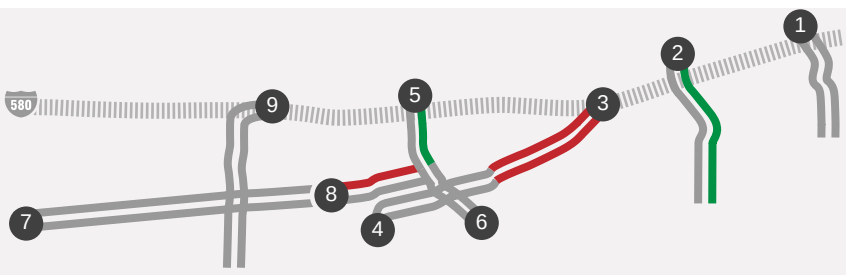
No Build



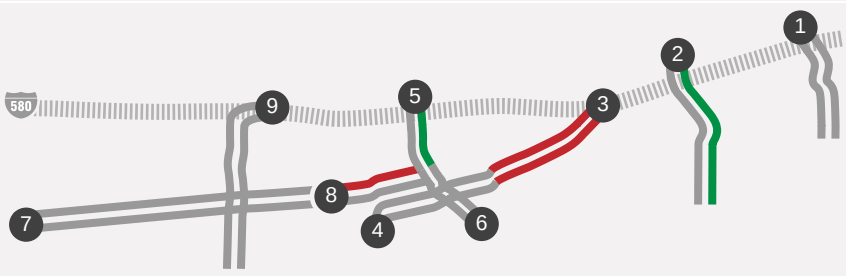
1. Greenville East



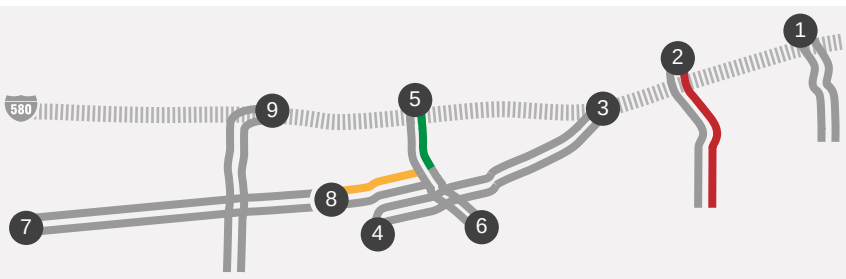
1a. Downtown-Greenville East via UPRR



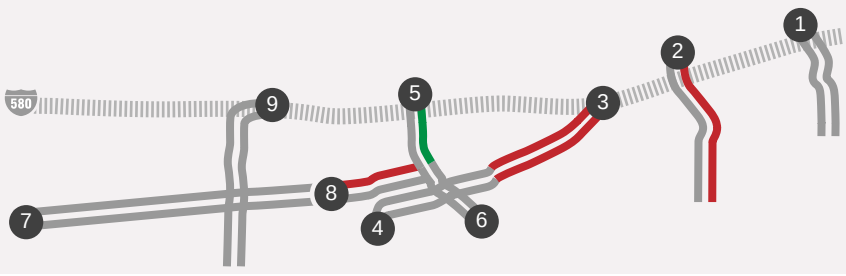
1b. Downtown-Greenville East via SPRR



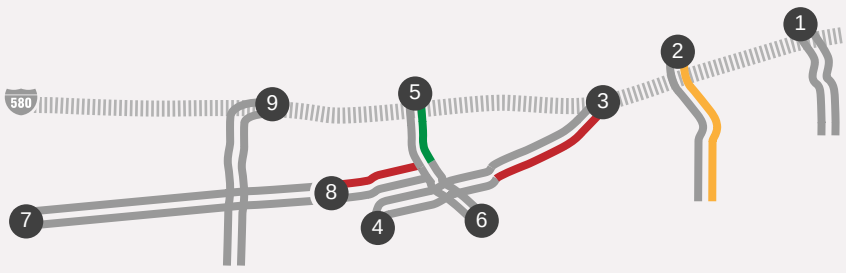
2. Las Positas



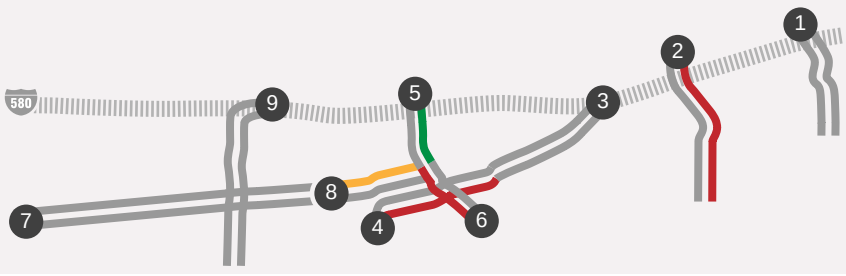
2a. Downtown-Vasco



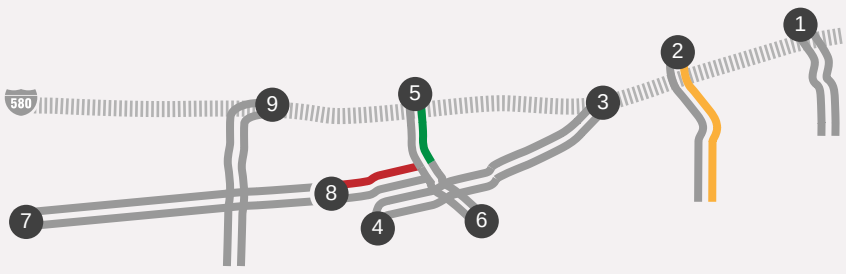
3. Portola



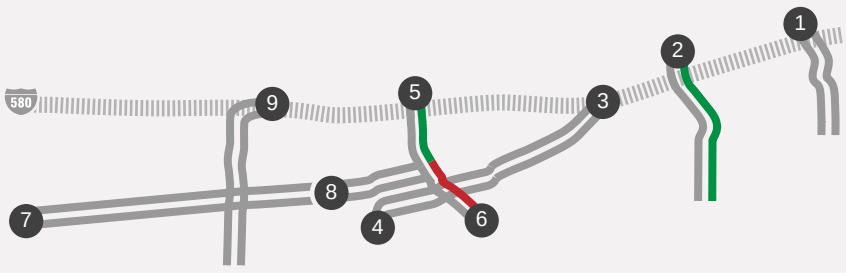
3a. Railroad



4. Isabel/ I-580



5. Quarry



Source: WSA, 2009.

Arterial Study Segments

Arterial	From	To
1. Greenville Road	Altamont Pass Road	Patterson Pass Road
2. Vasco Road	Northfront Road	East Avenue
3. First Street	I-580 Eastbound Ramps	Scott Street
4. First Street (Downtown)	Scott Street	Holmes Street/ Murrieta Boulevard/ College Avenue
5. Livermore Avenue	I-580 Eastbound Ramps	Chestnut Street
6. Livermore Avenue (Downtown)	Chestnut Street	East Avenue
7. Stanley Boulevard	Valley Avenue	Murrieta Boulevard
8. Stanley Boulevard (Downtown)	Murrieta Boulevard	Livermore Avenue
9. Isabel Avenue	I-580 Eastbound Ramps	Concannon Boulevard

- Segment improves to acceptable conditions
- Unacceptable segment under No Build Alternative
- Minor improvement - Segment improves over No Build Alternative, but remains at unacceptable conditions
- No change
- Impact - Segment operates at unacceptable conditions and performs worse than under No Build Alternative

NOTE
Red, yellow, green, black, and gray colored lines represent arterial segments; I-580 is shown for context as a dashed gray line.

ARTERIAL IMPACTS SUMMARY
FIGURE 3.2-6

Alternative 1a – Downtown-Greenville East via UPRR. During the AM peak hour, the #3 First Street southbound segment would operate at an unacceptable LOS. The #8 Stanley Boulevard westbound segment would operate at an unacceptable LOS under Alternative 1a.

During the PM peak hour, the #3 First Street northbound segment would operate at an unacceptable LOS. Alternative 1a would improve operation of the #2 Vasco Road northbound and #5 Livermore Avenue northbound segments from an unacceptable to an acceptable LOS.

Because of the changes to Stanley Boulevard in the AM and First Street in the AM and PM peak hour, Alternative 1a would have a significant impact to arterial operations.

Alternative 1b – Downtown-Greenville East via SPRR. For the AM and PM peak hours, the impacts associated with Alternative 1a would also apply to this alternative. As a result, Alternative 1b would have a significant impact on First Street in the AM and PM peak hour.

Alternative 2 – Las Positas. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would operate at an unacceptable LOS.

During the PM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #2 Vasco Road northbound segment would experience worsened operating conditions.

The #5 Livermore Avenue northbound segment would improve to an acceptable LOS.

Because of the changes to Vasco Road in the PM peak hour, Alternative 2 would have a significant impact to arterial operations.

Alternative 2a – Downtown-Vasco. During the AM peak hour, the #3 First Street southbound segment would operate at an unacceptable LOS. The #8 Stanley Boulevard westbound segment would operate at an unacceptable LOS with Alternative 2a.

During the PM peak hour, two of the nine arterial study segments would operate at an unacceptable LOS. The #3 First Street northbound and #2 Vasco Road northbound segments would operate at an unacceptable LOS. The #5 Livermore Avenue northbound segment would improve to an acceptable LOS.

As described above, Alternative 2a would have a significant impact on Stanley Boulevard in the AM, Vasco Road in the PM, and First Street in the AM and PM peak hours.

Alternative 3 – Portola. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would experience worsened operating conditions.

During the PM peak hour, the #2 Vasco Road northbound segment would experience improved operation; however, the segment would continue to operate at an unacceptable LOS. The #3 First Street northbound segment would operate at an unacceptable LOS. By contrast, the #5 Livermore Avenue northbound segment would experience improved operation to an acceptable LOS.

As described above, Alternative 3 would have a significant impact on Stanley Boulevard in the AM and First Street in the PM peak hour.

Alternative 3a - Railroad. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would experience improved operation with Alternative 3a but would continue to operate at an unacceptable LOS.

During the PM peak hour, the #4 First Street northbound and #6 Livermore Avenue southbound segments would operate at an unacceptable LOS. The #2 Vasco Road northbound segment would experience worsened operating conditions with Alternative 3a.

The #5 Livermore Avenue northbound segment would experience improved operation to an acceptable LOS.

In summary, Alternative 3a would have a significant impact to arterial operations on Vasco Road, Livermore Avenue, and First Street in the PM peak hour.

Alternative 4 – Isabel/I-580. During the AM peak hour, the #8 Stanley Boulevard westbound segment would experience worsened operating conditions. During the PM peak hour, operations on the #2 Vasco Road northbound segment would experience improved operation but would continue to operate at an unacceptable LOS. The #5 Livermore Avenue northbound segment would improve to an acceptable LOS under Alternative 4.

As a result of increased travel on Stanley Boulevard in the PM peak hour, Alternative 4 would have a significant impact to arterial operations.

Alternative 5 – Quarry. During the AM peak hour, eight of the nine arterial study segments would operate at an acceptable LOS. The #8 Stanley Boulevard westbound segment would continue to operate at an unacceptable LOS.

During the PM peak hour, the #6 Livermore Avenue northbound segment would operate at an unacceptable LOS. The #2 Vasco Road northbound and #5 Livermore Avenue northbound segments would experience improved operation to an acceptable LOS.

In summary, Alternative 5 would have a significant impact to arterial operations on Livermore Avenue in the PM peak hour.

MITIGATION MEASURE. The following mitigation measure would improve or reduce the impacts along the arterial segments in the study area to less than significant. While these

mitigation measures are expected to be effective based on current information, further evaluation of these mitigation measures may be necessary at the project level when more information about specific design features and current circumstances affecting these segments is available. (LTS)

TR-3.1 *Coordinate and Implement Intersection/Signal Improvements with ACCMA and Local Jurisdictions.* BART shall coordinate with the ACCMA and local jurisdictions to implement intersection and signal improvements to mitigate potential impacts to study area arterials. The intersection mitigations (Mitigation Measures TR-4.1 through TR-4.10) would address many of the deficiencies within the arterial segments. In addition, traffic signal coordination along the arterial segments in the study area shall be explored and BART shall work with local jurisdictions to make appropriate adjustments to signal phasing and timing to achieve the desired LOS.

TR-4 Intersections

A total of 37 study intersections were analyzed under Year 2035 No Build conditions and under each BART extension alternative. Proposed station locations and roadway access to these station areas may impact traffic conditions on a regional and local level. A significant intersection impact would result if traffic operations would perform worse than the established significance thresholds set forth by the applicable jurisdiction. Results of the intersection traffic analysis can be found in Table 3.2-27 and Table 3.2-28 (AM peak hour) and Table 3.2-29 and Table 3.2-30 (PM peak hour). Traffic volumes and lane configurations for the No Build Alternative and BART extension alternatives are presented in Figures 3.2-7 to 3.2-16.

The program-level review of the BART extension alternatives on intersection operations is discussed below. Further evaluation of these potential impacts may be necessary at the project level when more information about specific design features affecting these intersections is available.

No Build Alternative. During the AM peak hour, 30 of the 37 study area intersections would operate at acceptable conditions. The following seven intersections would operate at unacceptable levels:

- #1 Airway Boulevard/Isabel Avenue
- #4 Portola Avenue/Murrieta Boulevard
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Easttbound Ramp

Table 3.2-27
2035 AM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Airway Blvd/ Isabel Avenue	**0.87**	**49.1**	**D**	**0.94**	**56.9**	**E**	**0.78**	**38.7**	**D**	**0.78**	**38.7**	**D**	**0.89**	**56.0**	**E**	**0.82**	**41.8**	**D**
2	Stanley Blvd/ Isabel Ave On Ramp	0.70	11.6	B	0.70	12.6	B	0.69	11.4	B	0.69	11.4	B	0.69	11.5	B	0.69	10.9	B
3	Isabel Avenue/ Stanley Blvd On Ramp	0.82	16.5	B	0.89	21.7	C	0.84	17.2	B	0.84	17.2	B	0.88	20.3	C	0.79	15.3	B
4	Portola Ave/ Murrieta Blvd	**0.97**	**49.6**	**D**	**1.07**	**96.7**	**F**	0.89	30.1	C	0.89	30.1	C	**1.08**	**93.6**	**F**	0.90	31.5	C
5	Murrieta Blvd/ Stanley Blvd	0.99	58.2	E	0.96	53.1	D	0.98	56.3	E	0.98	56.3	E	0.97	53.4	D	0.99	57.3	E
6	Portola Ave/ Livermore Ave	**0.94**	**60.2**	**E**	**0.92**	**58.3**	**E**	**0.93**	**56.6**	**E**	**0.93**	**56.6**	**E**	**0.92**	**56.2**	**E**	**0.91**	**54.3**	**D**
7	Livermore Ave/ Chestnut Street	0.65	23.9	C	0.59	19.3	B	0.58	18.5	B	0.58	18.5	B	0.59	20.5	C	0.58	18.4	B
8	First Street/ Livermore Avenue	0.46	14.9	B	0.48	12.6	B	0.44	11.7	B	0.44	11.7	B	0.51	14.6	B	0.45	12.4	B
9	First Street/Scott Street	1.06	224.2	F	0.99	196.5	F	3.37	>50	F	3.37	>50	F	0.99	202.0	F	2.81	>50	F
10	Vasco Road/ Las Positas Road	**1.09**	**48.2**	**D**	**1.06**	**47.8**	**D**	1.00	39.5	D	1.00	39.5	D	**1.07**	**51.6**	**D**	**1.00**	**40.3**	**D**
11	Vasco Road/Brisa Street	0.49	16.5	B	0.48	16.2	B	0.48	16.2	B	0.48	16.2	B	0.62	17.1	B	0.60	22.1	C
12	Vasco Road/ Patterson Pass Road	0.83	29.6	C	0.80	25.9	C	0.80	25.0	C	0.80	25.0	C	0.80	25.4	C	0.80	25.5	C
13	Altamont Pass Road/ Greenville Road	0.44	30.2	C	0.43	29.3	C	0.42	29.7	C	0.42	29.7	C	0.46	29.8	C	0.43	29.4	C
14	Southfront Road/ Greenville Road	0.40	8.1	A	0.51	9.9	A	0.49	9.6	A	0.49	9.6	A	0.49	9.7	A	0.48	9.6	A
15	Hopyard Road/ Owens Drive	0.72	23.6	C	0.70	25.0	C	0.71	25.3	C	0.71	25.3	C	0.70	24.7	C	0.73	23.3	C

Table 3.2-27
2035 AM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
16	Owens Drive/ Willow Road	0.49	6.4	A	0.45	6.3	A	0.45	6.4	A	0.45	6.4	A	0.46	6.3	A	0.50	6.7	A
17	Hacienda Drive/ Owens Drive	0.70	17.6	B	0.65	17.1	B	0.65	16.7	B	0.65	16.7	B	0.66	16.9	B	0.64	17.5	B
18	Hacienda Drive/ Dublin Blvd	**1.16**	**88.0**	**F**	**1.08**	**90.2**	**F**	**1.10**	**101.9**	**F**	**1.10**	**101.9**	**F**	**1.14**	**90.1**	**F**	**1.04**	**59.3**	**E**
19	Stanley Blvd/ Valley Ave	0.92	44.7	D	0.83	36.8	D	0.82	38.2	D	0.82	38.2	D	0.82	34.7	C	0.84	37.4	D
20	Greenville Road/ I-580 WB ramp	0.69	29.9	C	**0.98**	**65.9**	**E**	**0.92**	**49.2**	**D**	**0.92**	**49.2**	**D**	0.85	31.2	C	0.81	30.0	C
21	Greenville Road/ I-580 EB ramp	0.80	19.2	B	**1.08**	**67.1**	**E**	**1.04**	**62.5**	**E**	**1.04**	**62.5**	**E**	0.95	27.4	C	0.92	25.0	C
22	Vasco Road/ I-580 WB Ramp	0.63	10.6	B	0.63	10.5	B	0.62	10.5	B	0.62	10.5	B	0.74	14.1	B	0.72	13.7	B
23	Vasco Road/ I-580 EB Ramp	0.94	24.3	C	0.99	28.8	C	0.97	26.9	C	0.97	26.9	C	**1.07**	**54.9**	**D**	**1.05**	**46.6**	**D**
24	First Street/ I-580 WB Ramp	0.22	4.8	A	0.26	6.4	A	0.70	20.4	C	0.70	20.4	C	0.28	6.9	A	0.65	19.2	B
25	First Street/ I-580 EB Ramp	0.25	9.0	A	0.23	8.7	A	0.44	9.0	A	0.44	9.0	A	0.24	8.6	A	0.41	9.1	A
26	Livermore Avenue/ I-580 WB Ramp	0.51	10.3	B	0.52	10.5	B	0.50	9.6	A	0.50	9.6	A	0.52	10.6	B	0.49	9.9	A
27	Livermore Avenue/ I-580 EB Ramp	0.40	14.0	B	0.39	13.8	B	0.36	13.6	B	0.36	13.6	B	0.39	13.5	B	0.35	13.7	B
28	Isabel Avenue/ I-580 WB Ramp	0.68	12.1	B	**1.15**	**66.2**	**E**	0.67	12.0	B	0.67	12.0	B	**1.17**	**68.0**	**E**	0.66	11.9	B
29	Isabel Avenue/ I-580 EB Ramp	0.77	16.5	B	0.80	13.2	B	0.81	15.0	B	0.81	15.0	B	0.79	14.6	B	0.81	15.2	B

Table 3.2-27
2035 AM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
30	Airway Blvd/ I-580 WB Ramp	0.72	11.0	B	0.73	11.2	B	0.70	10.6	B	0.70	10.6	B	0.69	10.6	B	0.70	10.3	B
31	Airway Blvd/ I-580 EB Ramp	0.80	32.9	C	0.73	27.1	C	0.73	27.2	C	0.73	27.2	C	0.77	32.2	C	0.75	28.8	C
32	Fallon Rd/ I-580 WB Ramp	0.95	26.8	C	0.62	13.3	B	0.62	13.2	B	0.62	13.2	B	0.63	12.2	B	0.59	11.0	B
33	El Charro Rd/ I-580 EB Ramp	0.73	15.9	B	0.70	17.8	B	0.69	17.7	B	0.69	17.7	B	0.69	18.2	B	0.69	18.7	B
34	Hacienda Drive/ I-580 WB Ramp	**1.08**	**52.1**	**D**	0.79	11.5	B	0.86	16.1	B	0.86	16.1	B	0.82	12.8	B	0.80	9.2	A
35	Hacienda Drive/ I-580 EB Ramp	**1.03**	**36.9**	**D**	0.98	33.3	C	**0.98**	**35.8**	**D**	**0.98**	**35.8**	**D**	0.99	34.1	C	0.96	32.8	C
36	Hopyard Rd/ I-580 WB Ramp	0.66	12.8	B	0.57	11.7	B	0.56	11.3	B	0.56	11.3	B	0.57	10.5	B	0.56	10.3	B
37	Hopyard Rd/ I-580 EB Ramp	0.87	22.5	C	0.75	19.3	B	0.74	19.4	B	0.74	19.4	B	0.77	19.7	B	0.75	19.4	B

Source: Wilbur Smith Associates, 2009.

Notes:

Delay presented in seconds per vehicles.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Boldfaced type indicates unacceptable values.

Table 3.2-28
2035 AM Peak Hour Intersection Operations without and with Alternatives 3, 3a, 4, and 5

		No Build			Alt 3			Alt 3a			Alt 4			Alt 5		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Airway Blvd/Isabel Avenue	**0.87**	**49.1**	**D**	**0.86**	**49.8**	**D**	**0.85**	**49.2**	**D**	**0.98**	**67.8**	**E**	**0.89**	**59.6**	**E**
2	Stanley Blvd/Isabel Ave On Ramp	0.70	11.6	B	0.73	14.4	B	0.90	41.2	D	0.69	11.5	B	0.67	12.5	B
3	Isabel Avenue/Stanley Blvd On Ramp	0.82	16.5	B	0.95	26.8	C	**1.03**	**45.1**	**D**	0.83	16.8	B	0.76	13.8	B
4	Portola Ave/Murrieta Blvd	**0.97**	**49.6**	**D**	**0.96**	**46.8**	**D**	0.92	35.6	D	**1.06**	**89.8**	**F**	0.91	31.2	C
5	Murrieta Blvd/Stanley Blvd	0.99	58.2	E	0.98	55.1	E	0.99	59.1	E	1.00	57.0	E	1.06	77.0	E
6	Portola Ave/Livermore Ave	**0.94**	**60.2**	**E**	**0.94**	**62.2**	**E**	**0.92**	**62.1**	**E**	**0.96**	**62.3**	**E**	**0.95**	**55.3**	**E**
7	Livermore Ave/Chestnut Street	0.65	23.9	C	0.59	19.3	B	0.59	19.2	B	0.60	19.4	B	0.64	20.3	C
8	First Street/Livermore Avenue	0.46	14.9	B	0.47	12.2	B	0.48	12.9	B	0.48	12.5	B	0.47	15.5	B
9	First Street/Scott Street	1.06	224.2	F	3.13	>50	F	7.14	>50	F	1.07	233.8	F	1.06	238.0	F
10	Vasco Road/Las Positas Road	**1.09**	**48.2**	**D**	**1.09**	**52.3**	**D**	**1.29**	**89.0**	**F**	1.02	40.4	D	1.01	39.1	D
11	Vasco Road/Brisa Street	0.49	16.5	B	0.48	16.5	B	0.48	19.6	B	0.49	19.7	B	0.49	19.6	B
12	Vasco Road/Patterson Pass Road	0.83	29.6	C	0.79	26.0	C	0.79	24.3	C	0.83	30.4	C	0.82	28.8	C
13	Altamont Pass Road/Greenville Road	0.44	30.2	C	0.42	29.8	C	0.45	30.2	C	0.43	30.2	C	0.43	30.1	C
14	Southfront Road/Greenville Road	0.40	8.1	A	0.37	8.0	A	0.37	8.1	A	0.37	8.1	A	0.38	8.1	A
15	Hopyard Road/Owens Drive	0.72	23.6	C	0.70	24.9	C	0.70	24.9	C	0.70	25.1	C	0.71	25.1	C
16	Owens Drive/Willow Road	0.49	6.4	A	0.46	6.3	A	0.45	6.2	A	0.46	6.3	A	0.48	6.5	A
17	Hacienda Drive/Owens Drive	0.70	17.6	B	0.66	17.0	B	0.65	16.6	B	0.66	16.7	B	0.66	16.9	B
18	Hacienda Drive/Dublin Blvd	**1.16**	**88.0**	**F**	**1.10**	**101.4**	**F**	**1.13**	**94.4**	**F**	**1.19**	**127.6**	**F**	**1.19**	**139.0**	**F**
19	Stanley Blvd/Valley Ave	0.92	44.7	D	0.83	36.6	D	0.81	35.1	D	0.86	37.6	D	0.88	37.1	D
20	Greenville Road/I-580 WB ramp	0.69	29.9	C	0.68	32.6	C	0.68	33.8	C	0.67	29.4	C	0.68	31.9	C
21	Greenville Road/I-580 EB ramp	0.80	19.2	B	0.76	18.9	B	0.74	19.2	B	0.75	19.6	B	0.76	20.1	C
22	Vasco Road/I-580 WB Ramp	0.63	10.6	B	0.62	10.6	B	0.70	13.9	B	0.62	10.6	B	0.62	10.6	B

Table 3.2-28
2035 AM Peak Hour Intersection Operations without and with Alternatives 3, 3a, 4, and 5

		No Build			Alt 3			Alt 3a			Alt 4			Alt 5		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
23	Vasco Road/I-580 EB Ramp	0.94	24.3	C	0.98	28.1	C	**1.04**	**42.8**	**D**	1.00	30.2	C	0.97	27.4	C
24	First Street/I-580 WB Ramp	0.22	4.8	A	0.58	17.0	B	0.69	19.8	B	0.27	6.6	A	0.28	7.2	A
25	First Street/I-580 EB Ramp	0.25	9.0	A	0.40	9.0	A	0.44	9.1	A	0.26	9.0	A	0.25	8.8	A
26	Livermore Avenue/I-580 WB Ramp	0.51	10.3	B	0.49	9.5	A	0.50	9.6	A	0.53	11.0	B	0.50	9.5	A
27	Livermore Avenue/I-580 EB Ramp	0.40	14.0	B	0.34	14.0	B	0.34	14.2	B	0.42	13.5	B	0.36	13.5	B
28	Isabel Avenue/I-580 WB Ramp	0.68	12.1	B	**1.41**	**133.9**	**F**	0.71	14.3	B	**1.70**	**227.8**	**F**	0.69	13.2	B
29	Isabel Avenue/I-580 EB Ramp	0.77	16.5	B	0.81	14.7	B	0.80	16.1	B	0.82	14.7	B	0.85	16.6	B
30	Airway Blvd/I-580 WB Ramp	0.72	11.0	B	0.68	10.7	B	0.72	11.2	B	0.71	10.7	B	0.71	9.4	A
31	Airway Blvd/I-580 EB Ramp	0.80	32.9	C	0.70	25.5	C	0.76	30.4	C	0.70	24.2	C	0.77	29.0	C
32	Fallon Rd/ I-580 WB Ramp	0.95	26.8	C	0.63	12.3	B	0.64	13.0	B	0.63	12.9	B	0.62	13.0	B
33	El Charro Rd/I-580 EB Ramp	0.73	15.9	B	0.68	17.9	B	0.69	17.8	B	0.70	18.1	B	0.71	18.4	B
34	Hacienda Drive/I-580 WB Ramp	**1.08**	**52.1**	**D**	0.85	15.2	B	0.92	20.1	C	0.99	30.0	C	1.02	33.5	C
35	Hacienda Drive/I-580 EB Ramp	**1.03**	**36.9**	**D**	0.99	31.6	C	0.99	31.4	C	1.00	31.4	C	1.00	31.0	C
36	Hopyard Rd/I-580 WB Ramp	0.66	12.8	B	0.58	11.2	B	0.58	11.1	B	0.59	11.0	B	0.59	11.3	B
37	Hopyard Rd/I-580 EB Ramp	0.87	22.5	C	0.76	19.4	B	0.75	19.3	B	0.79	20.1	C	0.78	19.7	B

Source: Wilbur Smith Associates, 2009.

Notes:

Delay presented in seconds per vehicles.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Boldfaced type indicates unacceptable values.

Table 3.2-29
2035 PM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Airway Blvd Isabel Avenue	**1.25**	**145.2**	**F**	**1.38**	**150.3**	**F**	**1.22**	**129.2**	**F**	**1.22**	**129.2**	**F**	**1.38**	**150.7**	**F**	**1.23**	**143.0**	**F**
2	Stanley Blvd Isabel Ave On Ramp	0.56	15.3	B	0.73	12.7	B	0.73	13.0	B	0.73	13.0	B	0.73	13.0	B	0.74	13.1	B
3	Isabel Avenue Stanley Blvd On Ramp	**0.84**	**36.7**	**D**	0.79	18.7	B	0.77	18.2	B	0.77	18.2	B	0.79	18.7	B	0.80	19.1	B
4	Portola Ave Murrieta Blvd	0.53	15.9	B	0.72	26.7	C	0.68	21.7	C	0.68	21.7	C	0.70	25.4	C	0.70	24.5	C
5	Murrieta Blvd Stanley Blvd	0.93	48.1	D	0.94	46.1	D	0.91	45.9	D	0.91	45.9	D	0.93	48.4	D	0.90	45.8	D
6	Portola Ave Livermore Ave	**0.97**	**49.0**	**D**	0.89	37.4	D	0.87	34.3	C	0.87	34.3	C	0.89	36.6	D	0.91	38.9	D
7	Livermore Ave Chestnut Street	0.57	14.6	B	0.62	17.3	B	0.64	17.9	B	0.64	17.9	B	0.62	16.5	B	0.67	19.8	B
8	First Street Livermore Avenue	0.57	16.8	B	0.47	13.6	B	0.48	14.6	B	0.48	14.6	B	0.51	12.4	B	0.51	14.8	B
9	First Street Scott Street	0.55	88.4	F	0.45	71.3	F	0.76	169.9	F	0.76	169.9	F	0.50	79.1	F	0.73	152.5	F
10	Vasco Road/Las Positas Road	**0.88**	**63.2**	**E**	0.78	39.0	D	0.77	34.9	C	0.77	34.9	C	**0.90**	**63.9**	**E**	0.87	36.6	D
11	Vasco Road Brisa Street	0.73	30.4	C	0.67	21.6	C	0.68	22.7	C	0.68	22.7	C	**0.91**	**79.2**	**E**	**0.95**	**63.2**	**E**
12	Vasco Road Patterson Pass Road	0.80	34.8	C	0.68	24.8	C	0.70	26.9	C	0.70	26.9	C	0.81	29.5	C	0.81	32.9	C
13	Altamont Pass Road Greenville Road	0.67	41.2	D	0.62	42.3	D	0.62	40.2	D	0.62	40.2	D	0.66	38.3	D	0.65	39.6	D

Table 3.2-29
2035 PM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
14	Southfront Road/ Greenville Road	0.73	17.4	B	0.66	14.7	B	0.65	14.4	B	0.65	14.4	B	0.79	19.4	B	0.79	19.3	B
15	Hopyard Road Owens Drive	0.80	42.5	D	0.77	31.1	C	0.78	33.2	C	0.78	33.2	C	0.77	31.3	C	0.77	32.3	C
16	Owens Drive/Willow Road	1.00	37.7	D	1.00	32.8	C	1.02	38.0	D	1.02	38.0	D	1.00	33.0	C	1.05	40.2	D
17	Hacienda Drive Owens Drive	0.86	35.9	D	0.72	27.1	C	0.71	27.8	C	0.71	27.8	C	0.72	27.8	C	0.76	29.4	C
18	Hacienda Drive Dublin Blvd	**1.24**	**118.9**	**F**	**1.38**	**146.0**	**F**	**1.37**	**143.4**	**F**	**1.37**	**143.4**	**F**	**1.39**	**147.9**	**F**	**1.48**	**187.1**	**F**
19	Stanley Blvd/ Valley Ave	**1.22**	**97.2**	**F**	**1.26**	**107.9**	**F**	**1.24**	**103.1**	**F**	**1.24**	**103.1**	**F**	**1.23**	**100.9**	**F**	**1.24**	**104.8**	**F**
20	Greenville Road/ I-580 WB ramp	0.59	11.0	B	0.52	11.1	B	0.51	10.7	B	0.51	10.7	B	0.55	10.5	B	0.55	10.9	B
21	Greenville Road/ I-580 EB ramp	**0.83**	**43.9**	**D**	0.73	22.9	C	0.73	24.2	C	0.73	24.2	C	0.81	26.4	C	0.76	23.6	C
22	Vasco Road/ I-580 WB Ramp	0.78	9.7	A	0.75	9.2	A	0.73	8.6	A	0.73	8.6	A	0.77	9.3	A	0.76	9.5	A
23	Vasco Road/ I-580 EB Ramp	**0.94**	**37.3**	**D**	0.89	25.6	C	0.87	23.3	C	0.87	23.3	C	0.89	26.1	C	0.89	25.4	C
24	First Street/ I-580 WB Ramp	**0.96**	**71.7**	**E**	**1.08**	**85.3**	**F**	**1.07**	**80.8**	**F**	**1.07**	**80.8**	**F**	**1.07**	**81.6**	**F**	**1.07**	**81.0**	**F**
25	First Street/ I-580 EB Ramp	0.41	9.0	A	0.50	11.0	B	0.47	9.4	A	0.47	9.4	A	0.50	11.1	B	0.48	10.4	B
26	Livermore Avenue/ I-580 WB Ramp	0.57	24.0	C	0.58	26.0	C	0.58	26.9	C	0.58	26.9	C	0.58	25.8	C	0.56	26.9	C
27	Livermore Avenue/ I-580 EB Ramp	0.82	19.0	B	0.72	16.6	B	0.63	16.2	B	0.63	16.2	B	0.73	16.7	B	0.63	15.7	B

Table 3.2-29
2035 PM Peak Hour Intersection Operations without and with Alternatives 1, 1a, 1b, 2, and 2a

		No Build			Alt 1			Alt 1a			Alt 1b			Alt 2			Alt 2a		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
28	Isabel Avenue/ I-580 WB Ramp	0.60	16.6	B	0.66	16.4	B	0.59	17.4	B	0.59	17.4	B	0.69	16.6	B	0.59	17.0	B
29	Isabel Avenue/ I-580 EB Ramp	0.65	5.2	A	0.68	2.9	A	0.64	3.1	A	0.64	3.1	A	0.66	3.3	A	0.68	5.2	A
30	Airway Blvd/ I-580 WB Ramp	0.69	7.2	A	0.70	7.4	A	0.70	7.4	A	0.70	7.4	A	0.69	7.4	A	0.68	7.2	A
31	Airway Blvd/ I-580 EB Ramp	0.53	26.1	C	0.50	24.6	C	0.54	25.8	C	0.54	25.8	C	0.56	25.7	C	0.52	25.2	C
32	Fallon Rd/ I-580 WB Ramp	0.61	13.9	B	0.52	12.5	B	0.53	12.5	B	0.53	12.5	B	0.52	13.0	B	0.52	13.7	B
33	El Charro Rd/ I-580 EB Ramp	0.44	5.4	A	0.50	8.9	A	0.49	8.7	A	0.49	8.7	A	0.51	9.8	A	0.43	7.4	A
34	Hacienda Drive/ I-580 WB Ramp	**1.17**	**74.1**	**E**	**1.01**	**36.3**	**D**	**1.02**	**38.1**	**D**	**1.02**	**38.1**	**D**	**1.01**	**35.6**	**D**	**1.08**	**52.9**	**D**
35	Hacienda Drive/ I-580 EB Ramp	**0.85**	**51.4**	**D**	0.84	18.1	B	**0.82**	**79.4**	**E**	**0.82**	**79.4**	**E**	**0.83**	**79.3**	**E**	**0.83**	**67.7**	**E**
36	Hopyard Rd/ I-580 WB Ramp	0.86	21.5	C	0.88	29.7	C	0.88	31.2	C	0.88	31.2	C	0.88	30.0	C	0.87	26.6	C
37	Hopyard Rd/ I-580 EB Ramp	**1.08**	**63.4**	**E**	1.04	50.3	D	**1.04**	**51.4**	**D**	**1.04**	**51.4**	**D**	**1.04**	**49.3**	**D**	**1.05**	**53.5**	**D**

Source: Wilbur Smith Associates, 2009.

Notes:

Delay presented in seconds per vehicles.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Boldfaced type indicates unacceptable values.

Table 3.2-30
2035 PM Peak Hour Intersection Operations without and with Alternatives 3, 3a, 4, and 5

		2035 No Build			2035 Alt 3			2035 Alt 3a			2035 Alt 4			2035 Alt 5		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Airway Blvd/ Isabel Avenue	**1.25**	**145.2**	**F**	**1.27**	**133.5**	**F**	**1.32**	**175.7**	**F**	**1.30**	**147.0**	**F**	**1.32**	**182.4**	**F**
2	Stanley Blvd/ Isabel Ave On Ramp	0.56	15.3	B	0.70	13.2	B	0.78	13.5	B	0.75	13.5	B	0.76	13.4	B
3	Isabel Avenue/ Stanley Blvd On Ramp	**0.84**	**36.7**	**D**	0.70	15.4	B	0.85	27.2	C	0.81	20.5	C	0.77	19.0	B
4	Portola Ave/ Murrieta Blvd	0.53	15.9	B	0.69	21.5	C	0.69	20.7	C	0.72	26.8	C	0.68	23.1	C
5	Murrieta Blvd/ Stanley Blvd	0.93	48.1	D	0.9	45.8	D	0.92	47.7	D	0.93	48.6	D	1.00	57.4	E
6	Portola Ave/ Livermore Ave	**0.97**	**49.0**	**D**	0.85	33.2	C	0.87	34.6	C	**0.89**	**38.3**	**D**	0.92	41.1	D
7	Livermore Ave/ Chestnut Street	0.57	14.6	B	0.61	15.6	B	0.62	17.6	B	0.61	15.0	B	0.65	14.1	B
8	First Street/ Livermore Avenue	0.57	16.8	B	0.50	13.1	B	0.46	14.6	B	0.52	12.9	B	0.53	13.0	B
9	First Street/ Scott Street	0.55	88.4	F	0.69	144.0	F	1.12	>50	F	0.45	69.1	F	0.52	84.5	F
10	Vasco Road/ Las Positas Road	**0.88**	**63.2**	**E**	0.82	30.9	C	0.76	29.8	C	0.82	33.8	C	0.78	39.2	D
11	Vasco Road/ Brisa Street	0.73	30.4	C	0.66	28.9	C	0.67	29.2	C	0.67	22.7	C	0.69	23.2	C
12	Vasco Road/ Patterson Pass Road	0.80	34.8	C	0.69	28.4	C	0.71	28.9	C	0.68	25.6	C	0.71	26.8	C
13	Altamont Pass Road/ Greenville Road	0.67	41.2	D	0.63	38.4	D	0.64	38.4	D	0.61	41.5	D	0.62	41.9	D
14	Southfront Road/ Greenville Road	0.73	17.4	B	0.65	14.6	B	0.66	14.8	B	0.65	14.5	B	0.65	14.6	B
15	Hopyard Road/ Owens Drive	0.80	42.5	D	0.76	31.2	C	0.76	28.6	C	0.78	35.2	D	0.77	30.7	C

Table 3.2-30
2035 PM Peak Hour Intersection Operations without and with Alternatives 3, 3a, 4, and 5

		2035 No Build			2035 Alt 3			2035 Alt 3a			2035 Alt 4			2035 Alt 5		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
16	Owens Drive/ Willow Road	1.00	37.7	D	1.03	40.6	D	1.01	34.8	C	1.03	42.1	D	1.03	39.9	D
17	Hacienda Drive/ Owens Drive	0.86	35.9	D	0.72	28.0	C	0.73	28.8	C	0.74	28.9	C	0.74	29.3	C
18	Hacienda Drive/ Dublin Blvd	**1.24**	**118.9**	**F**	**1.37**	**142.9**	**F**	**1.36**	**141.9**	**F**	**1.38**	**147.5**	**F**	**1.45**	**175.2**	**F**
19	Stanley Blvd/ Valley Ave	**1.22**	**97.2**	**F**	**1.22**	**100.0**	**F**	**1.26**	**112.8**	**F**	**1.24**	**104.3**	**F**	**1.25**	**108.0**	**F**
20	Greenville Road/ I-580 WB ramp	0.59	11.0	B	0.52	10.2	B	0.52	10.2	B	0.50	10.2	B	0.53	10.7	B
21	Greenville Road/ I-580 EB ramp	**0.83**	**43.9**	**D**	**0.80**	**36.1**	**D**	0.78	31.7	C	**0.74**	**27.1**	**C**	0.78	34.7	C
22	Vasco Road/ I-580 WB Ramp	0.78	9.7	A	0.75	8.9	A	0.77	9.5	A	0.75	8.5	A	0.74	8.8	A
23	Vasco Road/ I-580 EB Ramp	**0.94**	**37.3**	**D**	0.89	25.7	C	0.90	28.0	C	0.90	27.1	C	0.88	24.7	C
24	First Street/ I-580 WB Ramp	**0.96**	**71.7**	**E**	**1.07**	**94.5**	**F**	**1.06**	**79.5**	**E**	**1.08**	**83.8**	**F**	**1.06**	**98.0**	**F**
25	First Street/ I-580 EB Ramp	0.41	9.0	A	0.53	11.9	B	0.48	9.5	A	0.52	11.9	B	0.46	9.8	A
26	Livermore Avenue/ I-580 WB Ramp	0.57	24.0	C	0.57	27.0	C	0.57	27.0	C	0.58	25.8	C	0.58	26.2	C
27	Livermore Avenue/ I-580 EB Ramp	0.82	19.0	B	0.61	16.1	B	0.62	16.1	B	0.72	16.7	B	0.69	15.5	B
28	Isabel Avenue/ I-580 WB Ramp	0.60	16.6	B	0.76	17.8	B	0.61	17.6	B	0.85	19.1	B	0.62	17.1	B
29	Isabel Avenue/ I-580 EB Ramp	0.65	5.2	A	0.68	3.5	A	0.89	4.8	A	0.71	4.4	A	0.90	5.4	A
30	Airway Blvd/ I-580 WB Ramp	0.69	7.2	A	0.69	7.3	A	0.70	7.4	A	0.69	7.5	A	0.70	7.3	A

Table 3.2-30
2035 PM Peak Hour Intersection Operations without and with Alternatives 3, 3a, 4, and 5

		2035 No Build			2035 Alt 3			2035 Alt 3a			2035 Alt 4			2035 Alt 5		
#	Intersection	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
31	Airway Blvd/ I-580 EB Ramp	0.53	26.1	C	0.53	25.5	C	0.57	25.6	C	0.55	24.2	C	0.60	25.9	C
32	Fallon Rd/ I-580 WB Ramp	0.61	13.9	B	0.53	13.1	B	0.53	13.3	B	0.52	13.3	B	0.52	13.3	B
33	El Charro Rd/ I-580 EB Ramp	0.44	5.4	A	0.51	10.0	B	0.49	8.8	A	0.48	8.3	A	0.48	8.5	A
34	Hacienda Drive/ I-580 WB Ramp	**1.17**	**74.1**	**E**	**1.01**	**37.0**	**D**	**1.02**	**39.2**	**D**	**1.04**	**43.0**	**D**	**1.04**	**41.6**	**D**
35	Hacienda Drive/ I-580 EB Ramp	**0.85**	**51.4**	**D**	**0.83**	**78.7**	**E**	**0.81**	**69.5**	**E**	0.84	17.8	B	**0.82**	**66.6**	**E**
36	Hopyard Rd/ I-580 WB Ramp	0.86	21.5	C	0.87	28.3	C	0.88	28.9	C	0.87	27.8	C	0.88	30.1	C
37	Hopyard Rd/ I-580 EB Ramp	**1.08**	**63.4**	**E**	**1.02**	**44.8**	**D**	**1.04**	**48.8**	**D**	**1.06**	**52.5**	**D**	**1.06**	**51.2**	**D**

Source: Wilbur Smith Associates, 2009.

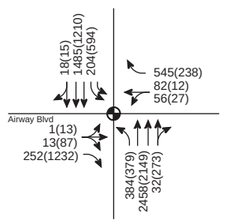
Notes:

Delay presented in seconds per vehicles.

Delay and LOS presented for worst approach for two-way stop controlled intersections.

Boldfaced type indicates unacceptable values.

1. Airway Blvd & Isabel Ave



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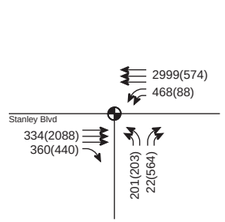

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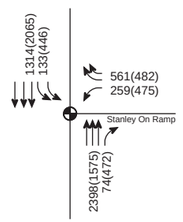

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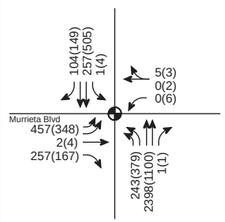

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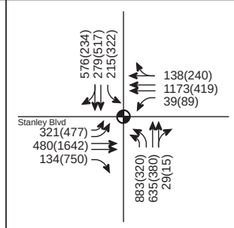

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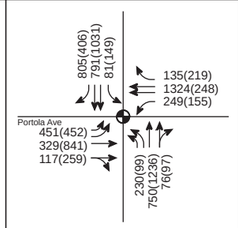

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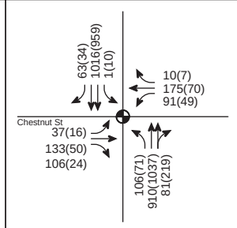

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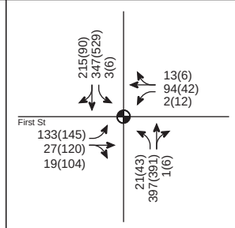

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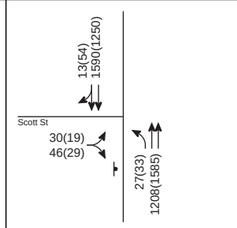
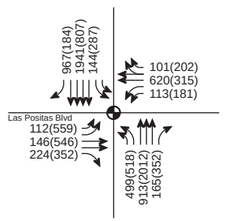


10. Las Positas Rd & Vasco Rd



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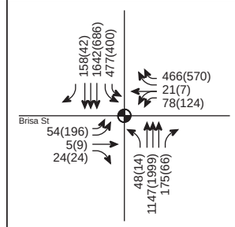

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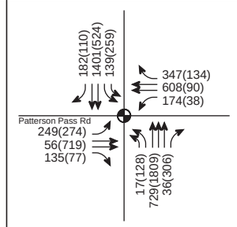

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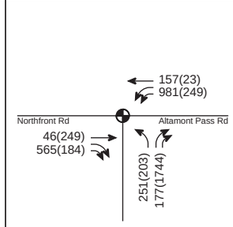

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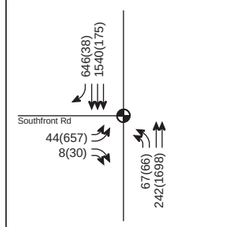
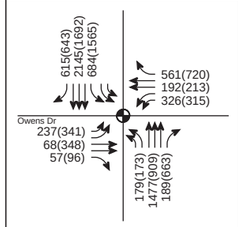
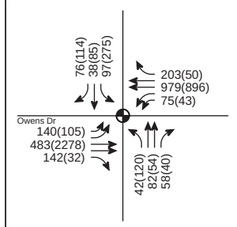


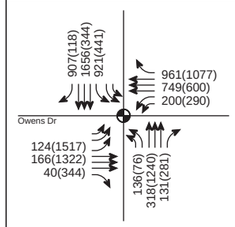
15. Owens Dr & Hopyard Rd



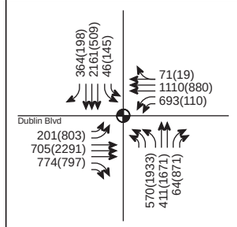
16. Owens Dr & Willow Rd



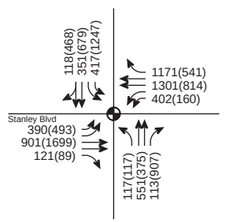
17. Owens Dr & Hacienda Dr



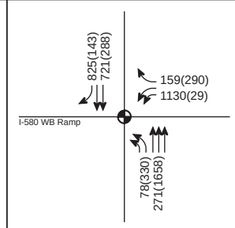
18. Dublin Blvd & Hacienda Dr



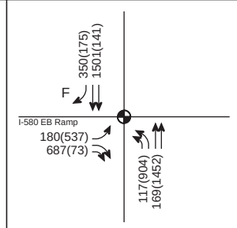
19. Stanley Blvd & Valley Ave



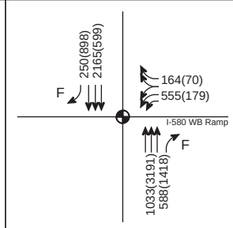
20. I-580 WB Ramps & Greenville Rd



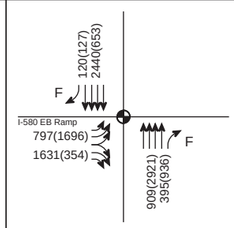
21. I-580 EB Ramps & Greenville Rd



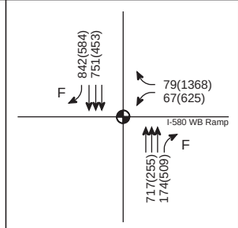
22. I-580 WB Ramps & Vasco Rd



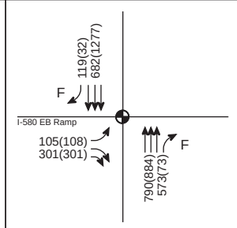
23. I-580 EB Ramps & Vasco Rd



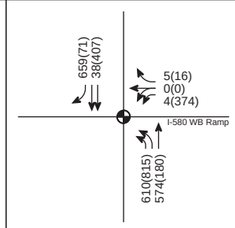
24. I-580 WB Ramps & First St



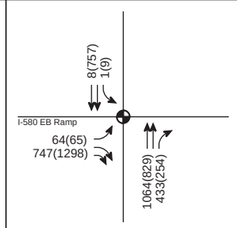
25. I-580 EB Ramps & First St



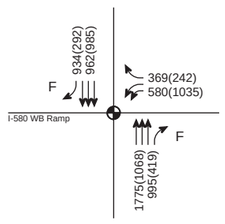
26. I-580 WB Ramps & N Livermore Ave



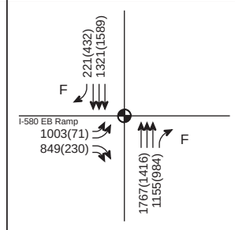
27. I-580 EB Ramps & N Livermore Ave



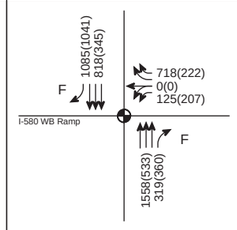
28. I-580 WB Ramps & Isabel Ave



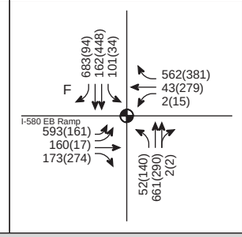
29. I-580 EB Ramps & Isabel Ave



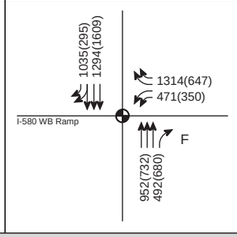
30. I-580 WB Ramps & Airway Blvd



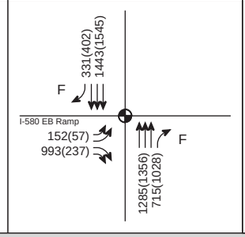
31. I-580 EB Ramps & Airway Blvd



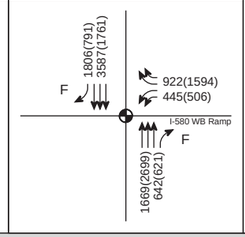
32. I-580 WB Ramps & Fallon Rd



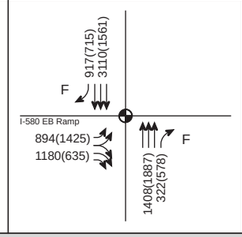
33. I-580 EB Ramps & El Charro Rd



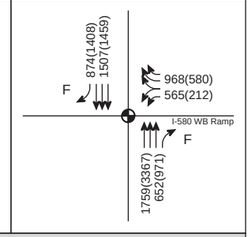
34. I-580 WB Ramps & Hacienda Dr



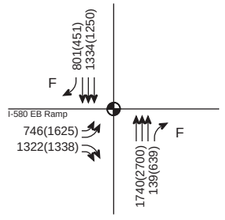
35. I-580 EB Ramps & Hacienda Dr



36. I-580 WB Ramps & Hopyard Rd



37. I-580 EB Ramp & Hopyard Rd



Legend

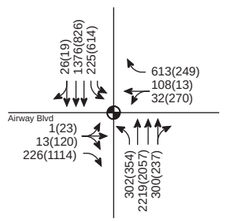
AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

Source: WSA, 2009.

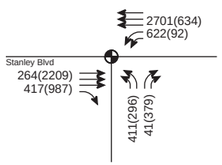
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: NO BUILD CONDITIONS

FIGURE 3.2-7

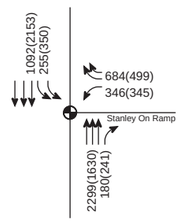
1. Airway Blvd & Isabel Ave



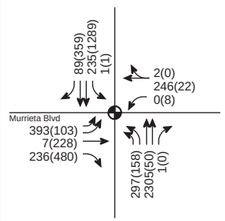
2. Stanley Blvd & Isabel Ave On Ramp



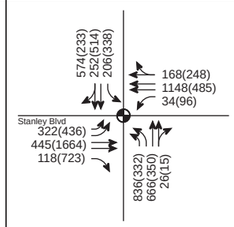
3. Isabel Ave & Stanley Blvd On Ramp



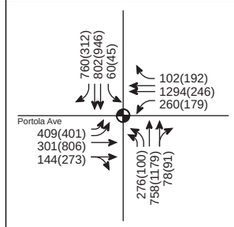
4. Murrieta Blvd & Portola Ave



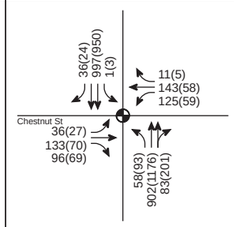
5. Stanley Blvd & Murrieta Blvd



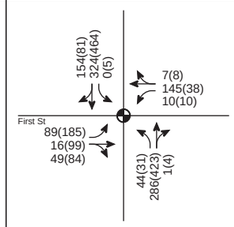
6. Portola Ave & Livermore Ave



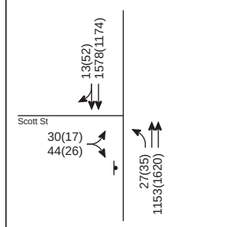
7. Chestnut St & Livermore Ave



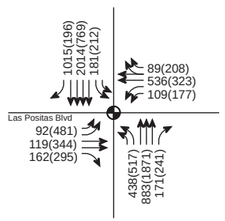
8. First St & Livermore Ave



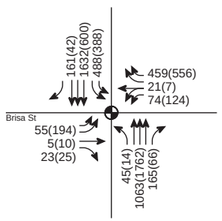
9. Scott St & First St



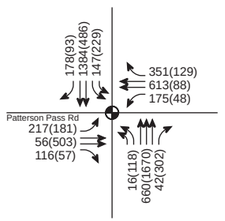
10. Las Positas Rd & Vasco Rd



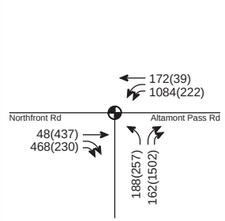
11. Brisa St & Vasco Rd



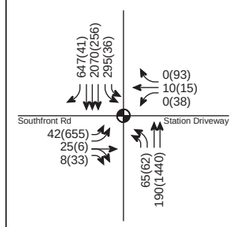
12. Patterson Pass Rd & Vasco Rd



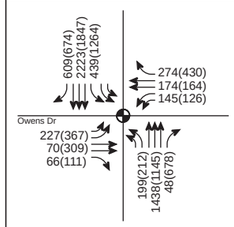
13. Northfront Rd & Greenville Rd



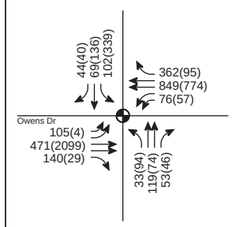
14. Southfront Rd & Greenville Rd



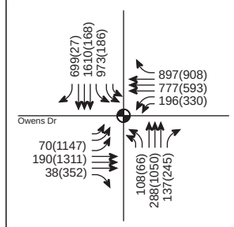
15. Owens Dr & Hopyard Rd



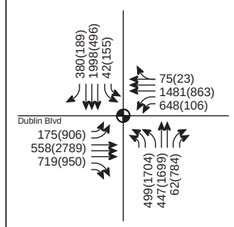
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramps & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramps & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

28. I-580 WB Ramps & Isabel Ave

29. I-580 EB Ramps & Isabel Ave

30. I-580 WB Ramps & Airway Blvd

31. I-580 EB Ramps & Airway Blvd

32. I-580 WB Ramps & Fallon Rd

33. I-580 EB Ramps & El Charro Rd

34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd

Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

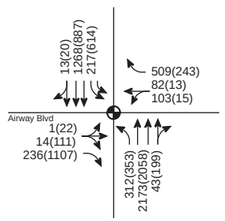
Alignment Schematic

Source: WSA, 2009.

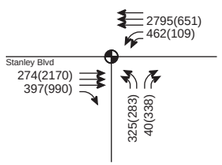
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 1 - GREENVILLE EAST

FIGURE 3.2-8

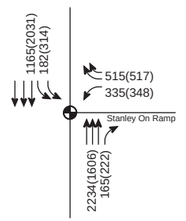
1. Airway Blvd & Isabel Ave



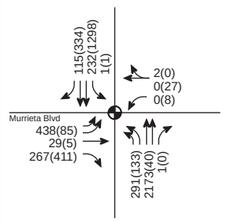
2. Stanley Blvd & Isabel Ave On Ramp



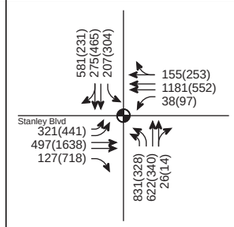
3. Isabel Ave & Stanley Blvd On Ramp



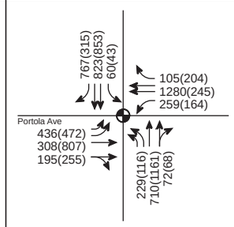
4. Murrieta Blvd & Portola Ave



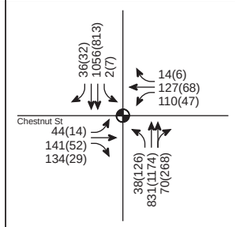
5. Stanley Blvd & Murrieta Blvd



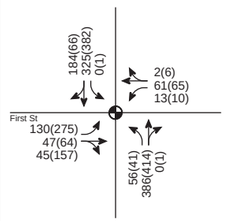
6. Portola Ave & Livermore Ave



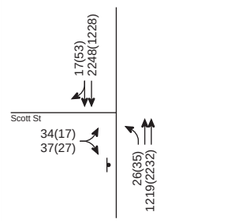
7. Chestnut St & Livermore Ave



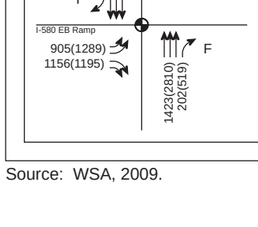
8. First St & Livermore Ave



9. Scott St & First St

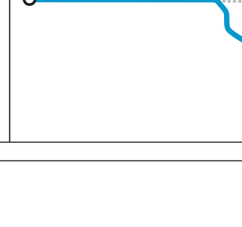


10. Las Positas Rd & Vasco Rd

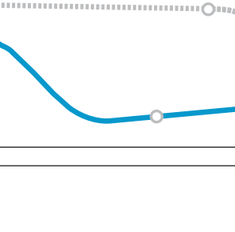


11. Brisa St & Vasco Rd

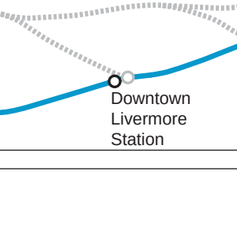
12. Patterson Pass Rd & Vasco Rd



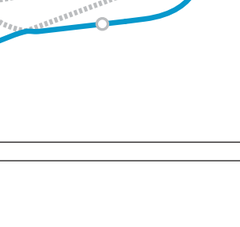
13. Northfront Rd & Greenville Rd



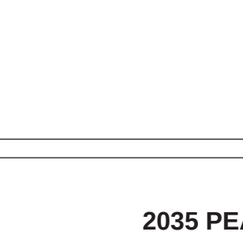
14. Southfront Rd & Greenville Rd



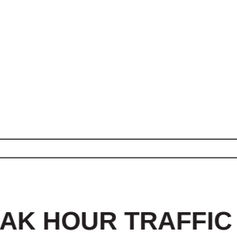
15. Owens Dr & Hopyard Rd



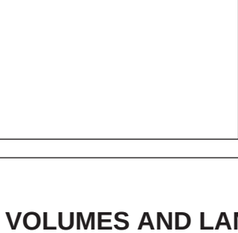
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramps & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramps & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

28. I-580 WB Ramps & Isabel Ave

29. I-580 EB Ramps & Isabel Ave

30. I-580 WB Ramps & Airway Blvd

31. I-580 EB Ramps & Airway Blvd

32. I-580 WB Ramps & Fallon Rd

33. I-580 EB Ramps & El Charro Rd

34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd

Legend

AM (PM) Peak Hour Traffic Volume

F "Free" Right Turn

Traffic Signal

Turn Lane

Stop Sign

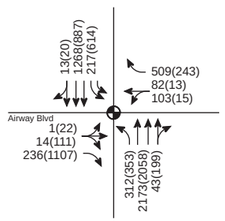
Alignment Schematic

Source: WSA, 2009.

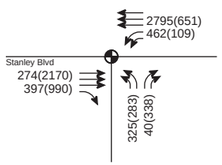
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 1A - DOWNTOWN-GREENVILLE EAST VIA UPRR

FIGURE 3.2-9

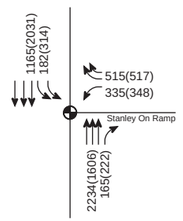
1. Airway Blvd & Isabel Ave



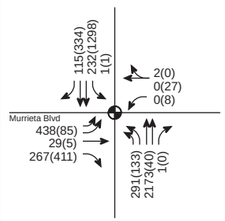
2. Stanley Blvd & Isabel Ave On Ramp



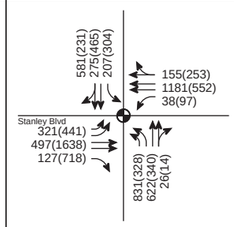
3. Isabel Ave & Stanley Blvd On Ramp



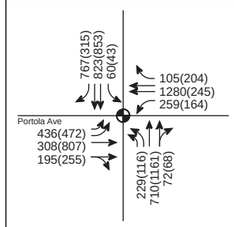
4. Murrieta Blvd & Portola Ave



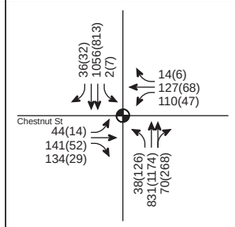
5. Stanley Blvd & Murrieta Blvd



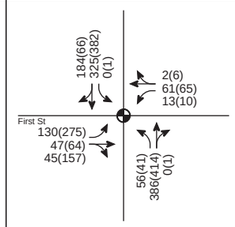
6. Portola Ave & Livermore Ave



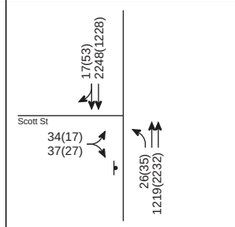
7. Chestnut St & Livermore Ave



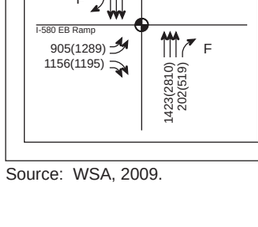
8. First St & Livermore Ave



9. Scott St & First St

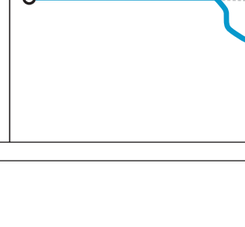


10. Las Positas Rd & Vasco Rd

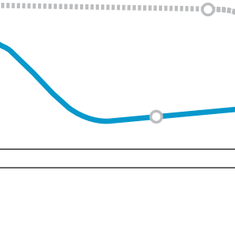


11. Brisa St & Vasco Rd

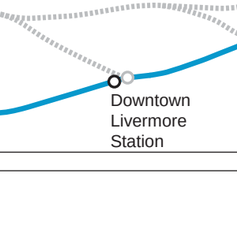
12. Patterson Pass Rd & Vasco Rd



13. Northfront Rd & Greenville Rd

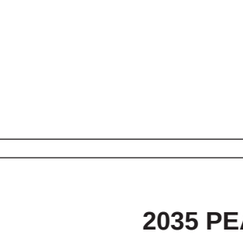


14. Southfront Rd & Greenville Rd

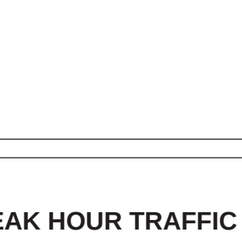


15. Owens Dr & Hopyard Rd

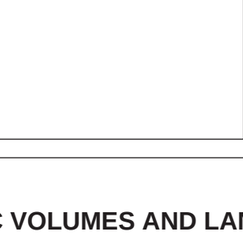
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramps & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramps & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

28. I-580 WB Ramps & Isabel Ave

29. I-580 EB Ramps & Isabel Ave

30. I-580 WB Ramps & Airway Blvd

31. I-580 EB Ramps & Airway Blvd

32. I-580 WB Ramps & Fallon Rd

33. I-580 EB Ramps & El Charro Rd

34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd

Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

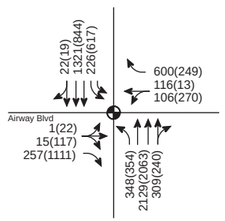
Alignment Schematic

Source: WSA, 2009.

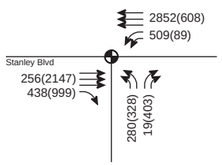
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 1B - DOWNTOWN-GREENVILLE EAST VIA SPRR

FIGURE 3.2-10

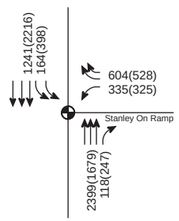
1. Airway Blvd & Isabel Ave



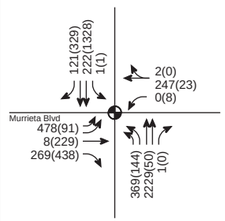
2. Stanley Blvd & Isabel Ave On Ramp



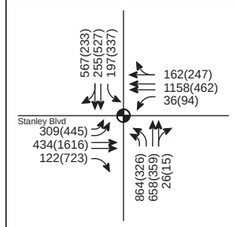
3. Isabel Ave & Stanley Blvd On Ramp



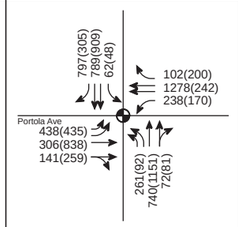
4. Murrieta Blvd & Portola Ave



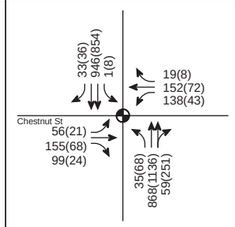
5. Stanley Blvd & Murrieta Blvd



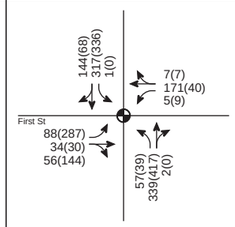
6. Portola Ave & Livermore Ave



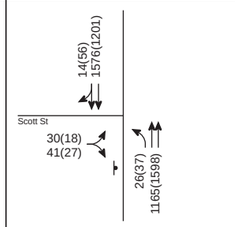
7. Chestnut St & Livermore Ave



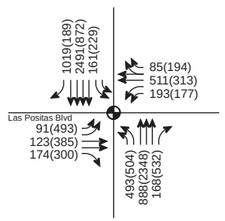
8. First St & Livermore Ave



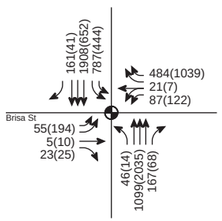
9. Scott St & First St



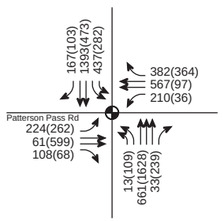
10. Las Positas Rd & Vasco Rd



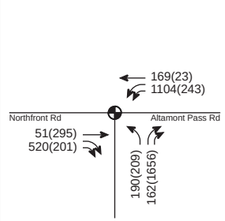
11. Brisa St & Vasco Rd



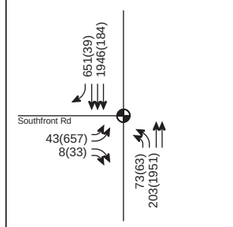
12. Patterson Pass Rd & Vasco Rd



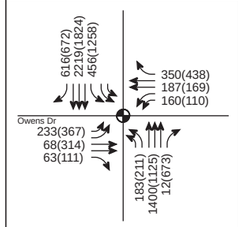
13. Northfront Rd & Greenville Rd



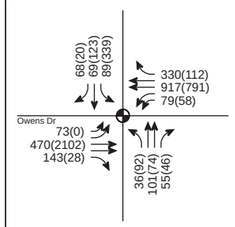
14. Southfront Rd & Greenville Rd



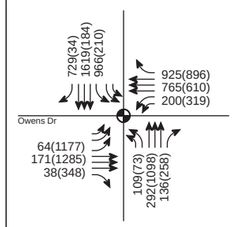
15. Owens Dr & Hopyard Rd



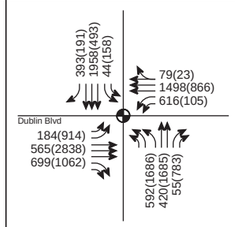
16. Owens Dr & Willow Rd



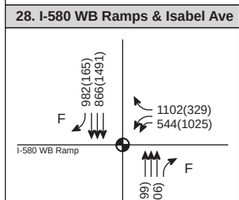
17. Owens Dr & Hacienda Dr



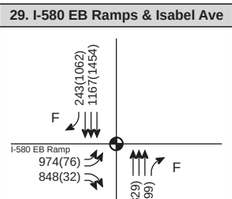
18. Dublin Blvd & Hacienda Dr



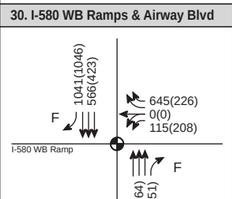
19. Stanley Blvd & Valley Ave



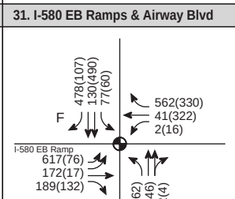
20. I-580 WB Ramps & Greenville Rd



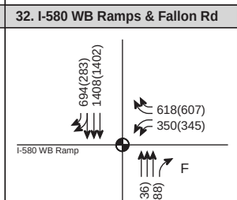
21. I-580 EB Ramps & Greenville Rd



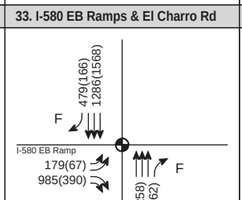
22. I-580 WB Ramps & Vasco Rd



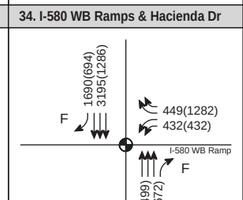
23. I-580 EB Ramps & Vasco Rd



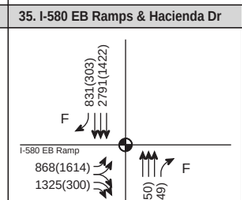
24. I-580 WB Ramps & First St



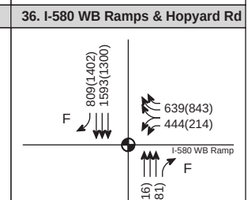
25. I-580 EB Ramps & First St



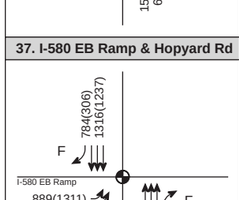
26. I-580 WB Ramps & N Livermore Ave



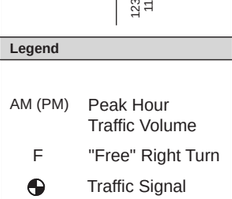
27. I-580 EB Ramps & N Livermore Ave



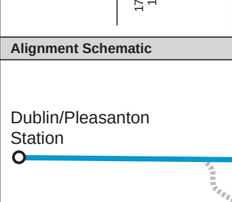
28. I-580 WB Ramps & Isabel Ave



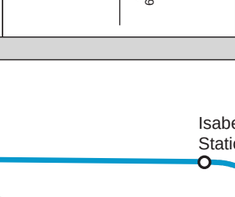
29. I-580 EB Ramps & Isabel Ave



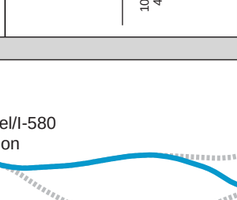
30. I-580 WB Ramps & Airway Blvd



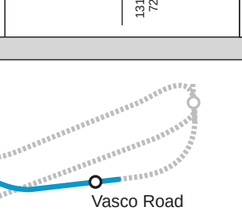
31. I-580 EB Ramps & Airway Blvd



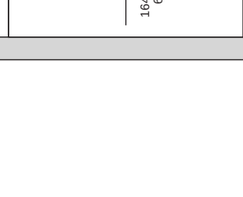
32. I-580 WB Ramps & Fallon Rd



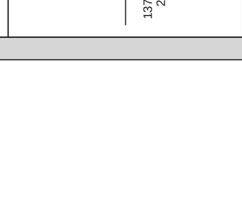
33. I-580 EB Ramps & El Charro Rd



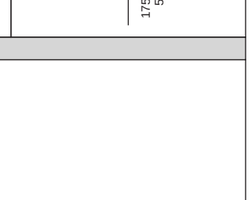
34. I-580 WB Ramps & Hacienda Dr



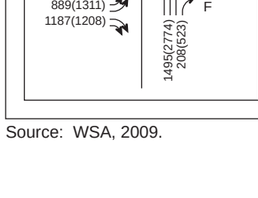
35. I-580 EB Ramps & Hacienda Dr



36. I-580 WB Ramps & Hopyard Rd



37. I-580 EB Ramp & Hopyard Rd



Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

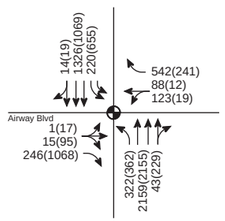
Alignment Schematic

Source: WSA, 2009.

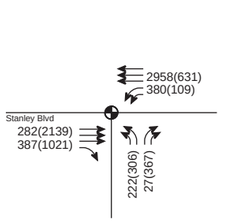
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 2 - LAS POSITAS

FIGURE 3.2-11

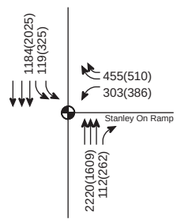
1. Airway Blvd & Isabel Ave



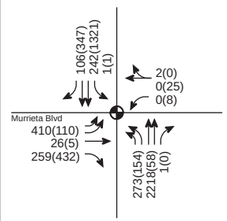
2. Stanley Blvd & Isabel Ave On Ramp



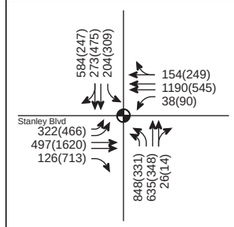
3. Isabel Ave & Stanley Blvd On Ramp



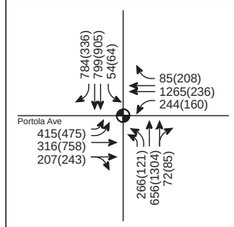
4. Murrieta Blvd & Portola Ave



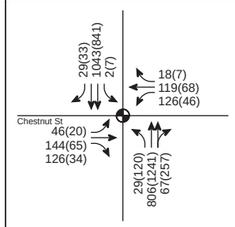
5. Stanley Blvd & Murrieta Blvd



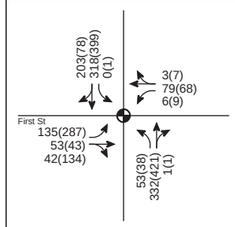
6. Portola Ave & Livermore Ave



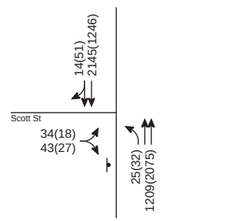
7. Chestnut St & Livermore Ave



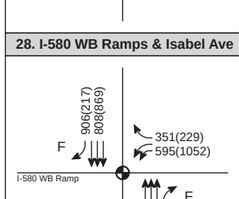
8. First St & Livermore Ave



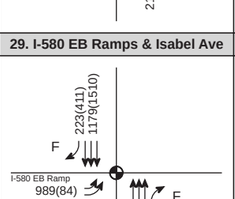
9. Scott St & First St



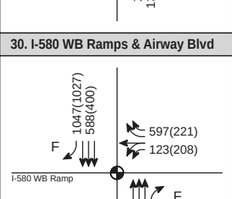
10. Las Positas Rd & Vasco Rd



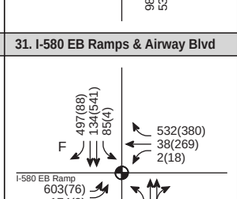
11. Brisa St & Vasco Rd



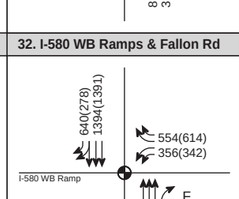
12. Patterson Pass Rd & Vasco Rd



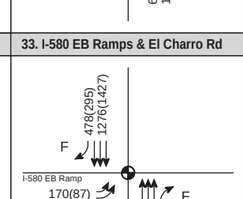
13. Northfront Rd & Greenville Rd



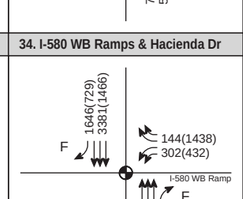
14. Southfront Rd & Greenville Rd



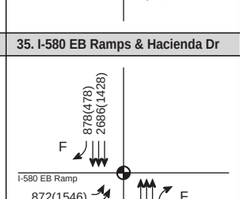
15. Owens Dr & Hopyard Rd



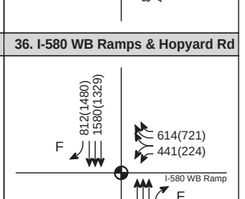
16. Owens Dr & Willow Rd



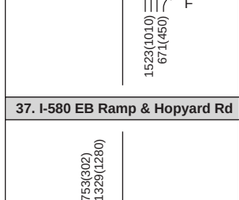
17. Owens Dr & Hacienda Dr



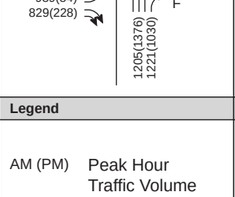
18. Dublin Blvd & Hacienda Dr



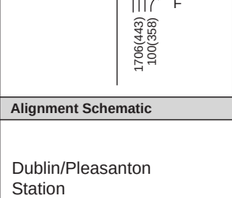
19. Stanley Blvd & Valley Ave



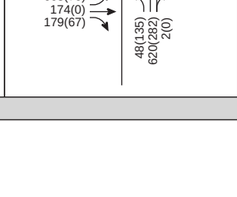
20. I-580 WB Ramps & Greenville Rd



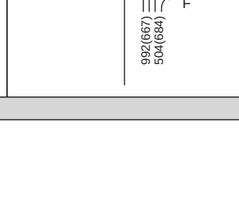
21. I-580 EB Ramps & Greenville Rd



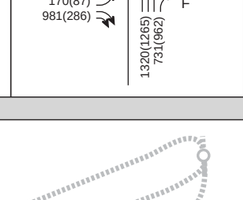
22. I-580 WB Ramps & Vasco Rd



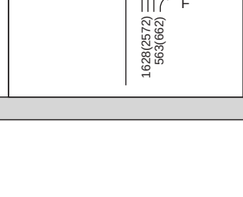
23. I-580 EB Ramps & Vasco Rd



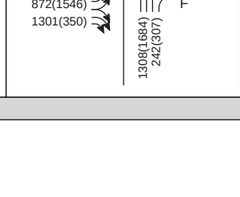
24. I-580 WB Ramps & First St



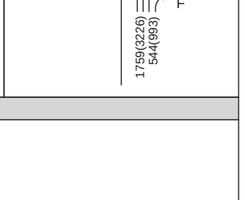
25. I-580 EB Ramps & First St



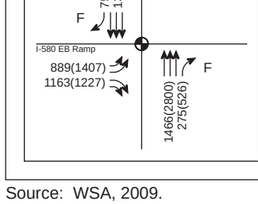
26. I-580 WB Ramps & N Livermore Ave



27. I-580 EB Ramps & N Livermore Ave

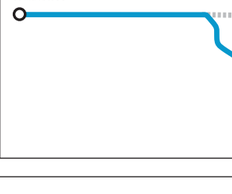


28. I-580 WB Ramps & Isabel Ave

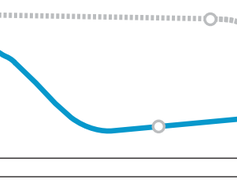


29. I-580 EB Ramps & Isabel Ave

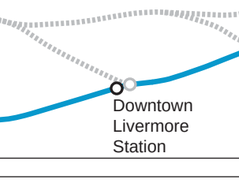
30. I-580 WB Ramps & Airway Blvd



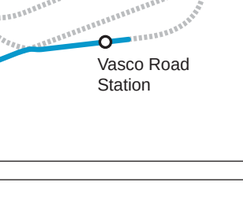
31. I-580 EB Ramps & Airway Blvd



32. I-580 WB Ramps & Fallon Rd



33. I-580 EB Ramps & El Charro Rd

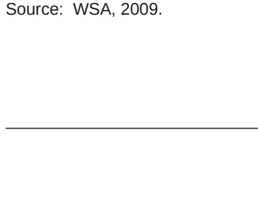


34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd



Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

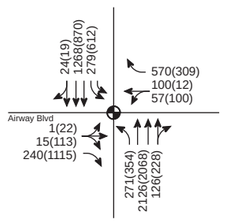
Alignment Schematic

Source: WSA, 2009.

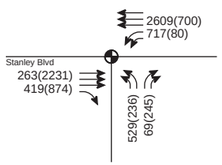
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 2A - DOWNTOWN-VASCO

FIGURE 3.2-12

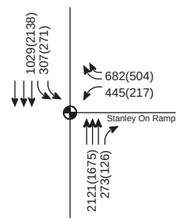
1. Airway Blvd & Isabel Ave



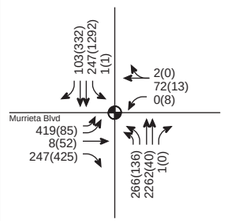
2. Stanley Blvd & Isabel Ave On Ramp



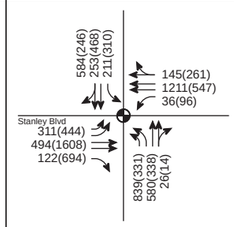
3. Isabel Ave & Stanley Blvd On Ramp



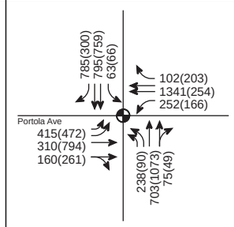
4. Murrieta Blvd & Portola Ave



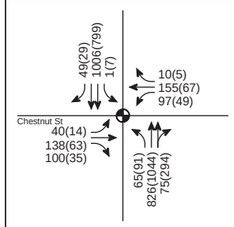
5. Stanley Blvd & Murrieta Blvd



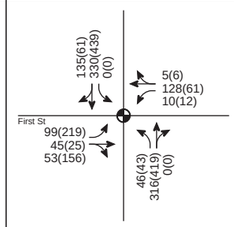
6. Portola Ave & Livermore Ave



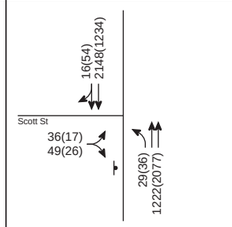
7. Chestnut St & Livermore Ave



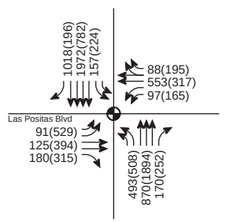
8. First St & Livermore Ave



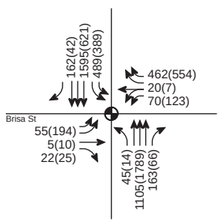
9. Scott St & First St



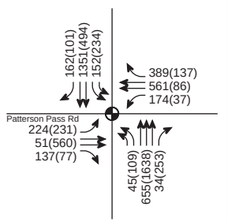
10. Las Positas Rd & Vasco Rd



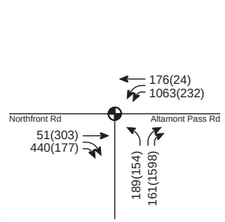
11. Brisa St & Vasco Rd



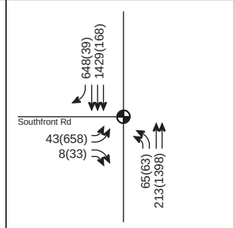
12. Patterson Pass Rd & Vasco Rd



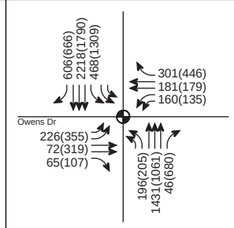
13. Northfront Rd & Greenville Rd



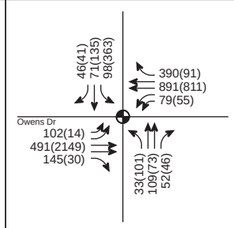
14. Southfront Rd & Greenville Rd



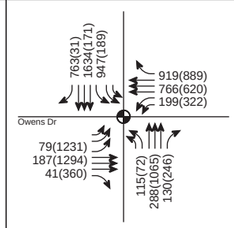
15. Owens Dr & Hopyard Rd



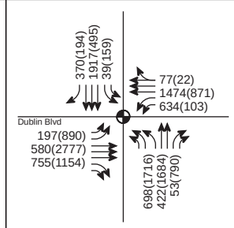
16. Owens Dr & Willow Rd



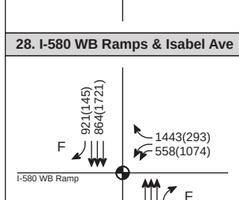
17. Owens Dr & Hacienda Dr



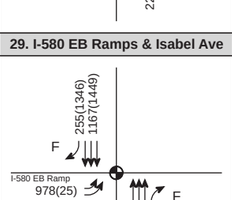
18. Dublin Blvd & Hacienda Dr



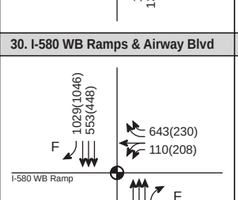
19. Stanley Blvd & Valley Ave



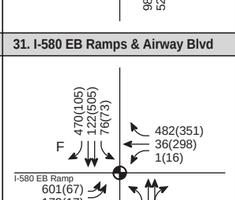
20. I-580 WB Ramps & Greenville Rd



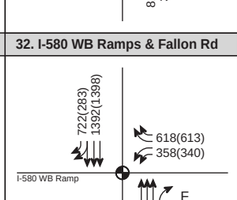
21. I-580 EB Ramps & Greenville Rd



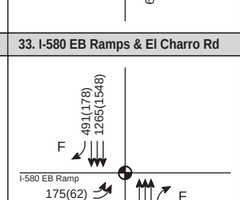
22. I-580 WB Ramps & Vasco Rd



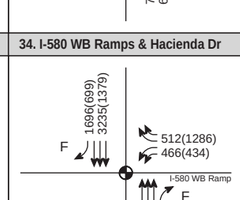
23. I-580 EB Ramps & Vasco Rd



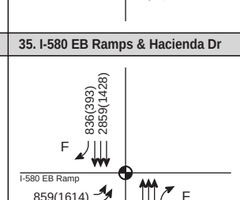
24. I-580 WB Ramps & First St



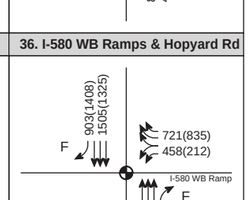
25. I-580 EB Ramps & First St



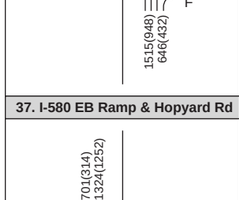
26. I-580 WB Ramps & N Livermore Ave



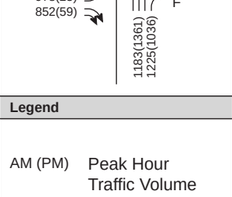
27. I-580 EB Ramps & N Livermore Ave



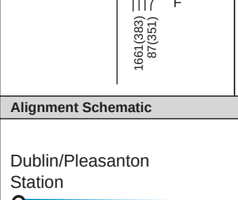
28. I-580 WB Ramps & Isabel Ave



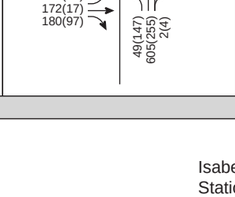
29. I-580 EB Ramps & Isabel Ave



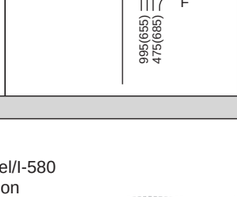
30. I-580 WB Ramps & Airway Blvd



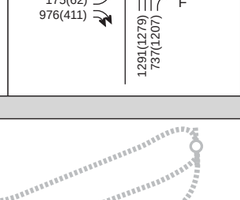
31. I-580 EB Ramps & Airway Blvd



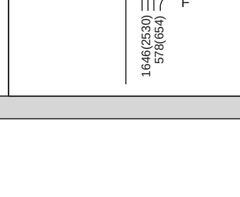
32. I-580 WB Ramps & Fallon Rd



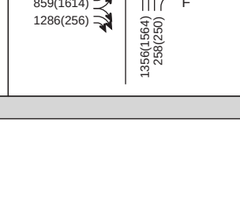
33. I-580 EB Ramps & El Charro Rd



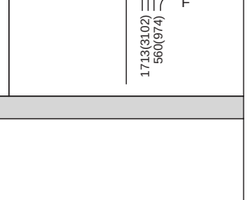
34. I-580 WB Ramps & Hacienda Dr



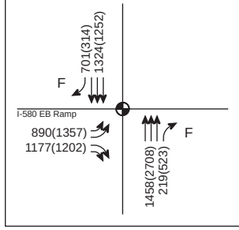
35. I-580 EB Ramps & Hacienda Dr



36. I-580 WB Ramps & Hopyard Rd



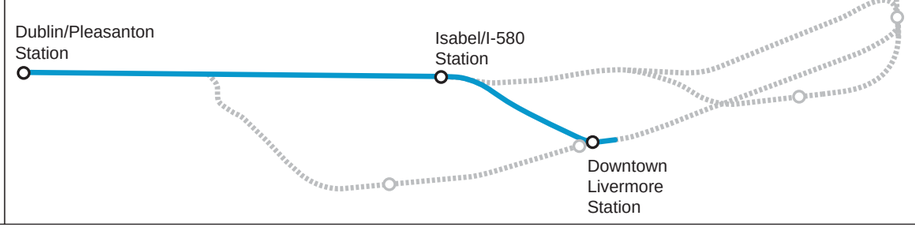
37. I-580 EB Ramp & Hopyard Rd



Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

Alignment Schematic

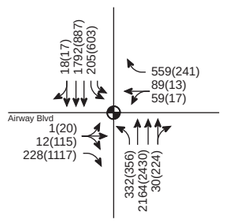


Source: WSA, 2009.

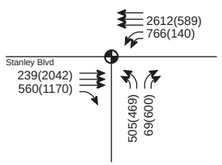
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 3 - PORTOLA

FIGURE 3.2-13

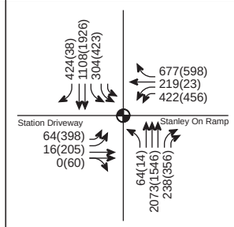
1. Airway Blvd & Isabel Ave



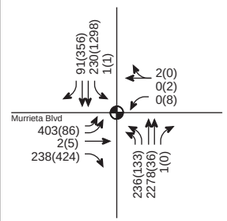
2. Stanley Blvd & Isabel Ave On Ramp



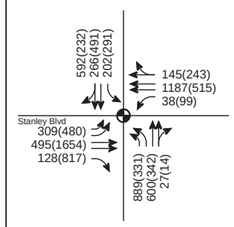
3. Isabel Ave & Stanley Blvd On Ramp



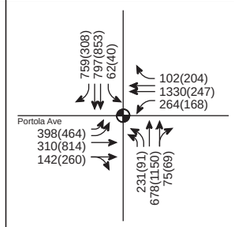
4. Murrieta Blvd & Portola Ave



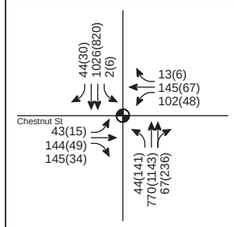
5. Stanley Blvd & Murrieta Blvd



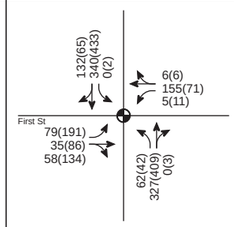
6. Portola Ave & Livermore Ave



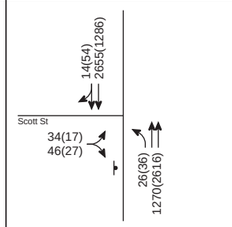
7. Chestnut St & Livermore Ave



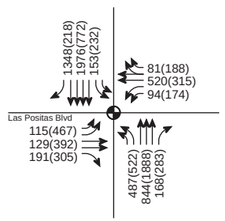
8. First St & Livermore Ave



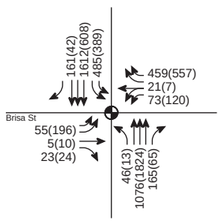
9. Scott St & First St



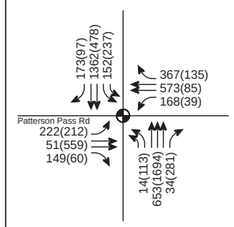
10. Las Positas Rd & Vasco Rd



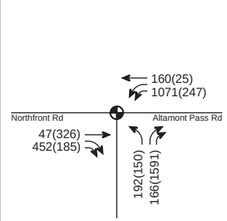
11. Brisa St & Vasco Rd



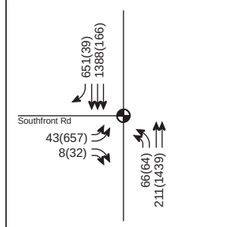
12. Patterson Pass Rd & Vasco Rd



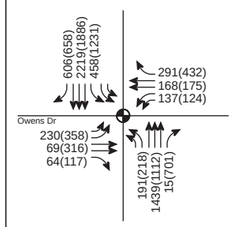
13. Northfront Rd & Greenville Rd



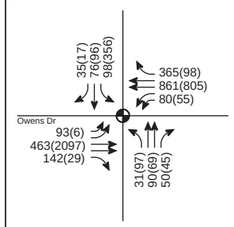
14. Southfront Rd & Greenville Rd



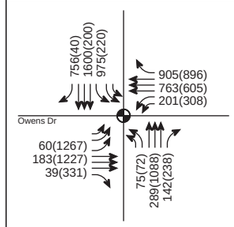
15. Owens Dr & Hopyard Rd



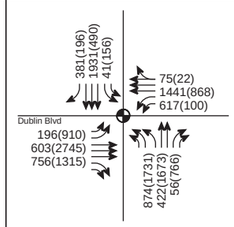
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramps & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramps & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

28. I-580 WB Ramps & Isabel Ave

29. I-580 EB Ramps & Isabel Ave

30. I-580 WB Ramps & Airway Blvd

31. I-580 EB Ramps & Airway Blvd

32. I-580 WB Ramps & Fallon Rd

33. I-580 EB Ramps & El Charro Rd

34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd

Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

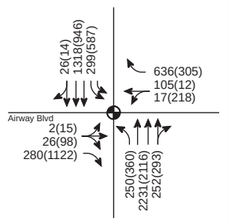
Alignment Schematic

Source: WSA, 2009.

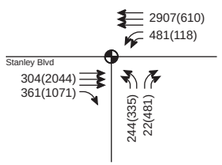
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 3A - RAILROAD

FIGURE 3.2-14

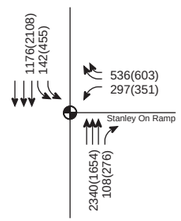
1. Airway Blvd & Isabel Ave



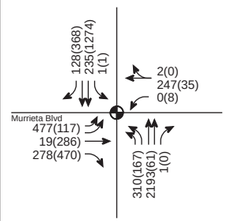
2. Stanley Blvd & Isabel Ave On Ramp



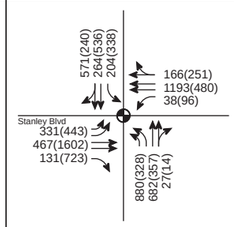
3. Isabel Ave & Stanley Blvd On Ramp



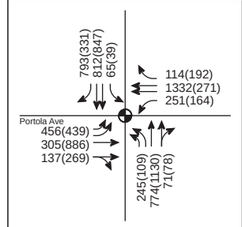
4. Murrieta Blvd & Portola Ave



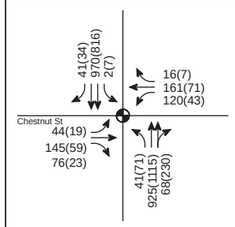
5. Stanley Blvd & Murrieta Blvd



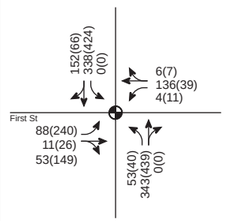
6. Portola Ave & Livermore Ave



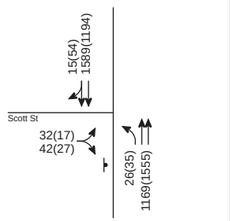
7. Chestnut St & Livermore Ave



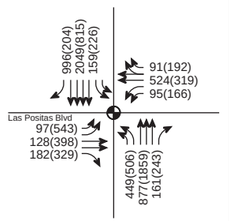
8. First St & Livermore Ave



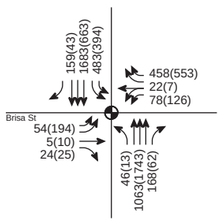
9. Scott St & First St



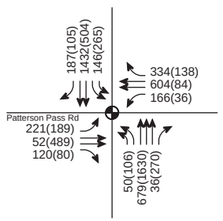
10. Las Positas Rd & Vasco Rd



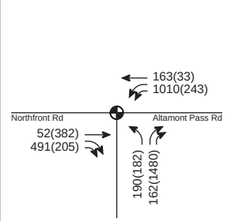
11. Brisa St & Vasco Rd



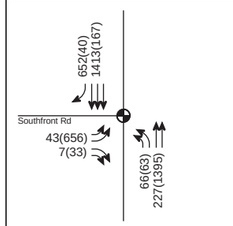
12. Patterson Pass Rd & Vasco Rd



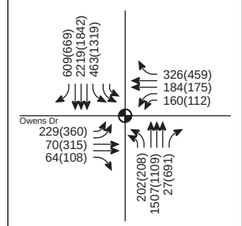
13. Northfront Rd & Greenville Rd



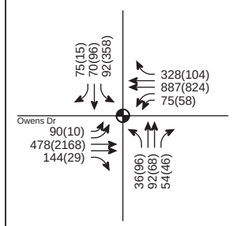
14. Southfront Rd & Greenville Rd



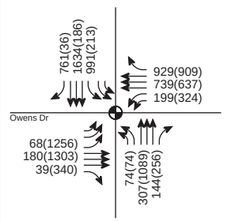
15. Owens Dr & Hopyard Rd



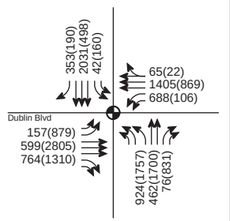
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramps & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramps & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

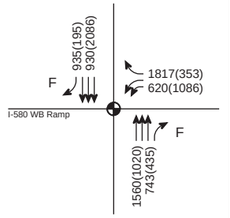
24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

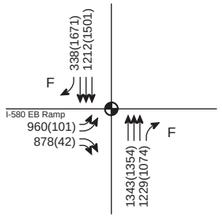
26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

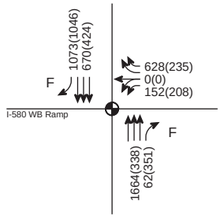
28. I-580 WB Ramps & Isabel Ave



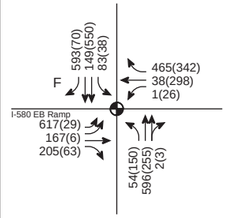
29. I-580 EB Ramps & Isabel Ave



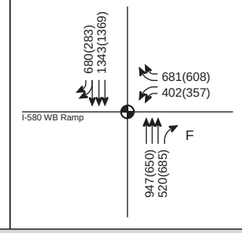
30. I-580 WB Ramps & Airway Blvd



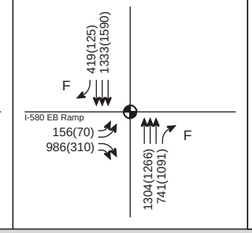
31. I-580 EB Ramps & Airway Blvd



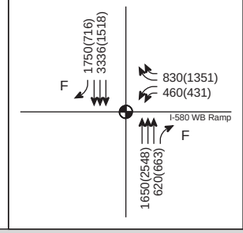
32. I-580 WB Ramps & Fallon Rd



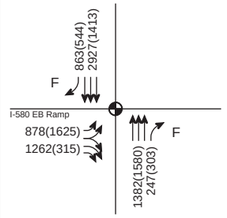
33. I-580 EB Ramps & El Charro Rd



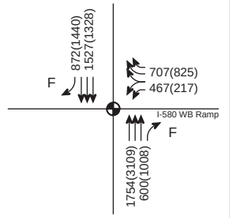
34. I-580 WB Ramps & Hacienda Dr



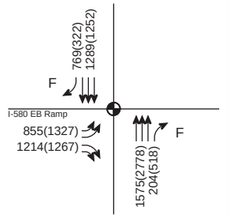
35. I-580 EB Ramps & Hacienda Dr



36. I-580 WB Ramps & Hopyard Rd



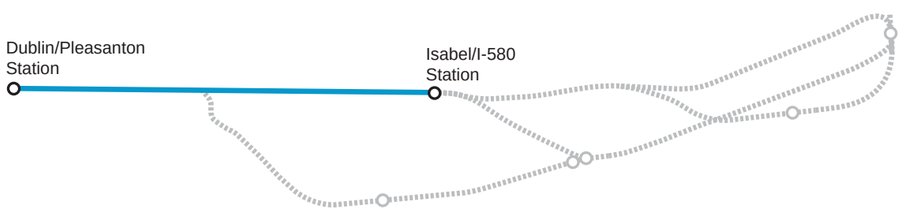
37. I-580 EB Ramp & Hopyard Rd



Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

Alignment Schematic

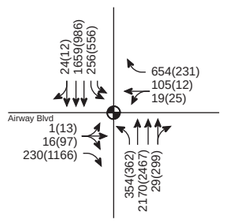


Source: WSA, 2009.

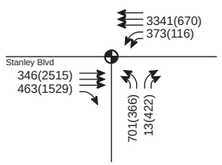
2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 4 - ISABEL/I-580

FIGURE 3.2-15

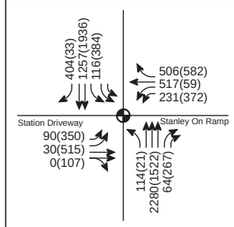
1. Airway Blvd & Isabel Ave



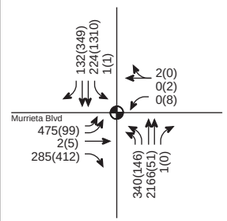
2. Stanley Blvd & Isabel Ave On Ramp



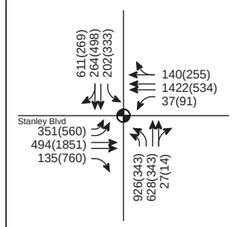
3. Isabel Ave & Stanley Blvd On Ramp



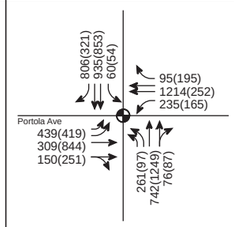
4. Murrieta Blvd & Portola Ave



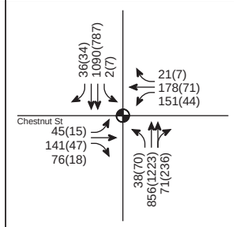
5. Stanley Blvd & Murrieta Blvd



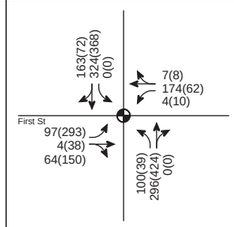
6. Portola Ave & Livermore Ave



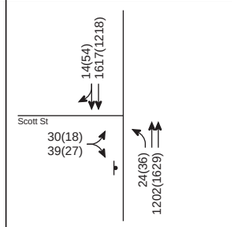
7. Chestnut St & Livermore Ave



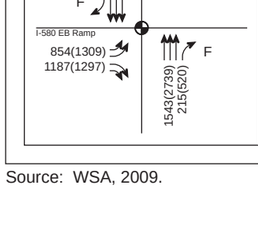
8. First St & Livermore Ave



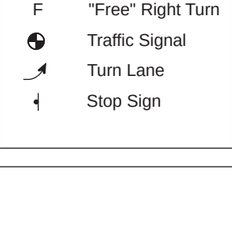
9. Scott St & First St



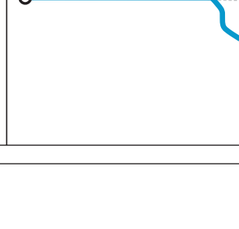
10. Las Positas Rd & Vasco Rd



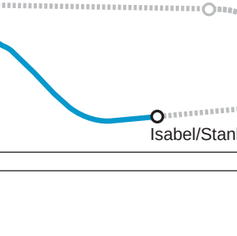
11. Brisa St & Vasco Rd



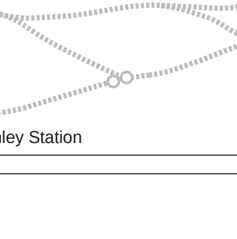
12. Patterson Pass Rd & Vasco Rd



13. Northfront Rd & Greenville Rd

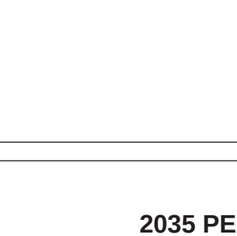


14. Southfront Rd & Greenville Rd

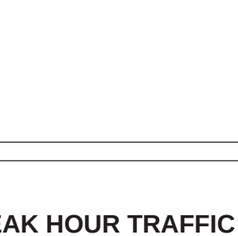


15. Owens Dr & Hopyard Rd

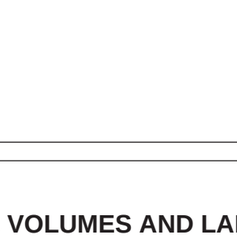
16. Owens Dr & Willow Rd



17. Owens Dr & Hacienda Dr



18. Dublin Blvd & Hacienda Dr



19. Stanley Blvd & Valley Ave

20. I-580 WB Ramp & Greenville Rd

21. I-580 EB Ramps & Greenville Rd

22. I-580 WB Ramp & Vasco Rd

23. I-580 EB Ramps & Vasco Rd

24. I-580 WB Ramps & First St

25. I-580 EB Ramps & First St

26. I-580 WB Ramps & N Livermore Ave

27. I-580 EB Ramps & N Livermore Ave

28. I-580 WB Ramps & Isabel Ave

29. I-580 EB Ramps & Isabel Ave

30. I-580 WB Ramps & Airway Blvd

31. I-580 EB Ramps & Airway Blvd

32. I-580 WB Ramps & Fallon Rd

33. I-580 EB Ramps & El Charro Rd

34. I-580 WB Ramps & Hacienda Dr

35. I-580 EB Ramps & Hacienda Dr

36. I-580 WB Ramps & Hopyard Rd

37. I-580 EB Ramp & Hopyard Rd

Legend

AM (PM)	Peak Hour Traffic Volume
F	"Free" Right Turn
	Traffic Signal
	Turn Lane
	Stop Sign

Alignment Schematic

Source: WSA, 2009.

2035 PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS: ALTERNATIVE 5 - QUARRY

FIGURE 3.2-16

Under the No Build Alternative PM peak hour conditions, 25 of the 37 intersections would operate at an acceptable LOS. The following twelve intersections operate at unacceptable levels.

- #1 Airway Boulevard/Isabel Avenue
- #3 Isabel Avenue/Stanley Boulevard On-Ramp
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #21 Greenville Road/I-580 Eastbound Ramp
- #23 Vasco Road/I-580 Eastbound Ramp
- #24 Vasco Road/I-580 Eastbound Ramp
- #34 Hacienda Drive/ I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The No Build Alternative would result in unacceptable levels of service at four locations in the AM peak hour and five locations in the PM peak hour. In some cases, the BART extension alternative would result in an intersection LOS that remains unacceptable but fluctuates from the value predicted for the No Build conditions. Since the intersection would operate at unacceptable conditions whether or not the BART extension alternative was built, the unacceptable LOS is only considered an impact of the BART extension alternative if the alternative would worsen intersection delay beyond No Build conditions.

Alternative 1 – Greenville East. During the AM peak hour, 29 of the 37 intersections would operate at acceptable conditions. The following eight intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #4 Portola Avenue/Murrieta Boulevard
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard

- #20 Greenville Road/I-580 Westbound Ramp
- #21 Greenville Road/I-580 Eastbound Ramp
- #28 Isabel Avenue/I-580 Westbound Ramp

Two of the intersections, Portola Avenue/Livermore Avenue and Vasco Road/Las Positas Road, operations would experience improved operation; however, these intersections would continue to operate at unacceptable conditions. Increased travel demand at the Airway Boulevard/Isabel Avenue, Portola Avenue/Murrieta Boulevard, Hacienda Drive/Dublin Boulevard, Greenville Road/I-580 Westbound Ramp, Greenville Road/I-580 Eastbound Ramp, and Isabel Avenue/I-580 Westbound Ramp intersections would worsen intersection operations. Conditions at two other intersections which were unacceptable under the No Build Alternative, Hacienda Drive/I-580 Westbound Ramp and Hacienda Drive/I-580 Eastbound Ramp, would improve to acceptable conditions with Alternative 1.

During the PM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

Conditions at the Hacienda Drive/I-580 Westbound Ramp and Hopyard Road/I-580 Eastbound Ramp would be improved but would remain unacceptable. The remaining four intersections would experience worsened operating conditions. Conditions would improve to acceptable levels at six intersections: Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, Vasco Road/I-580 Eastbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp.

In summary, Alternative 1 would have a significant intersection operation impact in the AM and PM peak hours.

Alternative 1a – Downtown-Greenville East via UPRR. During the AM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #6 Portola Avenue/Livermore Avenue

- #18 Hacienda Drive/Dublin Boulevard
- #20 Greenville Road/I-580 Westbound Ramp
- #21 Greenville Road/I-580 Eastbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp

The Hacienda Drive/Dublin Boulevard, Greenville Road/I-580 Westbound Ramp, Greenville Road/I-580 Eastbound Ramp intersections would experience worsened operating conditions. The Airway Boulevard/Isabel Avenue, Portola Avenue/Livermore Avenue, and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operation but would continue to operate at unacceptable levels. The intersection operations at Portola Avenue/Murrieta Boulevard, Vasco Road/Las Positas Road, and the Hacienda Drive/I-580 Westbound Ramp would improve to acceptable conditions.

During the PM peak hour, 30 of the 37 intersections would operate at acceptable conditions. The following seven intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

Conditions would improve at the Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp intersections to an acceptable LOS. Of the seven intersections that would operate at unacceptable levels, the Airway Boulevard/Isabel Avenue, Hacienda Drive/I-580 Westbound Ramp, and Hopyard Road/I-580 Eastbound Ramp intersections would experience improved operation but would continue to operate at unacceptable conditions. The remaining four intersections identified above would experience worsened operating conditions.

In summary, Alternative 1a would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 1b – Downtown-Greenville East via SPRR. During the AM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #6 Portola Avenue/Livermore Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #20 Greenville Road/I-580 Westbound Ramp
- #21 Greenville Road/I-580 Eastbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp

Conditions at the Hacienda Drive/Dublin Boulevard, Greenville Road/I-580 Westbound Ramp, and Greenville Road/I-580 Eastbound Ramp intersections would worsen and would be unacceptable. The Airway Boulevard/Isabel Avenue, Portola Avenue/Livermore Avenue, and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operation but would continue to operate at unacceptable levels. The intersection operations at Portola Avenue/Murrieta Boulevard, Vasco Road/Las Positas Road, and Hacienda Drive/I-580 Westbound Ramp would experience improved operation to an acceptable LOS.

During the PM peak hour, 30 of the 37 intersections would operate at acceptable conditions. The following seven intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

Conditions would improve at the Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp intersections to an acceptable LOS. Of the seven intersections that would operate at unacceptable levels, the Airway Boulevard/Isabel Avenue, Hacienda Drive/I-580 Westbound Ramp, and Hopyard Road/I-580 Eastbound Ramp intersection would experience improved operation but would continue to operate at an unacceptable LOS. Conditions at the remaining four intersections identified above would experience worsened operating conditions.

In summary, Alternative 1b would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 2 – Las Positas. During the AM peak hour, 30 of the 37 intersections would operate at acceptable conditions. The following seven intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #4 Portola Avenue/Murrieta Boulevard
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard
- #23 Vasco Road/I-580 Eastbound Ramp
- #28 Isabel Avenue/I-580 Westbound Ramp

The Portola Avenue/Livermore Avenue intersection would experience improved operation but would continue to operate at unacceptable conditions. The other six intersections identified above would experience worsened operating conditions. The Hacienda Drive/I-580 Westbound Ramp and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operations, moving from unacceptable to acceptable conditions with Alternative 2.

During the PM peak hour, 28 of the 37 intersections would operate at acceptable conditions. The following nine intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #10 Vasco Road/Las Positas Road
- #11 Vasco Road/Brisa Street
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

Intersection operations at Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS. Intersection operations at Airway Boulevard/Isabel Avenue, Vasco Road/Las Positas Road, Hacienda Drive/Dublin Boulevard, Stanley Boulevard/Valley Avenue, First Street/I-580 Westbound

Ramp, and Hacienda Drive/I-580 Eastbound Ramp would experience worsened operating conditions. The Vasco Road/Brisa Street intersection would experience worsened operating conditions to an unacceptable LOS. The Hacienda Drive/I-580 Westbound Ramp and Hopyard Road/I-580 Eastbound Ramp intersections would experienced improved operating conditions but would still be at an unacceptable LOS.

Based on the above assessment, Alternative 2 would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 2a – Downtown-Vasco. During the AM peak hour, 33 of the 37 intersections would operate at acceptable conditions. The following four intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #6 Portola Avenue/Livermore Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #23 Vasco Road/I-580 Eastbound Ramp

The Airway Boulevard/Isabel Avenue, Portola Avenue/Livermore Avenue, and Hacienda Drive/Dublin Boulevard intersections would experience improved operation but would continue to operate at unacceptable conditions. The Vasco Road/I-580 Eastbound Ramp intersection would experience worsened conditions resulting in an unacceptable LOS. The intersections of Portola Avenue/Murrieta Boulevard, Vasco Road/Las Positas Road, Hacienda Drive/I-580 Westbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS.

During the PM peak hour, 29 of the 37 intersections would operate at acceptable conditions. The following eight intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #11 Vasco Road/Brisa Street
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The intersections of Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS. The Airway Boulevard/Isabel Avenue, Hacienda Drive/I-580 Westbound Ramp, and Hopyard Road/I-580 Eastbound Ramp intersections would experience improved operation but would continue to operate at unacceptable levels. The Hacienda Drive/Dublin Boulevard, Stanley Boulevard/Valley Avenue, First Street/I-580 Westbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp, intersections would experience worsened operating conditions. The Vasco Road/Brisa Street intersection would experience worsened operating conditions to an unacceptable LOS.

Based on the above assessment, Alternative 2a would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 3 – Portola. During the AM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #4 Portola Avenue/Murrieta Boulevard
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard
- #28 Isabel Avenue/I-580 Westbound Ramp

The Airway Boulevard/Isabel Avenue and Portola Avenue/Murrieta Boulevard intersections would experience improved operation but would continue to operate at unacceptable levels. The Isabel Avenue/I-580 Westbound Ramp intersection would experience worsened operating conditions to an unacceptable LOS. The three remaining intersections identified above would experience worsened operating conditions. The Hacienda Drive/I-580 Westbound Ramp and the Hacienda Drive/I-580 Eastbound Ramp intersections would improve from unacceptable conditions to an acceptable LOS.

During the PM peak hour, 29 of the 37 intersections would operate at acceptable conditions. The following eight intersections would operate at unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #21 Greenville Road/I-580 Eastbound Ramp

- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The intersections of Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, and Vasco Road/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS. LOS would improve at the Airway Boulevard/Isabel Avenue, Greenville Road/I-580 Eastbound Ramp, Hacienda Drive/I-580 Westbound Ramp, and Hopyard Road/I-580 Eastbound Ramp intersections; however, the intersections would continue to operate at unacceptable conditions. The remaining four intersections identified above would experience worsened operating conditions.

In summary, Alternative 3 would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 3a - Railroad. During the AM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at unacceptable levels:

- #1 Airway Boulevard/Isabel Avenue
- #3 Isabel Avenue/Stanley Boulevard On-Ramp
- #6 Portola Avenue/Livermore Avenue
- #10 Vasco Road/Las Positas Road
- #18 Hacienda Drive/Dublin Boulevard
- #23 Vasco Road/I-580 Eastbound Ramp

The intersections of Portola Avenue/Murrieta Boulevard, Hacienda Drive/I-580 Westbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS. The Airway Boulevard/Isabel Avenue intersection would also experience improved operation but would remain at an unacceptable LOS. The remaining five intersections listed above would experience worsened operating conditions.

During the PM peak hour, 30 of the 37 intersections would operate at acceptable conditions. The following seven intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue

- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The intersections of Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp would experience improved operation to an acceptable LOS. The Hacienda Drive/I-580 Westbound Ramp and Hopyard Road/I-580 Eastbound Ramp intersections would experience improved operations but would remain at an unacceptable LOS. The remaining five intersections on the list above would experience worsened conditions.

Based on the above assessment, Alternative 3a would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 4 – Isabel/I-580. During the AM peak hour, 32 of the 37 intersections would operate at acceptable conditions. The following five intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #4 Portola Avenue/Murrieta Boulevard
- #6 Portola Avenue/Livermore Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #28 Isabel Avenue/I-580 Westbound Ramp

All five intersections listed above would experience worsened operating conditions with Alternative 4. Offsetting these adverse effects, the Vasco Road/Los Positas Road, Hacienda Drive/I-580 Westbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operation to an acceptable LOS.

During the PM peak hour, 31 of the 37 intersections would operate at acceptable conditions. The following six intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp

- #34 Hacienda Drive/I-580 Westbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, Vasco Road/I-580 Eastbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operation to an acceptable LOS. The intersections of Hacienda Drive/I-580 Westbound Ramp and Hopyard Road/I-580 Eastbound Ramp would experience improved operation but would continue to operate at unacceptable conditions. Conditions at the remaining four intersections on the list above would be worsened.

In summary, Alternative 4 would have a significant impact to intersection operations in the AM and PM peak hours.

Alternative 5 – Quarry. During the AM peak hour, 34 of the 37 intersections would operate at acceptable conditions. The following three intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #6 Portola Avenue/Livermore Avenue
- #18 Hacienda Drive/Dublin Boulevard

The intersection at Portola Avenue/Livermore Avenue would experience improved operation but would continue to operate at an unacceptable LOS. The Airway Boulevard/Isabel Avenue and Hacienda Drive/Dublin Boulevard intersections would experience worsened operating conditions. The Portola Avenue/Murrieta Boulevard, Vasco Road/Los Positas Road, Hacienda Drive/I-580 Westbound Ramp, and Hacienda Drive/I-580 Eastbound Ramp intersections would experience improved operation to an acceptable LOS.

During the PM peak hour, 30 of the 37 intersections would operate at acceptable conditions. The following seven intersections would operate at an unacceptable LOS:

- #1 Airway Boulevard/Isabel Avenue
- #18 Hacienda Drive/Dublin Boulevard
- #19 Stanley Boulevard/Valley Avenue
- #24 First Street/I-580 Westbound Ramp
- #34 Hacienda Drive/I-580 Westbound Ramp
- #35 Hacienda Drive/I-580 Eastbound Ramp
- #37 Hopyard Road/I-580 Eastbound Ramp

The Isabel Avenue/Stanley Boulevard On-Ramp, Portola Avenue/Livermore Avenue, Vasco Road/Las Positas Road, Greenville Road/I-580 Eastbound Ramp, and Vasco Road/I-580 Eastbound Ramp intersections would experience improved operation to an acceptable LOS. The intersections of Hacienda Drive/I-580 Westbound Ramp and Hopyard Road/I-580 Eastbound Ramp would experience improved operation but would continue to operate at unacceptable conditions. Conditions at the remaining five intersections on the list above would be worsened.

In light of the above, Alternative 5 would have a significant impact to intersection operations in the AM and PM peak hours.

MITIGATION MEASURES. The following measures would improve operations at the seven impacted intersections to an acceptable LOS. Lane configuration adjustments, signal timing modifications, and the possibility of installing additional lanes would reduce the impacts at these fourteen intersections to a less–than-significant level, for the BART extension alternatives where these intersections are impacted. While these mitigation measures are expected to be effective based on current information, further evaluation of these mitigation measures may be necessary at the project level when more information about specific design features and current circumstances affecting these intersections is available. As noted below in the description of each intersection improvement, the mitigation measures identified for #6 Portola Avenue/Livermore Avenue may be infeasible and the effect would remain significant and unavoidable; all other intersections could be improved to acceptable levels of service. (SU)

TR-4.1 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Airway Boulevard/Isabel Avenue (Alternatives 1, 2, 2a, 3a, 4, 5).* Modification of the eastbound Airway Boulevard approach from one shared left-through-right lane and one exclusive right turn lane to one exclusive left turn lane, one through lane, and two exclusive right turn lanes would improve the intersection operations to an acceptable LOS.

TR-4.2 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Isabel Avenue/Stanley Boulevard On Ramp (Alternative 3a).* Installing an additional exclusive westbound left lane in the Stanley Boulevard On Ramp approach would improve the intersection operations to an acceptable LOS.

TR-4.3 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Portola Avenue/Murrieta Boulevard (Alternatives 1, 2, 3, 4).* Restriping the northbound Portola Avenue approach and modifying the lane configuration from two exclusive left-turn lanes, one through lane, and one shared through-right turn lane to one exclusive left-turn lane, two through lanes, and one shared through-right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.4 *Provide Signalization Improvements at the Intersection of Portola Avenue/Livermore Avenue (Alternatives 3, 3a, 4).* Installing additional through lanes in the southbound Livermore Avenue approach and westbound Portola Avenue approach would improve the intersection operations to an acceptable LOS; however, this improvement would require roadway widening into Portola Park (located on the southwest corner of the intersection) which would be an adverse effect of the mitigation measure. Widening in this location is considered to be infeasible because it is not supported by the City of Livermore. Therefore, the intersection impact is considered significant and unavoidable.

TR-4.5 *Provide Lane Configuration Adjustments at the Intersection of Vasco Road/Las Positas Road (Alternatives 2, 3, 3a).* Removal of the Las Positas Road westbound shared through-right optional lane while providing right-turn permitted-overlap phasing in the westbound Las Positas Road approach, and installing an additional southbound right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.6 *Provide Signalization Adjustments at the Intersection of Vasco Road/Brisa Road (Alternatives 2, 2a).* Providing protected and permissive-overlap phasing for right turn lanes (where appropriate) would improve the intersection operations to an acceptable LOS.

TR-4.7 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Hacienda Drive/Dublin Boulevard*. Implementation of right-turn overlaps, and installing an additional southbound through lane in the Hacienda Drive approach would improve the intersection operations to an acceptable LOS.

TR-4.8 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Stanley Boulevard/Valley Avenue*. Installing an additional southbound right-turn lane in the Valley Avenue approach; adding an additional eastbound and westbound through lane on Stanley Boulevard, and right-turn overlap phasing would improve the intersection operations to an acceptable LOS.

TR-4.9 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Greenville Road/I-580 Westbound Ramp (Alternatives 1, 1a, 1b).* Restriping the westbound I-580 ramp approach and modifying the lane configuration from two exclusive left-turn lanes, and one exclusive right turn lane to two exclusive left turn lanes, and one shared left-through-right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.10 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Greenville Road/I-580 Eastbound Ramp (Alternatives 1, 1a, 1b).* Restriping the southbound Greenville Road approach and eastbound I-580 eastbound ramp approach and modifying the lane configuration at each approach

would improve the intersection operations to an acceptable LOS. The southbound Greenville approach would be modified from two through lanes and one exclusive right turn lane to two through lanes and one shared through-right turn lane. The eastbound I-580 ramp would be modified from two exclusive right turn lanes and one exclusive left turn lane to two exclusive right turn lanes and one shared left-right turn lane.

TR-4.11 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Vasco Road/I-580 Eastbound Ramp (Alternatives 2, 2a, 3a).* Installing an additional, exclusive eastbound right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.12 *Provide Lane Configuration Adjustments at the Intersection of First Street/I-580 Westbound Ramp*. Installing an additional westbound right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.13 *Provide Lane Configuration Adjustments at the Intersection of Isabel Avenue/I-580 Westbound Ramp (Alternatives 1, 2, 3, 4).* Installing an additional westbound right turn lane would improve the intersection operations to an acceptable LOS.

TR-4.14 *Provide Lane Configuration Adjustments and Signalization Improvements at the Intersection of Hacienda Drive/I-580 Eastbound Ramp (Alternatives 1a, 1b, 2, 2a, 3, 3a, 5).* Restriping the eastbound I-580 ramp approach and modifying the lane configuration from one exclusive left turn lane, one shared left-right turn lane, and two exclusive right turn lanes to two exclusive left turn lanes, one shared left-right turn lane, and one exclusive right turn lane would improve the intersection operations to an acceptable LOS.

TR-5 Connecting Transit

General Ridership Impacts. Likely impacts of a BART extension alternative to local and regional transit services within the Livermore-Amador Valley are described below.

ACE and High-Speed Rail. The extension of BART service eastward to Livermore is anticipated to significantly increase ACE ridership for all extension alternatives, other than Alternative 4 which has no direct connection to ACE. BART ridership and transfer projections, shown in Table 3.2-22 in the "BART System" section, indicate that most extension alternatives under consideration would result in a substantial number of transfers from ACE to BART. The exact changes to ACE's projected ridership (rather than simply the number of transfers) would vary by alternative and developing accurate estimates requires further analyses at the project level. At the program level, the general projections of ACE ridership are adequate to compare the different BART extension alternatives. It is important to note that ACE has plans to expand its services, but they are currently not funded. The recently approved California High-Speed Rail network includes a branch line from the Central Valley to

the Bay Area via the Altamont Pass. This service is envisioned as being implemented in phases with initial upgrades to the ACE system including an improved alignment and increased service. Thus, while the ridership from the BART extension alternatives would create stress on the existing ACE system in terms of capacity, the accommodation of ridership growth is consistent with long-range plans of ACE and the California High-Speed Rail network. Accordingly, the impact on ACE service is expected to be less than significant.

An issue related to evaluating the potential connectivity of the various BART extension alternatives to the future upgraded ACE or High-Speed Rail (HSR) service is the current uncertainty regarding the routing of the future improved rail service. Recent studies have considered a variety of potential routes for both ACE and HSR. Generally, however, the preferred routing over the Altamont Pass tends to be located in the vicinity of Patterson Pass Road, which is south of I-580. The MTC Regional Rail Plan's final recommendation for HSR through the Altamont Pass shows the alignment in this location. This alignment would suggest that the BART extension alternatives with an ACE connection at Greenville East or a terminus station at Isabel/I-580 (Alternatives 1 and 4) would be less likely to have a direct connection to improved ACE or HSR services than the other alternatives. Realistically, however, as these options are still in the planning stages, it is not appropriate to draw a definitive conclusion regarding connectivity to ACE or HSR service at this time.

Bus Transit Services. In general, ridership on buses along or near the project corridor, particularly on express services between the existing Dublin/Pleasanton Station and the BART park-and-ride lot in northern Livermore, would be expected to decline as riders shift to the BART to Livermore extension. On the other hand, ridership on feeder routes to the BART extension stations would be expected to increase. LAVTA is planning to reconfigure existing routes to provide increased service to the BART extension stations in response to this demand. Changes to routes would depend on the selected alternative. It is anticipated that LAVTA would provide major intermodal hub services to existing (Downtown Livermore Station/Livermore Transit Center) or potential future intermodal stations (Isabel/Stanley, Isabel/580, Vasco Road, and/or Greenville East stations). These changes would involve the elimination of existing express bus services on I-580 between the existing Dublin/Pleasanton Station and the BART extension stations. LAVTA plans to use the buses removed from I-580 express services to improve bus service to the BART extension alternative stations, as well as to improve other local transit services.

The overall result of these anticipated changes is that local transit services, including those routes operated by LAVTA, would not experience increased ridership exceeding system capacity. LAVTA may experience decreased ridership and productivity on those routes that use local streets to provide service in the east-west direction along the I-580 corridor, due to the higher speed and frequency of the transit service provided by the BART extension. This decrease should be offset by increased ridership on those routes that provide access to the BART extension. Currently, many LAVTA transit routes traverse long distances to provide access to the existing Dublin/Pleasanton Station. The extension of rail service eastward to Livermore would allow some of these routes to be shortened and simplified. This adjustment

in routes should result in improved service reliability and schedule adherence. It is further anticipated that other transit operators providing service in the study area, including Tri Delta Transit, SJRTD, County Connection, and MAX, may experience some increases in ridership due to the increased number of transit riders that would be generated by the BART extension. These increases should be beneficial to the viability of these services. Overall, it is anticipated that there would be a less-than-significant impact on bus transit operators as a result of ridership changes related to the BART to Livermore extension.

The program-level review of the impact of the BART extension alternatives on local and regional transit services within the Tri-Valley is discussed in the following section. Note that impacts to the BART system are discussed separately in the previous "BART System" section and that the following discussion is focused on ACE, LAVTA, and other bus transit service providers. Further evaluation of these potential impacts will be necessary at the project level when more information about specific design features is available. The bus and rail transfers to/from the BART extension alternatives are presented in Table 3.2-31.

Table 3.2-31
2035 Daily Transit Connections to the BART Extension Alternatives

Alternatives	ACE Transfers	Bus Transfers
1 – Greenville East	6,800	3,800
1a –Downtown-Greenville East via UPRR	3,800	6,100
1b –Downtown-Greenville East via SPRR	3,800	6,100
2 – Las Positas	5,000	3,500
2a –Downtown-Vasco	4,900	5,700
3 – Portola	2,400	5,400
3a –Railroad	3,900	6,200
4 – Isabel/I-580	NA	3,600
5 – Quarry	10,200	2,500

Source: Dowling Associates, 2009.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Transit impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to transit.

Alternative 1 – Greenville East. This alternative would attract a demand for a large number of transfers from ACE (6,800) at the Greenville East Station, the second highest volume of transfers compared to the other alternatives. The high number of ACE transfers relative to those associated with the other alternatives is due to the fact that this alternative involves an ACE connection further to the east of the corridor than the other alternatives which allows

ACE riders to board the faster BART system sooner than for the other options. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by planned expansion of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Isabel/I-580 Station. The proposed Isabel/I-580 Station would serve as an intermodal connection point between BART and LAVTA bus service in close proximity to Las Positas College. It is anticipated that select LAVTA bus routes would be reconfigured or new routes created to provide local feeder bus service to this station. Trans-Altamont Pass commuter bus services would not serve this station; they would instead serve the Greenville East Station as described below. Although the LAVTA bus system would be adjusted with the addition of the Isabel/I-580 Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Greenville East Station. The proposed Greenville East Station would create an intermodal connection point between BART, ACE, and regional bus service. The station would introduce a new ACE facility in Livermore and offer adjacent BART and ACE platforms; passengers would be able to change platforms to transfer between trains. This new ACE facility would replace the existing Vasco Road ACE Station. The station would also include a bus facility to serve LAVTA, MAX, SJRTD, and Tri Delta Transit routes. It is assumed that existing LAVTA routes would be extended eastward to serve this station. MAX, SJRTD, and Tri Delta routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station would be truncated to terminate at the Greenville East Station or Lawrence Livermore and Sandia National Laboratories. County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station. Although bus routes would be changed with the addition of the Greenville East Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would attract a demand for a large number of transfers from ACE (3,800) at the Downtown Livermore Station. The number of ACE transfers would be less than those expected for Alternative 1 because ACE riders would have to travel all the way to Downtown Livermore on ACE, which is slower than BART. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Downtown Livermore Station. The Downtown Livermore Station would expand upon the site of the existing LAVTA/ACE Livermore Transit Center and would allow intermodal connections between BART, ACE, and LAVTA. The station would offer adjacent BART and ACE platforms; passengers would be able to change platforms to transfer between trains. This facility would remain a regionally significant LAVTA transit hub, and LAVTA bus service to this station could increase as a result of a BART extension. As a means of increasing intermodal connectivity, trans-Altamont Pass commuter bus services could be routed to serve this station; however, the station's distance from I-580 might prove this routing impractical.

Although bus routes would be changed with the addition of the Downtown Livermore Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Greenville East Station. The changes in transit service would be similar to those described for Alternative 1 with the exception that there would be no connection to ACE. As a result, Alternative 1a is anticipated to result in less-than-significant bus transit impacts at the Greenville East Station, as described earlier under Alternative 1.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would have the same impacts described above for Alternative 1a.

Alternative 2 – Las Positas. This alternative would attract a demand for a large number of transfers from ACE (5,000) at the Vasco Road Station. The number of ACE transfers would be less than those expected for Alternative 1 because ACE riders would have to travel to the Vasco Road Station on ACE which is slower than BART. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Isabel/I-580 Station. The proposed Isabel/I-580 Station would serve as an intermodal connection point between BART and regional bus service in close proximity to Las Positas College. It is anticipated that select LAVTA bus routes would be reconfigured or new routes created to provide local feeder bus service to this station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Isabel/I-580 Station. These commuter bus routes could also serve the Vasco Road Station as described below. Although bus routes would be adjusted with the addition of the Isabel/I-580 Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Vasco Road Station. The proposed Vasco Road Station would create an intermodal connection point between BART, ACE, and regional bus service. The station, an existing ACE facility, would offer parallel BART and ACE platforms, and passengers would be able to change platforms to transfer between trains. Selected local LAVTA routes would be redirected to serve the Vasco Road Station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Vasco Road Station or Lawrence Livermore and Sandia National Laboratories. Contra Costa County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station. Although bus routes would be adjusted with the addition of the Vasco Road Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Alternative 2a – Downtown-Vasco. This alternative would attract a demand for a large number of transfers from ACE (4,900) at the Downtown Livermore (4,000) and Vasco Road Stations (900). The number of ACE transfers would be less than those expected for Alternative 1 because ACE riders would have to travel to the Vasco Road or Downtown Livermore Stations on ACE, which is slower than BART. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Downtown Livermore Station. Transit impacts at this station under Alternative 2a would be similar to those described for Alternative 1a, which would also feature a Downtown Livermore Station. In summary, bus routes would be changed with the addition of this station, but these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Vasco Road Station. Transit impacts at this station under Alternative 2a would be similar to those described for Alternative 2, which would also feature a Vasco Road Station. In summary, bus routes would be changed with the addition of this station, but these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Alternative 3 – Portola. This alternative would attract a demand for transfers from ACE (2,400) at the Downtown Livermore Station, the fewest transfers compared to the other alternatives. The number of ACE transfers would be less than those expected for Alternative 1 because ACE riders would have to travel all the way to Downtown Livermore on ACE which is slower than BART. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Isabel/I-580 Station. The proposed Isabel/I-580 Station would serve as an intermodal connection point between BART and regional bus service in close proximity to Las Positas College. It is anticipated that select LAVTA bus routes would be reconfigured or new routes created to provide local feeder bus service to this station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Isabel/I-580 Station. These commuter bus routes could also serve the Downtown Livermore Station, as described above for Alternative 1a; however, the station's distance from I-580 might prove this routing impractical. Although bus routes would be adjusted with the addition of the Isabel/I-580 Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Downtown Livermore Station. Transit impacts at this station under Alternative 3 would be similar to those described for Alternative 1a, which would also feature a Downtown Livermore Station.

Alternative 3a - Railroad. This alternative would attract a demand for a large number of transfers from ACE (4,000) at the Downtown Livermore Station. The number of ACE transfers would be less than those expected for Alternative 1 because ACE riders would have to travel all the way to Downtown Livermore on ACE, which is slower than BART. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Isabel/Stanley Station. The proposed Isabel/Stanley Station would serve as an intermodal connection point between BART and local bus services. The station would include a bus facility to serve LAVTA and potentially MAX, SJRTD, and Tri Delta Transit routes. The planned LAVTA Route 10 BRT corridor would provide frequent local bus service from this station to Pleasanton and Livermore. MAX, SJRTD, and Tri Delta routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could potentially be rerouted via SR 84 to terminate at the Isabel/Stanley Station. An alternate option would have trans-Altamont Pass bus routes serve the Downtown Livermore Station that would be served by both BART and ACE. County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station. Although bus routes would be adjusted with the addition of the Isabel/Stanley Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Downtown Livermore Station. Transit impacts at this station under Alternative 3a would be similar to those described for Alternative 1a, which would also feature a Downtown Livermore Station.

Alternative 4 – Isabel/I-580. This alternative would have no connection to ACE and therefore no direct transfers from ACE.

Isabel/I-580 Station. The proposed Isabel/I-580 Station would serve as an intermodal connection point between BART and regional bus service in close proximity to Las Positas College. It is anticipated that select LAVTA bus routes would be reconfigured or new routes created to provide local feeder bus service to this station. MAX, SJRTD, and Tri Delta Transit routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could be truncated to terminate at Isabel/I-580 Station. Although bus routes would be adjusted with the addition of the Isabel/I-580 Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

Alternative 5 – Quarry. This alternative would attract a demand for a large number of transfers from ACE (10,200), the highest volume of transfers compared to the other alternatives. This high volume of ACE transfers is because this station has very poor accessibility from I-580 which would encourage travelers from San Joaquin County to use ACE to access the BART extension. While this volume of transfers would exceed the current capacity of ACE, they could be accommodated by the planned expansions of ACE service. Therefore, these changes are anticipated to result in a less-than-significant impact to the ACE system.

Isabel/Stanley Station. Under Alternative 5, the proposed Isabel/Stanley Station would include the addition of an ACE facility and would serve as an intermodal connection point between BART, ACE, and regional bus service. It is also assumed that the existing Vasco Road ACE Station would remain in service, meaning that the Isabel/Stanley Station would offer an additional ACE stop. The station would offer adjacent BART and ACE platforms, and passengers would be able to change platforms to transfer between trains. The station would include a bus facility to serve LAVTA and potentially MAX, SJRTD, and Tri Delta Transit routes. The planned LAVTA Route 10 BRT corridor would provide frequent local bus service from this station to Pleasanton and Livermore. MAX, SJRTD, and Tri Delta routes that traverse Altamont Pass and currently serve the existing Dublin/Pleasanton Station could potentially be rerouted via SR 84 to terminate at the Isabel/Stanley Station. County Connection bus service routed via I-680 would terminate at the West Dublin/Pleasanton Station. Although bus routes would be adjusted with the addition of the Isabel/Stanley Station, these changes are anticipated to result in a less-than-significant impact to bus transit services as defined by the significance criteria.

TR-6 Parking

BART Extension Stations. For purposes of this Program EIR, the proposed stations outside of Downtown Livermore (Isabel/I-580 Station under Alternatives 1, 3, and 4; Isabel/Stanley Station under Alternatives 3a and 5; Vasco Road Station under Alternatives 2 and 2a; and Greenville East Station under Alternatives 1, 1a, and 1b) were planned to have sufficient land to accommodate the amount of parking needed to serve the unconstrained ridership related parking demand. At these stations, the amount of parking proposed was sized to meet the demand for parking as forecast from the ridership model. Additionally, the parking supply was adjusted from total demand downward 20 percent at each station to account for daily estimated turnover and ridesharing, or the peak parking demand. As a result, the available supply purposely matches daily peak parking demand and no significant parking impacts would occur at the non-downtown stations.

A different approach to parking supply was used for the Downtown Livermore Station, which is proposed under Alternatives 1a, 1b, 2a, 3, and 3a. To be consistent with the parking and land use policies for the downtown area, the amount of parking for BART patrons was purposely constrained. BART station parking supply at the Downtown Livermore Station was estimated to be approximately 2,000 to 3,000 spaces based on station size, land availability, station access and placement, potential facility massing, and adjacent land uses. As a result, the Downtown Livermore Station would have a projected parking supply deficit ranging from 1,284 to 2,686 spaces depending upon the alternative analyzed. The parking impact of each of the BART extension alternatives is discussed below.

The No Build Alternative predicts that the parking supply (year 2035) at the West Dublin/Pleasanton and existing Dublin/Pleasanton stations would increase to 2,500 and 4,500 spaces, respectively. Daily demand at these stations, which could reasonably be satisfied under these supply estimates is 3,000 and 5,400 vehicles, respectively, and includes daily turnover.

Nevertheless, under No Build conditions, the daily demand at these locations in 2035 would far exceed the anticipated supply. When the BART extension alternative stations and associated parking facilities open, the demand at the West Dublin/Pleasanton Station would decline (as some demand would shift to newly available stations). The parking demand at the existing Dublin/Pleasanton Station would decrease under five of nine alternatives (Alternatives 1, 1a, 1b, 2a, and 3a). The existing Dublin/Pleasanton Station BART Station demand would remain the same under the remaining four alternatives (Alternatives 2, 3, 4, and 5) and West Dublin/Pleasanton Station parking demand would not change among the alternatives.[14]

Downtown Livermore Station Alternatives. Five of the nine alternatives (Alternatives 1a, 1b, 2a, 3, and 3a) have stations located in Downtown Livermore that would have a constrained parking supply due to limited land availability and existing development. Table 3.2-32 provides a summary of the extension alternatives with intermediate or terminus stations in Downtown Livermore with parking demand and deficit/surplus between stations on the corridor, assuming a downtown station supply of 2,500 spaces.

The Downtown Livermore Station has a projected parking supply deficit ranging between 1,284 and 1,900 spaces depending upon the alternative and assuming a supply of 2,500 spaces. This deficit is caused by a combination of traffic from the I-580 freeway attempting to find parking at a BART station and by locally generated traffic traveling to the nearest BART station. Because of this combination of freeway and local traffic accessing the downtown station, the forecasts suggest that the magnitude of the demand is not dependent on whether or not the downtown station is the eastern terminus of the extension. In order to address the parking deficiency at the Downtown Livermore Station, additional parking could be provided at the other non-downtown BART station locations for each of the alternatives. This would allow BART patrons to find parking, but not at their preferred location. Additionally, there would be a need to develop and apply parking management and transportation demand management solutions at this station and the surrounding neighborhood, which would affect Alternatives 1a, 1b, 2a, 3, and 3a.

Non-Downtown Livermore Station Alternatives. Alternatives 1, 2, 4, and 5 have no Downtown Livermore Station. The parking demand at the existing Dublin/Pleasanton Station decreases in two of four non-downtown alternatives from between 675 to 774 spaces. The West Dublin/Pleasanton Station parking demand would not change among the different alternatives. The stations included in these alternatives have site size, reasonable placement, and massing that would accommodate the projected parking demand. Table 3.2-33 provides a summary of the BART extension alternatives with no Downtown Livermore Station, including deficit/ surplus between stations on the corridor.

[14] *Transportation and Parking Demand Analysis,* Dowling Associates, Inc., July 2009.

Table 3.2-32
Parking Demand and Supply for Downtown Livermore Station Alternatives

Alternative	Demand		Supply	(Deficit)/Surplus
	Actual[a]	Adjusted[b]		
1a – Downtown-Greenville East via UPRR				
West Dublin/ Pleasanton	3,000	–	–	–
Dublin/ Pleasanton	4,990	–	–	–
Downtown Livermore	5,140	4,112	2,500	(1,612)
Greenville East	4,516	3,613	3,625	12
1b – Downtown-Greenville East via SPRR				
West Dublin/ Pleasanton	3,000	–	–	–
Dublin/ Pleasanton	4,990	–	–	–
Downtown Livermore	5,140	4,112	2,500	(1,612)
Greenville East	4,516	3,613	3,625	12
2a – Downtown-Vasco				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	5,327	–	–	–
Downtown Livermore	4,730	3,784	2,500	(1,284)
Vasco Road	4,716	3,773	3,775	2
3 – Portola				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	5,400	–	–	–
Isabel/I-580	5,466	4,373	4,375	2
Downtown Livermore	4,860	3,888	2,500	(1,388)
3a – Railroad				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	5,000	–	–	–
Isabel/Stanley	3,600	2,880	2,880	–
Downtown Livermore	5,500	4,400	2,500	(1,900)

Source: Dowling Associates, 2009.

Notes:

a. Parking Demand for the No Build Alternative for West Dublin/Pleasanton and existing Dublin/Pleasanton Stations is projected to be 3,000 and 5,400 spaces, respectively, as such, all alternatives either reduce or have no impact on parking demand at these stations.

b. Adjusted demand accounts for rideshare and daily turnover – a total of 20% of total parking demand.

Table 3.2-33
Parking Demand and Supply for Non-Downtown Livermore Station Alternatives

Alternative	Demand		Supply	(Deficit)/Surplus
	Actual[a]	Adjusted[b]		
1 – Greenville East				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	4,626	–	–	–
Isabel/I-580	5,106	4,085	4,100	15
Greenville East	5,501	4,400	4,400	–
2 – Las Positas				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	4,725	–	–	–
Isabel/I-580	5,589	4,471	4,475	4
Vasco Road	5,000	4,000	4,000	–
4 – Isabel/I-580				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	5,400	–	–	–
Isabel/I-580	8,255	6,604	6,625	11
5 – Quarry				
West Dublin/Pleasanton	3,000	–	–	–
Dublin/Pleasanton	5,400	–	–	–
Isabel/Stanley	4,443	3,554	3,575	21

Source: Dowling Associates, 2009.

Notes:

a. Parking Demand for the No Build Alternative for West Dublin/Pleasanton and existing Dublin/Pleasanton Stations is projected to be 3,000 and 5,400 spaces, respectively, as such, all alternatives either reduce or have no impact on parking demand at these stations.

b. Adjusted demand accounts for rideshare and daily turnover – a total of 20% of total parking demand.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Parking impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new parking impacts.

Alternative 1 – Greenville East. This alternative would not have a Downtown Livermore Station. The amount of parking proposed at the stations proposed under this alternative was purposely sized to meet the forecast transit parking demand. As a result, this alternative would have no impact to parking.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would have a station in Downtown Livermore. The parking demand estimated at the Downtown Station for this alternative would exceed the proposed parking capacity, creating a significant impact in the Downtown area.

Alternative 1b – Downtown-Greenville East via SPRR. Because this alternative would include a Downtown Livermore Station, the significant parking impact associated with Alternative 1a would also apply to this alternative.

Alternative 2 – Las Positas. Because this alternative would not include a Downtown Livermore Station, this alternative would have no impact to parking.

Alternative 2a – Downtown-Vasco. Because this alternative would include a Downtown Livermore Station, the significant parking impact associated with Alternative 1a would also apply to this alternative.

Alternative 3 – Portola. Because this alternative would include a Downtown Livermore Station, the significant parking impact associated with Alternative 1a would also apply to this alternative.

Alternative 3a – Railroad. Because this alternative would include a Downtown Livermore Station, the significant parking impact associated with Alternative 1a would also apply to this alternative.

Alternative 4 – Isabel/I-580. Because this alternative would not include a Downtown Livermore Station, this alternative would have no impact to parking.

Alternative 5 – Quarry. Because this alternative would not include a Downtown Livermore Station, this alternative would have no impact to parking.

MITIGATION MEASURES. Mitigation Measures TR-6.1 and TR-6.2 would reduce the significant parking impacts for the intermediate Downtown Livermore Station included as part of Alternatives 1a, 1b, 2a, 3, and 3a to less than significant. (LTS)

TR-6.1 *Construct Parking Facilities at Non-Downtown Livermore Stations (Alternatives 1a, 1b, 2a, 3, 3a).* The parking supply at the proposed Downtown Livermore Station would be constrained, primarily due to the projected parking demand at this station, and the location of the station. In order to reduce potential parking and traffic impacts at this station, and to prevent possible parking spillover onto nearby residential areas, the parking demand at the Downtown Livermore Station would warrant the construction of additional parking supply at the alternative station locations outside the immediate Downtown Livermore Station area. Additional parking would be required to accommodate demand and adequately serve the Downtown Livermore Station. The non-downtown stations which would serve as alternative supply locations to support the Downtown Livermore Station would be:

1. Greenville East for Alternatives 1a and 1b
2. Vasco Road for Alternative 2a
3. Isabel/I-580 for Alternative 3
4. Isabel/Stanley Station for Alternative 3a

The provision of additional parking at the non-downtown stations sites would have the further beneficial effect of reducing the traffic impacts related to vehicle travel and access to the Downtown Livermore Station on those routes leading to the downtown area. This benefit would be somewhat offset by increased traffic around the stations where the additional parking would be provided.

Further evaluation and selection of an appropriate location or locations for alternative parking supply would be necessary at the project level, when more information about specific design features, parking constraints, and current circumstances is available.

TR-6.2 *Implement Parking Monitoring Program and Institute Parking Controls at Downtown Livermore Station as Necessary (Alternatives 1a, 1b, 2a, 3, 3a).* BART and the City of Livermore shall institute an annual monitoring program on streets adjacent to the Downtown Livermore Station. A baseline survey of parking conditions in the vicinity of the station will be conducted prior to commencement of the extension operations. The baseline survey will establish parking conditions in the vicinity of the station during the first six months of operation to verify if spillover parking is occurring. Such monitoring will be based on field surveys and any complaints received by BART and local parking authorities. A follow-up survey will occur once a year. BART Community Relations staff will respond to

parking complaints and BART would investigate such complaints to verify parking concerns. If a parking spillover problem is confirmed by this monitoring program, BART staff will assist the City of Livermore in implementing a parking management program. The program would incorporate appropriate parking control measures based on BART's Parking Management Toolkit. This toolkit identifies a detailed process for understanding local parking issues, evaluating parking conflicts, and implementing specific parking control measures. These measures could include time limits and time-based restrictions, increased enforcement, or parking fees, all of which have proven effective at existing BART stations. The residents of the area could also request implementation of a Residential Permit Parking Zone. The parking management program would be implemented by the City of Livermore. BART staff will assist to ensure that the parking control measures, adapted as appropriate for site-specific conditions, are implemented and are achieving the necessary effect. BART staff would also continue discussions as necessary with the City to help adjust any parking control measures in response to issues that may arise during implementation of such measures.

TR-7 Pedestrian

The construction of a BART extension alternative may impact the existing and future pedestrian facilities in the study area. While there are no established criteria for the assessment of pedestrian impacts, the goal to provide safe and convenient pedestrian access within the study area is reiterated at the city, county, and regional levels. Pedestrian facilities are an important component for access to transit (via sidewalks, roadway crossings and trails).

For purposes of this Program EIR, a significant pedestrian impact would result if the extension alternative eliminated pedestrian access to adjoining areas. Note that for this Program EIR, the analysis of pedestrian impacts is focused on potential changes and disruptions to pedestrian facilities resulting from the designation and construction of the BART extension alignment and stations or maintenance yards.

The program-level review of the impact of the BART extension alternatives on pedestrian access by alternative is discussed below. For purposes of clarity, impacts have been categorized based on whether they are related to the designation of potential stations and maintenance yards or would occur along a potential extension alternative alignment. Further evaluation of these potential impacts will be necessary at the project level when more information about specific design features is available.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Pedestrian impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build

Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to pedestrians.

Alternative 1 – Greenville East. Potentially significant pedestrian impacts could result with Alternative 1. These impacts stem from the widening of I-580 and modifications to accommodate the BART extension.

Station Area. There are limited pedestrian facilities within the proposed Isabel/I-580 and Greenville East Station areas. Consequently, it is anticipated that there would be no significant pedestrian impacts as a result of the station development with Alternative 1. Sidewalks and pedestrian connections would be needed, however, to provide safe and convenient pedestrian access to the respective station areas.

Alignment. Potential pedestrian impacts along the Alternative 1 alignment include:

- Croak Road. Portions of Croak Road are within the ultimate right-of-way of the proposed I-580 freeway widening. Pedestrian facilities along Croak Road are not fully developed but include a paved shoulder along the road's south side that could potentially be impacted.
- Freisman Road. Portions of Freisman Road are within the ultimate right-of-way of the proposed I-580 freeway widening; however, there are currently no pedestrian facilities along Freisman Road that would be impacted by Alternative 1.
- Collier Canyon Road. Portions of Collier Canyon Road are within the ultimate right-of-way of the proposed I-580 freeway widening. Pedestrian facilities along Collier Canyon Road are not fully developed but include a paved shoulder along the road's south side that could potentially be impacted.
- Constitution Drive. Portions of Constitution Drive are within the ultimate right of way of the proposed I-580 freeway widening. Constitution Drive includes improved sidewalk facilities along its north side that could potentially be impacted.
- Kitty Hawk Road. Portions of Kitty Hawk Road are within the ultimate right-of-way of the proposed I-580 freeway widening. Kitty Hawk Road includes improved sidewalk facilities along both its north and south sides that could potentially be impacted.
- East Airway Boulevard. Portions of East Airway Boulevard are within the ultimate right-of-way of the proposed I-580 freeway widening. East Airway Boulevard includes improved sidewalk facilities along both its north and south sides that could be potentially impacted.
- Cayetano Court. Portions of Cayetano Court are within the ultimate right-of-way of the proposed I-580 freeway widening; however, there are currently no pedestrian facilities along Cayetano Court that would be impacted.
- Las Colinas Road. Portions of Las Colinas Road are within the ultimate right-of-way of the proposed I-580 freeway widening; however, there are currently no pedestrian facilities

along Las Colinas Road that would be impacted. As proposed, Alternative 1 would involve the reconstruction of the current Las Colinas Road overpass over I-580 to accommodate the widening of the freeway. The existing overpass includes sidewalks on both sides of Las Colinas Road that would need to be rebuilt to maintain pedestrian connectivity.

- Southfront Road. Portions of Southfront Road are within the ultimate right-of-way of the proposed I-580 freeway widening. Southfront Road includes improved sidewalk facilities along its south side that could potentially be impacted.

Alternative 1a – Downtown-Greenville East via UPRR. Potentially significant pedestrian impacts could result with Alternative 1a, because of the siting of the Downtown Livermore and Greenville East Stations and modifications along the alignment to accommodate the BART extension.

Station Area. Potential pedestrian impacts at Alternative 1a station areas include:

- Downtown Livermore Station. Under Alternative 1a, a Downtown Livermore Station is proposed along the alignment. Operation of this station would require extensive modifications to the existing pedestrian facilities to provide access to and maintain access around the station. In addition, improvements to the pedestrian facilities in this area are subject to the Downtown design guidelines of the City of Livermore. Development of this station would result in a potentially significant pedestrian impact.

- Greenville East Station. The impacts discussed for Alternative 1 apply to this alternative. In summary, no existing pedestrian facilities within the proposed station area would be impacted by Alternative 1a. Sidewalks and pedestrian connections would be needed to provide safe and convenient pedestrian access to the station area.

Alignment. Potential pedestrian impacts along the Alternative 1a alignment include:

- El Charro Road. There are currently no pedestrian facilities along El Charro Road. As proposed, the portion of the BART alignment running along El Charro Road would be elevated and would not interfere with crossings. Accordingly, no pedestrian impacts are expected along El Charro Road.

- Vasco Road. As proposed, Alternative 1a would not involve the reconstruction of the current Vasco Road overpass over the UPRR right-of-way and pedestrian circulation would not be impacted.

- North L Street. Under Alternative 1a, the current at-grade crossing of North L Street over the UPRR tracks would need to be rebuilt as an underpass, potentially impacting pedestrian circulation.

- Junction Avenue. Under Alternative 1a, the current at-grade crossing of Junction Avenue over the UPRR tracks would need to be rebuilt as an underpass, potentially impacting pedestrian circulation.

Alternative 1b – Downtown-Greenville East via SPRR. Potentially significant pedestrian impacts could result with Alternative 1b. Impacts under Alternative 1b would be associated with the Downtown Livermore and Greenville East Stations and with modifications along the alignment to accommodate the BART extension.

Station Area. Potential pedestrian impacts at the Alternative 1b station areas include:

- Downtown Livermore Station. The impacts discussed for Alternative 1a apply to this alternative.
- Greenville East Station. The impacts discussed for Alternative 1 apply to this alternative.

Alignment. Potential pedestrian impacts along the Alternative 1b alignment include:

- El Charro Road. The impacts discussed for Alternative 1a apply to this alternative.
- Vasco Road. As proposed, Alternative 1b would involve the conversion of the current Vasco Road at-grade crossing of the Southern Pacific Railroad right-of-way to an underpass. The existing at-grade crossing includes sidewalks on both sides of Vasco Road that would need to be rebuilt as part of the underpass, potentially impacting pedestrian circulation.
- North L Street. Under Alternative 1b, the current at grade crossing of North L Street over the UPRR tracks would need to be rebuilt as an underpass, potentially impacting pedestrian circulation. The existing at-grade crossing which includes sidewalks on both sides of North L Street would need to be rebuilt as part of the underpass to maintain pedestrian connectivity.
- Junction Avenue. Under Alternative 1b, the current at grade crossing of Junction Avenue over the UPRR tracks would need to be rebuilt as an underpass, potentially impacting pedestrian circulation. The existing at-grade crossing which includes sidewalks on both sides of Junction Avenue would need to be rebuilt as part of the underpass to maintain pedestrian connectivity.

Alternative 2 – Las Positas. Potentially significant pedestrian impacts could result with Alternative 2. Impacts under Alternative 2 would result from the Isabel/I-580 and Vasco Road Stations, the widening of I-580, and modifications to accommodate the BART extension.

Station Area. Potential pedestrian impacts at Alternative 2 station areas include:

- Isabel/I-580 Station. The impacts discussed for Alternative 1 apply to this alternative.
- Vasco Road Station. Under Alternative 2, the Vasco Road Station is planned to extend along Vasco Road from Brisa Street to Patterson Pass Road. There are existing sidewalks along the east and west sides of Vasco Road, including painted crosswalks with pedestrian signals at each intersection along the roadway. Modifications to the existing pedestrian

circulation network would be required in order to allow connections to and around the station area and could potentially result in a significant impact.

Alignment. Potential pedestrian impacts along the Alternative 2 alignment include:

- Croak Road. The impacts discussed for Alternative 1 apply to this alternative.
- Freisman Road. The impacts discussed for Alternative 1 apply to this alternative.
- Collier Canyon Road. The impacts discussed for Alternative 1 apply to this alternative.
- Constitution Drive. The impacts discussed for Alternative 1 apply to this alternative.
- Kitty Hawk Road. The impacts discussed for Alternative 1 apply to this alternative.
- East Airway Boulevard. The impacts discussed for Alternative 1 apply to this alternative.
- Cayetano Court. The impacts discussed for Alternative 1 apply to this alternative.
- Las Colinas Road: The impacts discussed for Alternative 1 apply to this alternative.
- Las Positas Road. There are sidewalks and crosswalks along the proposed portion of the Alternative 2 alignment traversing Las Positas Road. As proposed, however, the BART alignment would be constructed as an aerial structure, meaning there would be little if any impacts to pedestrian facilities and circulation on Las Positas Road.
- Vasco Road. As proposed, Alternative 2 would involve the reconstruction of the current Vasco Road overpass over the UPRR right-of-way. The existing overpass includes sidewalks on both sides of Vasco Road that would need to be rebuilt to maintain pedestrian connectivity. Pedestrian circulation could potentially be impacted during construction.

Alternative 2a – Downtown-Vasco. Potentially significant pedestrian impacts could result with Alternative 2a. Impacts under Alternative 2 would be from the Downtown Livermore and Vasco Road Stations and from modifications along the alignment to accommodate the BART extension.

*Station Area***.** Potential pedestrian impacts at Alternative 2a station areas include:

- Downtown Livermore Station. The impacts discussed for Alternative 1a apply to this alternative.
- Vasco Road Station. The impacts discussed for Alternative 2 apply to this alternative.

Alignment. Potential pedestrian impacts along the Alternative 2a alignment include:

- El Charro Road. The impacts discussed for Alternative 1a apply to this alternative.
- Vasco Road. The impacts discussed for Alternative 1a apply to this alternative.
- North L Street. The impacts discussed for Alternative 1a apply to this alternative.

- Junction Avenue. The impacts discussed for Alternative 1a apply to this alternative.

Alternative 3 – Portola. Potentially significant pedestrian impacts could result from Alternative 3. Impacts under Alternative 3 would be associated with the Isabel/I-580 and Downtown Livermore Stations, the widening of I-580, and modifications to the alignment to accommodate the BART extension.

Station Area. Potential pedestrian impacts at Alternative 3 station areas include:

- Isabel/I-580 Station. The impacts discussed for Alternative 1 apply to this alternative.
- Downtown Livermore Station. The impacts discussed for Alternative 1a apply to this alternative.

Alignment. Potential pedestrian impacts along the Alternative 3 alignment include:

- Croak Road. The impacts discussed for Alternative 1 apply to this alternative.
- Freisman Road. The impacts discussed for Alternative 1 apply to this alternative.
- Collier Canyon Road. The impacts discussed for Alternative 1 apply to this alternative.
- Constitution Drive. The impacts discussed for Alternative 1 apply to this alternative.
- Kitty Hawk Road. The impacts discussed for Alternative 1 apply to this alternative.
- East Airway Boulevard. The impacts discussed for Alternative 1 apply to this alternative.
- Portola Avenue. There are sidewalks along both sides of Portola Avenue, with continuous sidewalk connections to all intersecting roadways. Alternative 3 proposes a subway configuration beneath Portola Avenue, meaning that there would be no pedestrian impacts along this corridor.

Alternative 3a - Railroad. Potentially significant pedestrian impacts could result from Alternative 3a. Impacts under Alternative 3a would be associated with the Isabel/Stanley and Downtown Livermore Stations. No alignment impacts are anticipated.

Station Area. Potential pedestrian impacts at Alternative 3a station areas include:

- Isabel/Stanley Station. The proposed Isabel/Stanley Station would be situated on a site bounded on the west by quarry lands, on the north by the Arroyo Mocho, on the east by Isabel Avenue, and on the south by East Stanley Boulevard. Currently, an existing sidewalk is located along the south side of Stanley Boulevard; no sidewalk is present along the north side of Stanley Boulevard. In the north-south direction, there is an existing, exclusive sidewalk on the east side of Isabel Avenue, but there is no pedestrian facility along the west side of Isabel Avenue. Development of this station would potentially impact

existing pedestrian facilities and would require reconfiguration of facilities at the intersection of Stanley Boulevard and Isabel Avenue to permit access to the proposed station.

- Downtown Livermore Station. The impacts discussed for Alternative 1a apply to this alternative.

Alignment. There are no identified potential pedestrian impacts that would occur along the Alternative 3a alignment for the BART extension. The alignment would run along El Charro Road; however, as previously discussed under Alternative 1a, no pedestrian impacts would be expected.

Alternative 4 – Isabel/I-580. Potentially significant pedestrian impacts could result from Alternative 4. Impacts under Alternative 4 would be associated with the Isabel/I-580 Station, the widening of I-580, and modifications to the alignment to accommodate the BART extension.

Station Area. Potential pedestrian impacts at the Isabel/I-580 Station as discussed under Alternative 1 apply to this alternative.

Alignment. Potential pedestrian impacts along the Alternative 4 alignment include:

- Croak Road. The impacts discussed for Alternative 1 apply to this alternative.
- Freisman Road. The impacts discussed for Alternative 1 apply to this alternative.
- Collier Canyon Road. The impacts discussed for Alternative 1 apply to this alternative.
- Constitution Drive. The impacts discussed for Alternative 1 apply to this alternative.
- Kitty Hawk Road. The impacts discussed for Alternative 1 apply to this alternative.
- East Airway Boulevard. The impacts discussed for Alternative 1 apply to this alternative.

Alternative 5 – Quarry. Potentially significant pedestrian impacts could result from Alternative 5. Impacts under Alternative 5 would be associated with the Isabel/Stanley Station. There are no identified potential pedestrian impacts that would likely occur along the Alternative 5 alignment.

Station Area. Potential pedestrian impacts at the Isabel/Stanley Station as discussed under Alternative 3a apply to this alternative.

Alignment. There are no identified potential pedestrian impacts that might occur along the Alternative 5 alignment. The alignment would run along El Charro Road; however, as previously discussed under Alternative 1a, no pedestrian impacts are considered likely.

MITIGATION MEASURES. Mitigation measures below could be applied at the project level and would substantially lessen or avoid potential pedestrian impacts. Application of these

mitigation measures during project design would mitigate the pedestrian impacts of the BART extension alternatives to less than significant. (LTS)

TR-7.1 *Maintain Pedestrian Facilities on Roadways Affected by the Widening of I-580 (Alternatives 1, 2, 3, 4).* The existing pedestrian facilities on Croak Road, Freisman Road, Collier Canyon Road, Constitution Drive, Kitty Hawk Road, East Airway Boulevard, Cayetano Court, Las Colinas Road, and Southfront Road shall be retained on the roadway as part of any modification to this street resulting from the widening of I-580.

TR-7.2 *Maintain Pedestrian Crossings of BART Alignment (Alternatives 1, 1a, 1b, 2, 2a, 3).* Adequate replacement pedestrian facilities shall be included in the reconstructed crossings of Las Colinas Road, Vasco Road, North L Street, and Junction Avenue.

TR-7.3 *Maintain Pedestrian Facilities Around Station Sites (Alternatives 3a, 5).* Pedestrian facilities shall be retained where a station site bisects existing facilities. Designs to provide a pedestrian connection to the BART development and relocate pedestrian facilities to avoid disruptions to through pedestrian traffic shall be employed.

TR-8 Trails

The study area is crisscrossed by a network of existing trails within the rights-of-way of creeks, canals, active and abandoned rail corridors, and roadways. These trails offer a valuable recreational resource to pedestrian, bicyclists, and, in some cases, equestrians, as well as viable options for commuting to school, work, transit, and making other trips. The construction of a BART extension alternative may impact the existing trail network in the study area. While there are no established criteria for the assessment of trail impacts, the goal to provide a trail network for local and regional connections is reiterated at the city, county, and regional levels. As with pedestrian facilities, the trail network is an important component for access to transit.

A significant trail impact would result from disruption of the existing trail network. Trails are often designated along stream or railroad rights-of-way to take advantage of the available open space and limited or grade-separated roadway crossings. In fact, a major regional facility, the Iron Horse Trail, is proposed along both active and abandoned segments of the UPRR/SPRR corridor to ultimately connect to San Joaquin County. Impacts to existing segments of this and other trails are discussed in this section. Potential impacts to the future trail system as designated in local, county and regional documents are discussed in Section 3.3, Land Use, of this document.

The program-level review of the BART extension alternatives is presented below and identifies the individual trail segments that could potentially be affected. Further evaluation of these

potential impacts on trails and crossings will be necessary at the project level when more information about specific design features is available.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Trail impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to trails.

Alternative 1 – Greenville East. Much of the Alternative 1 impacts to trails result from widening I-580 to accommodate the BART tracks within the freeway median. Several of the existing trail alignments are within the widened Caltrans right-of-way including the existing Collier Canyon Creek Trail and existing Las Positas Trail. The existing Las Colinas overpass of I-580 would likely require reconstruction to accommodate the freeway widening. This reconstruction would interfere with connections to the Las Positas Trail. This would be considered a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. No impacts on existing trail facilities are associated with this alternative.

Alternative 1b – Downtown-Greenville East via SPRR. No impacts on existing trail facilities are associated with this alternative.

Alternative 2 – Las Positas. The widening of I-580 would potentially impact the existing Collier Canyon Creek Trail and the Las Positas Trail. As discussed in Alternative 1, the existing Las Colinas overpass of I-580 would likely require reconstruction to accommodate the freeway widening. This reconstruction could adversely affect connections to the existing Las Positas Trail. This would be considered a potentially significant impact.

Alternative 2a – Downtown-Vasco. No impacts on existing trail facilities are associated with this alternative.

Alternative 3 – Portola. With this alternative, impacts to the existing Collier Canyon Creek Trail could result from widening of I-580, because this trail alignment is located within the extended Caltrans right-of-way. This would be considered a potentially significant impact.

Alternative 3a - Railroad. Impacts to the existing Stanley Boulevard Trail could result from the location of the Isabel/Stanley Station bisecting the eastern terminus of the trail. This would be considered a potentially significant impact.

Alternative 4 – Isabel/I-580. With this alternative, impacts to the existing Collier Canyon Creek Trail and existing Las Positas Creek Trail could result from widening of I-580, because

these trail alignments are located within the extended Caltrans right-of-way. This would be considered a potentially significant impact.

Alternative 5 – Quarry. Similar to Alternative 3a, this alternative could impact the existing Stanley Boulevard Trail. The location of the Isabel/Stanley Station under this alternative would bisect the eastern terminus of the trail. This would be considered a potentially significant impact.

MITIGATION MEASURES. Mitigation measures below could be applied at the project level for Alternatives 1, 2, 3, 3a, 4, and 5, and may substantially lessen or avoid this impact. Application of these mitigation measures during project design would reduce potential trail impacts to less than significant. (LTS)

TR-8.1 *Maintain Trail Network Along the BART Alignment and Around Station Sites and Maintenance Yards (Alternatives 1, 2, 3, 3a, 4, 5).* BART shall ensure that an existing trail is retained where the alternative alignment coincides with the trail. In addition, trail access shall also be maintained where a station site or maintenance yard bisects an existing trail. Designs to provide a trail connection to the BART development and relocate the trail to avoid disruptions to through trail traffic shall be employed.

TR-8.2 *Maintain Trail Crossings of the BART Alignment (Alternatives 1, 2, 3, 4).* The BART alignment should include accommodations to maintain existing trail crossings.

TR-9 Bicycle Facilities

While there are no established criteria for the assessment of bicycle impacts, the goal to provide safe and convenient bicycle access within the study area is reiterated at the city, county, and regional levels. The existing on-street bicycle network is an important component in the circulation setting, with access to transit representing a key purpose of the bicycle network. The bicycle can provide a valuable link between home or work and the transit system.

Impacts to on-street bicycle facilities would result from disruption of the existing bicycle network. The widening of I-580 and modifications to roadways with existing bicycle facilities at crossings with the BART extension alternatives could potentially create barriers, obstructions, or difficulties for bicycle access. In keeping with the local and regional goals of providing safe and convenient bicycle access especially to transit, the new BART stations would include provisions for bicycle access between surrounding roadways and the BART platforms, including secure and convenient bicycle parking.

The program-level review of the impact of the BART extension alternatives on the bicycle network is discussed below and identifies the individual network segments that could

potentially be affected. Further evaluation of these potential impacts may be necessary at the project level when more information about specific design features is available.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Bicycle facility impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to bicycle facilities.

Alternative 1 – Greenville East. The existing bicycle lanes on Constitution Drive between Independence Drive and the existing bicycle lanes on Collier Canyon Road could be impacted by the widening of I-580. This would be considered a potentially significant impact to bicycle facilities.

Alternative 1a – Downtown-Greenville East via UPRR. There are existing bicycle lanes in downtown Livermore on Junction Avenue from Portola Avenue to Old First Street. An at-grade crossing of the railroad tracks is provided for pedestrian, bicycle, and auto traffic. With Alternative 1a, a new underpass for Junction Avenue would be provided that could disrupt bicycle lanes. This would be considered a potentially significant impact to bicycle facilities.

Alternative 1b – Downtown-Greenville East via SPRR. Bicycle impacts discussed for Junction Avenue under Alternative 1a apply to this alternative. Similarly, a new roadway underpass is proposed to replace the existing at- grade crossing with Vasco Road under Alternative 1b. This would be considered a potentially significant impact to bicycle facilities.

Alternative 2 – Las Positas. As identified in Alternative 1, the existing bicycle lanes on Constitution Drive between Independence Drive and the existing bicycle lanes on Collier Canyon Road could be impacted with the widening of I-580. In addition, the existing Vasco Road overpass of the UPRR would be rebuilt under Alternative 2. There are currently bicycle lanes on this segment of Vasco Road that would be disrupted under Alternative 2. This would be considered a potentially significant impact to bicycle facilities.

Alternative 2a – Downtown-Vasco. Bicycle impacts discussed for Junction Avenue under Alternative 1a apply to this alternative.

Alternative 3 – Portola. The existing bicycle lanes on Constitution Drive between Independence Drive and the existing bicycle lanes on Collier Canyon Road could be impacted with the widening of I-580. Alternative 3 would be constructed in a subway beneath Portola and Junction Avenues. When completed, this alternative would not likely have an impact on the existing bicycle lanes on those two streets assuming the roadways are replaced to existing or better standards. This would be considered a potentially significant impact to bicycle facilities.

Alternative 3a – Railroad. No bicycle impacts are associated with this alternative.

Alternative 4 – Isabel/I-580. Bicycle impacts discussed for Constitution Drive under Alternative 1 apply to this alternative.

Alternative 5 – Quarry. No bicycle impacts are associated with this alternative.

MITIGATION MEASURES. Mitigation measures are described below that could be applied at the project-level for Alternatives 1, 1a, 1b, 2, 2a, 3, and 4, and substantially lessen or avoid bicycle impacts. Application of these mitigation measures in project design would mitigate potential bicycle impacts to less than significant. (LTS)

TR-9.1 *Maintain Bicycle Network on Roadways Affected by the Widening of I-580 (Alternatives 1, 2, 3, 4).* The existing bicycle lanes on Constitution Drive between Independence Drive and Collier Canyon Road shall be retained on the roadway as part of any modification to this street resulting from the widening of I-580. Bicycle access shall be maintained for other roadways affected by widening that become apparent during the project-level design.

TR-9.2 *Maintain Bicycle Network Crossings of the BART Alignment (Alternatives 1a, 1b, 2, 2a).* BART shall maintain existing bicycle network crossings of the BART alignment, including those along Junction Avenue and Vasco Road. Other new underpass and overpass facilities that are identified during project-level evaluation should include bicycle access.

Effect of UP Commuter Access Principles

If UP Commuter Access Principles were fully observed, they would require the shift of some of the BART extension alternatives to the north of the current UPRR ROW which would relocate existing roadways, reconstruct existing crossings, and affect intersection operations. Alternatives 1a and 1b would each involve an estimated 2,400 feet of road relocations; Alternative 2, 4,200 feet; Alternative 2a, the most extensive relocation at approximately 6,400 feet; and Alternatives 3 and 3a, 2,100 feet. This relocation would affect local crossings and intersection operations: Alternative 1a would affect, in particular, First Street, Mines Road, and Vasco Road; Alternative 1b, First Street and Mines Road; Alternative 2, Vasco Road; Alternative 2a, First Street, Mines Road, and Vasco Road; Alternative 3, Mines Road; and Alternative 3a, First Street and Mines Road. These relocations would also potentially affect pedestrian and bicycle travel, and may impact the routing and stop locations of fixed route bus transit services. These issues and potential impacts will be addressed in greater detail during the project level environmental analysis, when a more precise project alignment has been defined.

Cumulative Analysis

Cumulative transportation impacts include the impacts resulting from the BART extension alternatives in conjunction with the related impacts of other foreseeable projects throughout the study area and the greater San Francisco Bay Area. The preceding transportation analysis incorporates these other

planned projects, as described in the methodology section of the analysis and, therefore, is a cumulative analysis.

The analysis in this Transportation section is based on year 2035 projections generated by the ACCMA travel demand model. This model forecasts future travel patterns based on programmed highway, street, transit, and bicycle/pedestrian improvements, as well as local and regional government projections of land use and employment intensity. Notable projects contained in this model include capacity improvements on I-580 and SR 84 as well as the West Dublin/Pleasanton Station, the BART Warm Springs extension, the eBART extension, and the BART-Oakland Airport Connector. The model also takes into account trips generated outside Alameda County, such as those trips with origins in the San Joaquin Valley.

However, there are certain planned and proposed transportation projects that were not included in the modeling effort because they are not currently funded or programmed. The projects include:

- California High-Speed Rail – The California high-speed rail network is planned to include a branch line linking the Central Valley with the Bay Area via the Altamont Pass. This project is not currently funded and the environmental and engineering studies have just recently started. The plan envisions that this service would be an upgrade of the ACE system that would ultimately involve an exclusive, dedicated alignment for ACE and the use of electrified trains. Such improvements would generate additional ridership on the BART extension alternatives to Livermore, assuming that the connection to the high-speed rail link could be made. Until the alignment of the high-speed rail service is determined, it will not be clear where the connection to the BART extension would occur. These improvements would also address the need for ACE to expand the capacity of its services to accommodate the demand that would be generated by the BART extension alternatives.

- I-580 High Occupancy Toll (HOT) Lanes – The ACCMA is currently studying the feasibility of converting the planned HOV lanes on I-580 to HOT lanes. This would allow single occupant vehicles to use the HOV lanes if they are willing to pay a toll. HOT lanes are designed to increase the usage of HOV lanes by selling off the unused capacity to willing single occupant auto travelers. This increased utilization results in improved operation of the overall freeway. Given this consideration, the HOT lanes are not likely to cause an impact on freeway operations or travel in this corridor that would have a major influence on the utilization of the BART extension alternatives.

- Silicon Valley Rapid Transit project – Plans are proceeding to implement the BART extension from the Warm Springs extension to San Jose although this project is not fully funded at this time. This project will result in increased ridership on the total BART system and would also generate increased ridership on a BART to Livermore extension. Because a transfer would be required at the Bay Fair Station to travel between the Livermore extension and the SVRT, a significant increase in ridership is not likely.

3.3 LAND USE

Introduction

This land use section provides background information on existing land uses, land use planning, and agricultural resources in the BART to Livermore Extension study area, and analyzes how each of the BART extension alternatives relate to and affect existing and future land uses, as defined by the General Plans and land use policies of relevant jurisdictions. This section summarizes land use attributes of the study area generally within one-quarter mile of the nine extension alternative alignments and one-half mile of the proposed stations. It is within these areas that the greatest land use change in response to a new transit facility is expected.

For the purposes of this analysis, the one-half mile areas surrounding the stations are referred to as station areas. The study area is defined as the total area of the nine extension alternative corridors and five station study areas, as described in Section 2, Alternatives, of this Program EIR.

The key issues examined in this analysis are:

- Whether these alternatives, and particularly the stations, would be compatible with adjacent and surrounding land uses;
- Whether these alternatives would result in the physical division of an established community; and
- Whether the alternatives would result in the premature conversion of land under a Williamson Act contract or land designated Important Farmland.

It should be noted that even though this section describes the alternatives' consistency with local planning and development policies, California Government Code Section 53090 exempts rapid transit districts such as BART from complying with local land use plans, policies, and zoning ordinances. For informational purposes and consistent with BART's policy goal of coordinating system expansion with local land use planning, the land use analysis in this section includes a discussion of local land use policies, plans, and zoning in order to disclose the compatibility, as well as any inconsistencies, between the BART to Livermore Extension Program and local land use planning. However, because BART is exempt from local land use planning, any inconsistencies would not be considered significant impacts for purposes of this Program EIR.

The compatibility of a new use, like a transit station, with existing and proposed future development is dependent on how the new use alters the character of the neighborhood, district, city, etc. Integral elements of community character include traffic patterns, visual quality, cultural resources, noise levels, air quality, and adequacy of community services, all of which are addressed in discussions of these specific topics in Sections 3.2, 3.5, 3.6, 3.10, 3.11, and 3.13, respectively, of this Program EIR. Also, impacts related to land acquisition and potential displacement are described in Section 3.4,

Population and Housing. This analysis focuses specifically on land use conflicts, the division of an established community, impacts to agricultural resources, and consistency with existing plans and policies, as well as the anticipated changes in land use.

Comments received from the public in response to the NOP or during the scoping meeting included issues regarding development potential and opportunities around future stations and acknowledgment of the City of Pleasanton's Sphere of Influence and development plans as part of the Staples Ranch Specific Plan. These comments are addressed in this section.

Existing Conditions

Historically, development in Alameda County was characterized by an initial pattern of rapid growth in the western cities of Oakland, Berkeley, and Alameda. To the south and east of these centers, smaller, less intensive population centers in Alameda County were established in the towns of Hayward, Pleasanton, and Livermore, with large areas of undeveloped, unincorporated land running through the center of the County.

Currently, the more open, less dense areas in the southern and eastern portions of Alameda County are the fastest growing areas. Cities to the south include Union City and Fremont, and cities to the east include Dublin, Pleasanton, and Livermore. These cities are characterized by a greater separation of land uses than western areas of the county, such as Oakland and Berkeley, and residential densities of five to six units per acre. The development strategy for the cities in the east county is the creation of more compact neighborhoods and preservation of existing open space. A large portion of the future development is planned for areas around transit, such as the planned Altamont Commuter Express (ACE) and BART transit stations. Alameda County's 2005 population of approximately 1.5 million is expected to increase by 27 percent, to 1.9 million by 2030.

Existing Land Use in Study Area

This discussion describes existing land uses along the alternative alignments, within the footprints of the stations and maintenance yards, and within the study area surrounding the alternatives. The following subheadings do not correspond to the BART extension alternatives; they are used only to organize the description of existing land uses within the study area. Existing land uses within the study area for analysis of the nine extension alternatives (including associated station areas) are quantified in Table 3.3-1; existing land uses for the five station areas are quantified in Table 3.3–2. Existing land uses are presented in Figure 3.3–1.

Interstate 580 (I-580) Corridor. The portion of the study area in I-580 corridor runs from the western boundary of the study area, which starts at the existing tailtracks at the east end of the existing Dublin/Pleasanton BART Station, to just beyond the eastern boundary of Livermore. In general, this corridor is characterized by highway-oriented commercial uses, business parks, and industrial uses and large, undeveloped parcels in the cities of Dublin, Pleasanton, and Livermore; unincorporated County land in this corridor is composed mostly of rural, agricultural, and grazing lands.

Table 3.3–1
Existing Land Uses in BART to Livermore Extension Study Area by Alternative

	Alternative 1 Greenville East		Alternative 1a Downtown-Greenville East via UPRR		Alternative 1b Downtown-Greenville East via SPRR		Alternative 2 Las Positas		Alternative 2a Downtown-Vasco		Alternative 3 Portola		Alternative 3a Railroad		Alternative 4 Isabel/I-580		Alternative 5 Quarry	
Land Use	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**
Agricultural	1,088	22%	656	12%	575	11%	573	12%	146	3%	83	2%	8	<1%	83	3%	8	<1%
Undeveloped	791	16%	711	13%	682	13%	816	17%	681	14%	669	17%	617	16%	613	25%	574	23%
Single-family Residential	216	4%	690	13%	659	13%	324	7%	769	15%	586	15%	764	18%	140	6%	279	11%
Multifamily Residential	128	3%	140	3%	140	3%	68	1%	140	3%	231	6%	140	3%	57	2%	21	1%
Commercial	559	11%	533	10%	553	11%	496	10%	496	10%	465	12%	434	11%	308	12%	229	9%
Industrial	597	11%	604	11%	687	13%	759	16%	632	13%	330	8%	123	3%	238	10%	33	1%
Public/Institutional	263	5%	168	3%	120	2%	513	10%	382	8%	351	9%	120	3%	255	10%	3	<1%
Park	8	<1%	30	1%	11	<1%	30	1%	35	1%	14	<1%	16	<1%	5	<1%	6	<1%
Open Space	433	9%	117	2%	126	2%	437	9%	100	2%	319	8%	93	2%	295	12%	62	3%
Utility	0	0	-35	1%	0	0%	35	1%	35	1%	0	0%	0	0%	0	0%	0	0%
Aggregate/Water Resource	0	0	663	13%	663	13%	0	0%	663	13%	0	0%	933	23%	0	0%	933	38%
Transportation/ Right-of-Way	934	19%	960	18%	982	19%	865	18%	845	17%	904	23%	813	20%	486	19%	341	14%
TOTAL	**5,015**	**100%**	**5,307**	**100%**	**5,200**	**100%**	**4,916**	**100%**	**4,976**	**100%**	**3,950**	**100%**	**4,059**	**100%**	**2,478**	**100%**	**2,489**	**100%**

Source: DC&E; County of Alameda, Office of the Assessor, 2009.

Notes:

a. All values rounded to the nearest acre.

b. Study area refers to the area within ¼-mile of alignments and ½-mile of station sites.

c. Percentages may not add to 100 percent due to rounding.

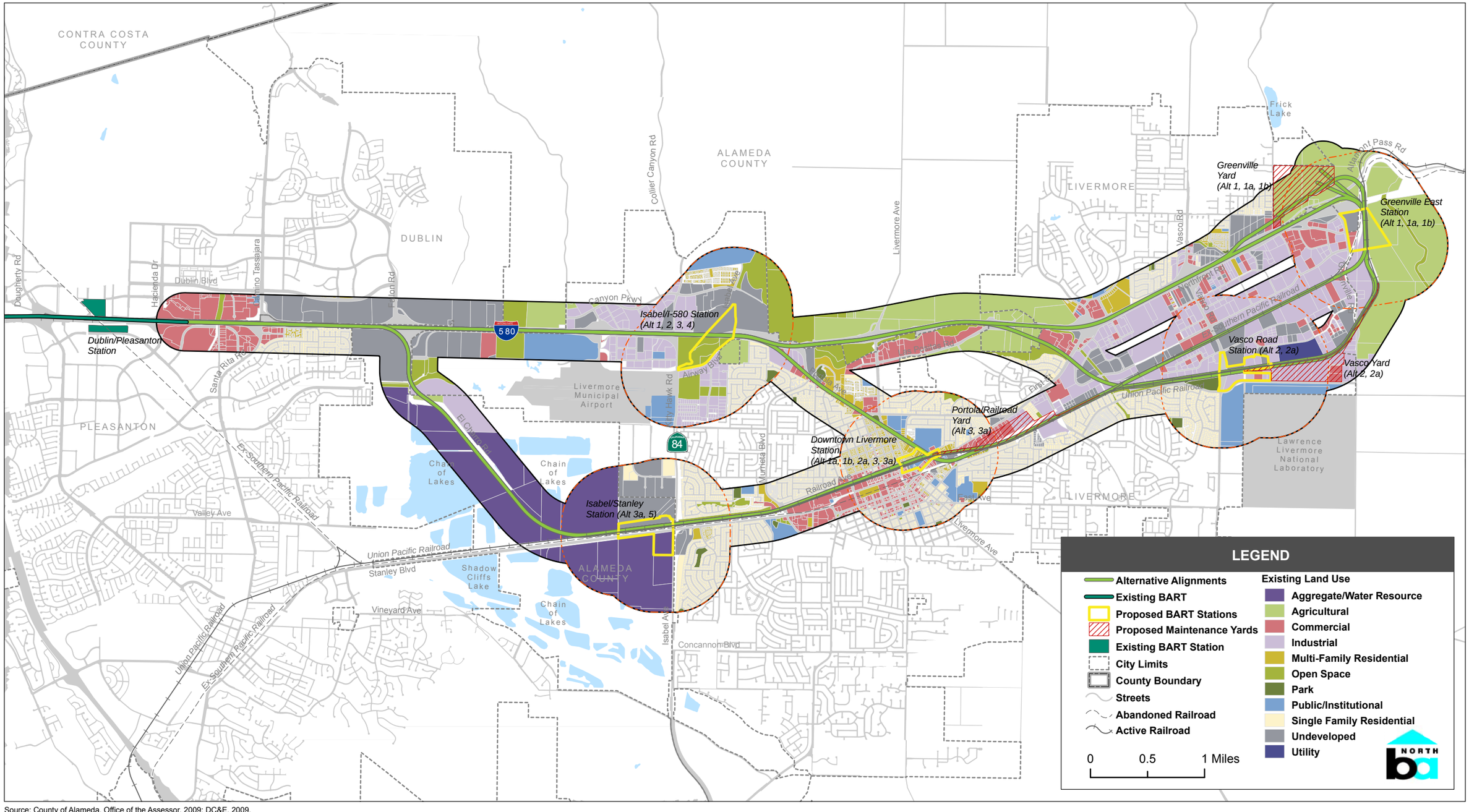
Table 3.3–2
Existing Land Uses within the BART to Livermore Station Areas

	Isabel/I-580 Station Area		Isabel/Stanley Station Area		Downtown Livermore Station Area		Vasco Road Station Area		Greenville East Station Area	
Land Use	**Acres**	**Percentage**	**Acres**	**Percentage**	**Acres**	**Percentage**	**Acres**	**Percentage**	**Acres**	**Percentage**
Agricultural	31	3%	0	0%	0	0%	0	0%	533	54%
Undeveloped	167	15%	175	17%	8	<1%	97	9%	25	3%
Single-Family Residential	68	6%	205	19%	240	29%	100	10%	0	0%
Multifamily Residential	46	4%	10	<1%	110	13%	0	0%	0	0%
Commercial	2	<1%	0	0%	119	14%	47	5%	63	6%
Industrial	209	19%	0	0%	<1	<1%	328	32%	168	15%
Public/Institutional	161	15%	0	0%	87	10%	258	25%	0	0%
Park	5	1%	7	<1%	5	<1%	24	2%	0	0%
Open Space	213	19%	25	2%	7	<1%	2	<1%	19	2%
Utility	0	0%	0	0%	0	0%	35	3%	0	0%
Aggregate/Water Resource	0	0%	475	46%	0	0%	0	0%	0	0%
Transportation/Right-of-Way	191	17%	146	14%	265	32%	149	14%	185	19%
TOTAL	**1,093**	**100%**	**1,043**	**100%**	**841**	**100%**	**1,040**	**100%**	**993**	**100%**

Source: DC&E; County of Alameda, Office of the Assessor, 2009.

Note:

a. Study area refers to area within ½-mile of station sites.



Source: County of Alameda, Office of the Assessor, 2009; DC&E, 2009.

EXISTING LAND USES IN BART TO LIVERMORE STUDY AREA
FIGURE 3.3-1

From the western end of the I-580 corridor to Isabel Avenue, the study area is primarily dominated by large parcels of commercial and undeveloped land in the cities of Dublin, Pleasanton, and Livermore. There is also a single-family residential neighborhood at the eastern border of Pleasanton and the Las Positas Municipal Golf Course in western Livermore. Areas of unincorporated County land north of I-580 are dominated by rural open space. From Isabel Avenue to North Livermore Avenue, the area north of I-580 is characterized by unincorporated open space and agricultural land. The area south of I-580 is a commercial landscape with large areas of undeveloped land and pockets of single-family housing. Finally, from SR 84 to the terminus of the study area east of Livermore, the area south of I-580 shifts to a landscape of light industry, dotted with low-intensity commercial uses and vacant parcels. North of I-580, land uses include the multifamily and commercial uses of the northeast Livermore community. At the west side of the northeast Livermore community, just west of North Vasco Road, the southern edge of the Springtown Golf Course dips into the study area. The Springtown Library is located adjacent to the course, below the northern boundary of the study area and separated from I-580 by residential and commercial development. East of the northeast Livermore area are large clusters of undeveloped parcels leading to the Livermore boundary, at which point the study area is characterized by undeveloped, open space, and grazing lands.

The Isabel/I-580 Station footprint straddles I-580. It is composed of vacant/undeveloped land to north of I-580 and open space to the south, all of which lies within the Airport Protection Area of the Livermore Municipal Airport (within which residential uses are prohibited to avoid aircraft safety hazards, as described further in Section 3.12, Public Health and Safety). As seen in Table 3.3-2, the land area in the larger station area is devoted primarily to open space, transportation/right-of-way, public/institutional uses, and undeveloped property. North of I-580, the station area is dominated by undeveloped and open space land, although a new, multifamily housing development and a portion of Las Positas College are both located in the northernmost portion of the area. A portion of the open space area north of I-580 is outside of the city limits and outside the Urban Growth Boundary (UGB). To the south of I-580, the station area contains a mix of open space, agricultural land, commercial uses, and a single-family residential neighborhood.

The Greenville East Station footprint contains a mix of agricultural land east of Greenville Road and undeveloped or low-intensity industrial uses west of Greenville Road. Most of the station footprint lies in unincorporated Alameda County. The Greenville East Station area would be one of the BART to Livermore Extension Program termini and the one closest to I-580 corridor. As seen in Table 3.3-2, the land use character of the station area is defined primarily by agricultural uses, transportation/right-of-way, and industrial uses. The western half of this station area, south of I-580, is in the City of Livermore and consists of warehouse-oriented light industrial and commercial land uses, with some undeveloped land, south of I-580. Agricultural uses are found in the portion north of the I-580, which is mostly unincorporated Alameda County. The remaining eastern half of the station area is in unincorporated Alameda County and characterized by agricultural uses.

Associated with the Greenville East Station is the Greenville Maintenance Yard on the north side of I-580 and almost entirely within unincorporated County land. The footprint of this proposed

maintenance yard consists almost entirely of agricultural land. The single exception is an existing small commercial area in the southwest corner of the yard footprint, the only portion of the footprint that lies within the City of Livermore.

El Charro Road, I-580 to UPRR. As described in Section 2, Alternatives, five of the nine extension alternatives diverge from the I-580 corridor at El Charro Road, following a southeasterly route toward the Union Pacific Railroad (UPRR) tracks. At the junction of El Charro Road and I-580, the south side of I-580 is defined by undeveloped land; however, both the east side of El Charro Road in the City of Livermore and the west side of El Charro Road in the City of Pleasanton are proposed for development pursuant to adopted Specific Plans for these areas. Commercial and recreational uses are proposed in both, and a continuing care community is also proposed in the Pleasanton plan area. South of these undeveloped lands, the El Charro Road portion of the study area is composed almost entirely of aggregate (sand and gravel mining) and water resource management. The land is largely under ownership of Rhodes & Jamieson and private mining ventures such as Vulcan Material Company.

Portola Avenue, I-580 to Downtown Livermore. One of the nine extension alternatives diverges southeast from I-580 along Portola Avenue. This portion of the study area contains a residential neighborhood with areas of both single family and higher density housing, and accompanying public parks, neighborhood-oriented commercial uses, and public institutions. The latter includes middle and elementary schools and a cemetery.

Las Positas Road, I-580 to UPRR. One of the nine extension alternatives diverges southeast from I-580 along Las Positas Road. From I-580 to First Street in Livermore, this portion of the study area contains mostly agricultural, open space, and very low-density residential land uses. A large commercial development is located at the corner of Las Positas and First Street. East of First Street, the study area runs through an area of light industrial uses and a large cluster of undeveloped parcels.

Union Pacific Railroad Corridor. This portion of the study area nearly traverses the entire length of the City of Livermore. It is characterized by resource management and undeveloped County land at its western end. Within the Livermore city limits, land use consists of a residential neighborhood with associated public parks, creek-oriented open spaces, and a high school, cemetery, and hospital. East of Murrieta Boulevard, the study area approaches Downtown Livermore, and land use begins shifting towards higher intensity, urban commercial and residential uses. East of downtown, a large area of single-family residential land is located along the southern side of the railroad. To the north is an area of light industrial uses that stretches into eastern Livermore. This area is dotted with warehouse-style commercial uses and large, undeveloped parcels. Unincorporated open space and agricultural land characterize the eastern end of the study area.

Most of the Isabel/Stanley Station footprint is located in unincorporated County, on the western side of the City of Livermore, and currently contains mining/aggregate resource management land use in its southern portion and undeveloped land in the portion north of Stanley Boulevard. As seen in Table 3.3-2, the primary land uses comprising the station area are aggregate/water resource, single-family residential units, and undeveloped areas. The western side of the station area is largely in

unincorporated County, and dominated by mining/aggregate resource management and a large area of undeveloped land, north of Stanley Boulevard. The eastern portion of the station area is largely in the City of Livermore and occupied almost entirely by a single-family residential neighborhood, with two public parks and a small area of multifamily townhomes.

The Downtown Livermore Station footprint contains a portion of the existing ACE station and land that is currently developed, including seven acres of multifamily residential uses on the north side of the UPRR tracks and numerous businesses surrounding the existing ACE station. The Downtown Livermore Station area is located in Downtown Livermore, and is the one station area that contains large areas of single family residential, multifamily residential, and commercial uses (see Table 3.3-2). The central, east-west running portion of this station area contains a mix of commercial land uses characteristic of a compact community or village center. Although this existing land use is intense relative to the rest of Livermore, it is not representative of the commercial density that defines larger Bay Area downtown areas. The station area contains an elementary school, middle school, high school, and continuation school, as well as three public parks.

Associated with the Downtown Livermore Station is the Portola/Railroad Yard. The footprint of this yard currently contains commercial land uses toward its western end, in the portion of the footprint that is within the Downtown Livermore Station area. The eastern end of the yard footprint, outside of the Downtown Livermore Station area, is currently composed of industrial land uses. A small pocket of early-twentieth century, Arts and Crafts-style housing is located adjacent the Portola/Railroad Yard site to the east, along Trevarno Road. This residential neighborhood was officially designated as the Trevarno Road Historic District by the City of Livermore in 1976. Additional information on this resource is provided in Section 3.6, Cultural Resources.

The Vasco Road Station footprint straddles the UPRR alignment, and contains mostly industrial land, in addition to two currently undeveloped parcels and a single commercial parcel. Table 3.3-2 shows that the Vasco Road Station area contains the most developed industrial and public/institutional lands of the five proposed station areas. To the north of the alignment, the station area is characterized by industrial land uses and several clusters of large, undeveloped parcels. South of the alignment, the area west of Vasco Road is a single-family residential neighborhood, with an accompanying public park that includes a large, BMX-style bicycle track. The southeast portion of the Vasco Road Station area contains the Lawrence Livermore National Laboratory.

The footprint of the Vasco Yard is dominated by the industrial land use that defines much of eastern Livermore. However, two commercial parcels are currently located at the far eastern end of the yard footprint, outside of the Vasco Road Station area.

Southern Pacific Railroad (SPRR) Corridor, Mines Road to Greenville East Station. One of the nine extension alternatives approaches the Greenville East Station by way of the former SPRR right-of-way. This portion of the study area is dominated by the large parcel, industrial land uses characteristic of east Livermore, with intermittent commercial uses and a number of undeveloped parcels.

Sensitive Land Uses

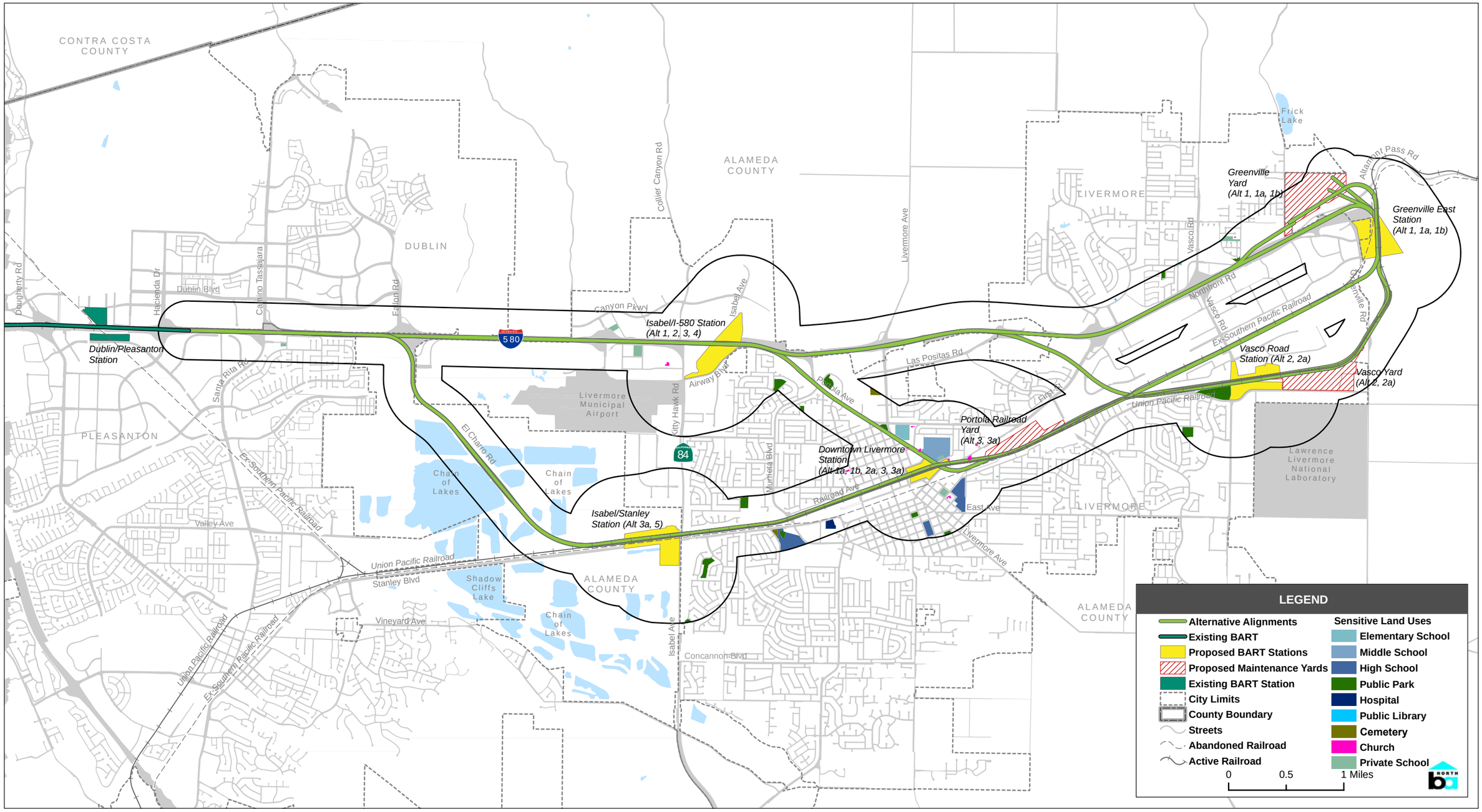
Certain types of land uses result in concentrated populations of individuals that are easily affected by surrounding environmental stress, such as changes in localized air quality and noise levels. These individuals include the elderly, very young, or infirm. Because of their vulnerability to changes in the environment, the buildings and activities that they occupy are considered sensitive land uses; i.e., schools, libraries, hospitals, elderly care centers, and places of worship. Sensitive land uses within the study area are shown in Figure 3.3–2. Descriptions of sensitive land uses within either a quarter-mile of the alternative alignments or a half-mile of the stations and yards are presented below by alternative.

Alternative 1 - Greenville East. The study area surrounding this alternative includes all or part of four public parks totaling approximately eight acres, as well as the Springtown Branch of the Livermore Public Library. As is the case with the majority of these sensitive uses, the Springtown Library is located at the edge of the study area, about 0.2 miles from the I-580 portion of the alignment. One exception is Northfront Park in Livermore, a neighborhood park located east of the Vasco Road interchange on Northfront Road, immediately adjacent to the I-580 portion of the alignment. The area also contains two churches, one approximately 0.17 miles south of I-580 and another approximately 0.4 miles west of the Greenville Maintenance Yard.

Alternative 1a - Downtown - Greenville East via UPRR. The Alternative 1a study area contains nine parks in the City of Livermore, including one park located west of Vasco Road that is south of and adjacent to the alignment. These parks total approximately 30 acres. The study area also contains an elementary school, middle school, continuation school, and two high schools. Four of the five schools within the study area are located within 0.35 miles of the Downtown Livermore Station, including the middle school located immediately north of the alignment and Downtown Livermore Station. One of the high schools and a nearby cemetery and park are located west of Murrieta Boulevard just 0.05 miles south of the UPRR portion of the alignment. There are also five churches located near the schools in the Downtown Livermore Station area. Finally, a general hospital and cemetery are located in the Alternative 1a study area, both approximately 0.18 miles from the alignment.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative contains portions of seven public parks in the City of Livermore, totaling approximately 11 acres. Although all are within a quarter-mile of the alignment, none are adjacent to the alignment. The study area also contains an elementary school, middle school, continuation school, two high schools, five churches, a general hospital, and a cemetery, within the downtown area similar to Alternative 1a described above.

Alternative 2 - Las Positas. All or part of six public parks in the City of Livermore, totaling about 30 acres, are located within the study area of this alternative, including one park located west of Vasco Road that is south of and adjacent to the alignment. Additionally, a church is located approximately 0.17 miles south of the I-580 alignment, west of the Isabel/I-580 Station.



Source: City of Livermore, 2008; County of Alameda, Office of the Assessor, 2009; DC&E, 2009

SENSITIVE LAND USES IN BART TO LIVERMORE STUDY AREA

FIGURE 3.3-2

Alternative 2a – Downtown-Vasco. This alternative contains eight public parks totaling approximately 35 acres. The study area also contains an elementary school, middle school, continuation school, and two high schools. Four of five of the schools are located within 0.35 miles of the Downtown Livermore Station, including the middle school immediately north of the proposed alignment and Downtown Livermore Station. One of the high schools and a nearby cemetery and park are located west of Murrieta Boulevard just 0.05 miles south of the UPRR portion of the alignment. There are also five churches located near the schools in the Downtown Livermore Station area. Finally, a general hospital and cemetery are located in the Alternative 2a study area, both approximately 0.18 miles from the alignment.

Alternative 3 - Portola. The study area of Alternative 3 contains multiple sensitive land uses, most of which are in the City of Livermore portion of the study area along Portola Avenue. These uses include an elementary school and middle school adjacent to the Portola portion of the alignment, as well as a high school and small continuation school within the 0.5-mile Downtown Livermore Station area. The study area also contains six public parks totaling about 14 acres. Two of these parks are located along Portola Avenue, adjacent to the alignment. A small cemetery is located approximately 0.2 miles northeast of the Portola portion of the alignment.

Alternative 3a - Railroad. This alternative contains a number of schools, including an elementary school, middle school, two high schools, and a small continuation school, as well as five churches located near the schools, in the Downtown Livermore Station area. All of these sensitive uses are located in the City of Livermore. Other sensitive land uses include seven public parks totaling approximately 16 acres, a cemetery, and a general hospital.

Alternative 4 - Isabel/I-580. The Alternative 4 study area contains one public park in the City of Livermore, totaling about four acres, and located about 0.2 miles south of the alignment. Additionally, a church is located approximately 0.17 miles south of the 1-580 alignment, west of the Isabel/I-580 Station.

Alternative 5 - Quarry. This alternative contains two public parks totaling approximately six acres. Both are located in the westernmost portion of Livermore, one about 0.2 miles north of the alignment, and the other about 0.25 miles south of the alignment.

Agricultural Resources

According to the Alameda County Farm Bureau, the total value of agricultural production in Alameda County for 2007 was approximately $42.5 million. The five leading agricultural commodities produced in the County, in descending order of value, were woody ornamentals, cattle and calves, wine grapes, pasture/rangeland, and nursery products.[1]

[1] California Farm Bureau Federation, *Alameda County Farm Bureau*, from http://www.cfbf.com/counties/index.cfm?id=1, accessed November 20, 2008.

Important Farmlands. The California Department of Conservation's (CDC) Division of Land Resource Protection maintains the Farmland Mapping and Monitoring Program (FMMP). As part of the FMMP, agricultural land throughout California is rated based on soil quality, irrigation status, and the potential for productivity. Land of the highest agricultural quality is called Prime Farmland. Prime Farmland, together with Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, is generally described here as "Important Farmland." Each FMMP category is defined in Table 3.3–3.

Table 3.3–3
FMMP Farmland Classifications

Land Classification	Definition
Prime Farmland	Land with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some point during the four years prior to the mapping date.
Farmland of Statewide Importance	Land similar to Prime Farmland but with shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
Unique Farmland	Land with lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
Farmland of Local Importance	Land of local importance to the local agricultural economy as determined by each County's board of supervisors and a local advisory committee.
Grazing Land	Land on which the existing vegetation is suited to the grazing of livestock. The minimum mapping unit is 40 acres.
Urban and Built-up Land	Land occupied by structures with a building density of at least one unit to 1.5 acres, or approximately six structures to a 10-acre parcel. Common examples include residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures.
Other Land	Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines, borrow pits; and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.
Water	Perennial water bodies with an extent of at least 40 acres.

Source: California Department of Conservation, *California Farmland Conversion Report 2002-2004*, page 5.

According to the most recent CDC survey, there was a total of 253,386 acres of agricultural land in Alameda County in 2006. Ninety-seven percent of that land, or 244,947 acres, was devoted to grazing. The County contained 8,438 acres of Important Farmland, including 4,725 acres of Prime Farmland; 1,391 acres of Farmland of Statewide Importance; and 2,323 acres of Unique Farmland. As of 2006, there was no Farmland of Local Importance in Alameda County.[2]

Williamson Act Contracts. As established in the California Land Conservation Act of 1965, local governments may enter into contracts with private landowners in order to restrict parcels of land to agricultural use. This voluntary agricultural land conservation program provides lower property taxes to agricultural landowners, in exchange for their commitment to maintain agricultural or open space uses of their land for at least 10 years. Tax assessment of contracted lands is based on farming and open space uses rather than full market value. Approximately 16 million acres of farm and ranch land in California are protected under the Act,[3] commonly referred to as the Williamson Act. As of Fiscal Year 2008-2009, there were 1,078 parcels of land in Alameda County enrolled in Williamson Act contracts, totaling approximately 140,500 acres[4]. Most of this land is in the East County Planning Area of Alameda County, to the east and south of the UGB of the East County Planning Area.

Although the majority of agricultural resources in Alameda County are located outside of city limits, the study area contains three small pockets of Important Farmland and clusters of parcels under Williamson Act contract (see Figure 3.3-3). Two of the pockets of Important Farmland are within the I-580 corridor, in western Livermore. The third pocket of Important Farmland is located in unincorporated Alameda County just south of I-580 along the El Charro Road portion of the study area. Farther east on the I-580 corridor, the study area also contains a cluster of parcels under Williamson Act contract, within unincorporated County land. Finally, just east of the Livermore border in the easternmost portion of the study area, there is a second cluster of Williamson Act-contracted parcels.

The Alternative 1 – Greenville East study area contains the highest percentage of land considered an agricultural resource, at six percent of the total land area. The study areas of Alternatives 2a, 3a, and 4, which are each composed of less than one percent agricultural resource land, contain the least percentage of such resources.

The amount of agricultural resources within the study areas of the BART extension alternatives and individual station areas is summarized in Tables 3.3–4 and 3.3–5. Agricultural resources are discussed in greater detail in the impact analysis, later in this section.

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2 California Department of Conservation, *Alameda County 2004-2006 Land Use Conversion, Table A-1*. http://redirect.conservation.ca.gov/DLRP/fmmp/pubs/2004-2006/conversion_tables/alacon06.xls, accessed December 1, 2008.

3 California Department of Conservation, *Williamson Act: Questions and Answers*, http://www.conservation.ca.gov/dlrp/lca/Documents/WA%20fact%20sheet%2006.pdf, accessed December 3, 2008.

4 California Department of Conservation, *Alameda County Williamson Act, 2008-2009*. GIS shapefile.

Table 3.3–4
Agricultural Resources within the Study Area (Acres)

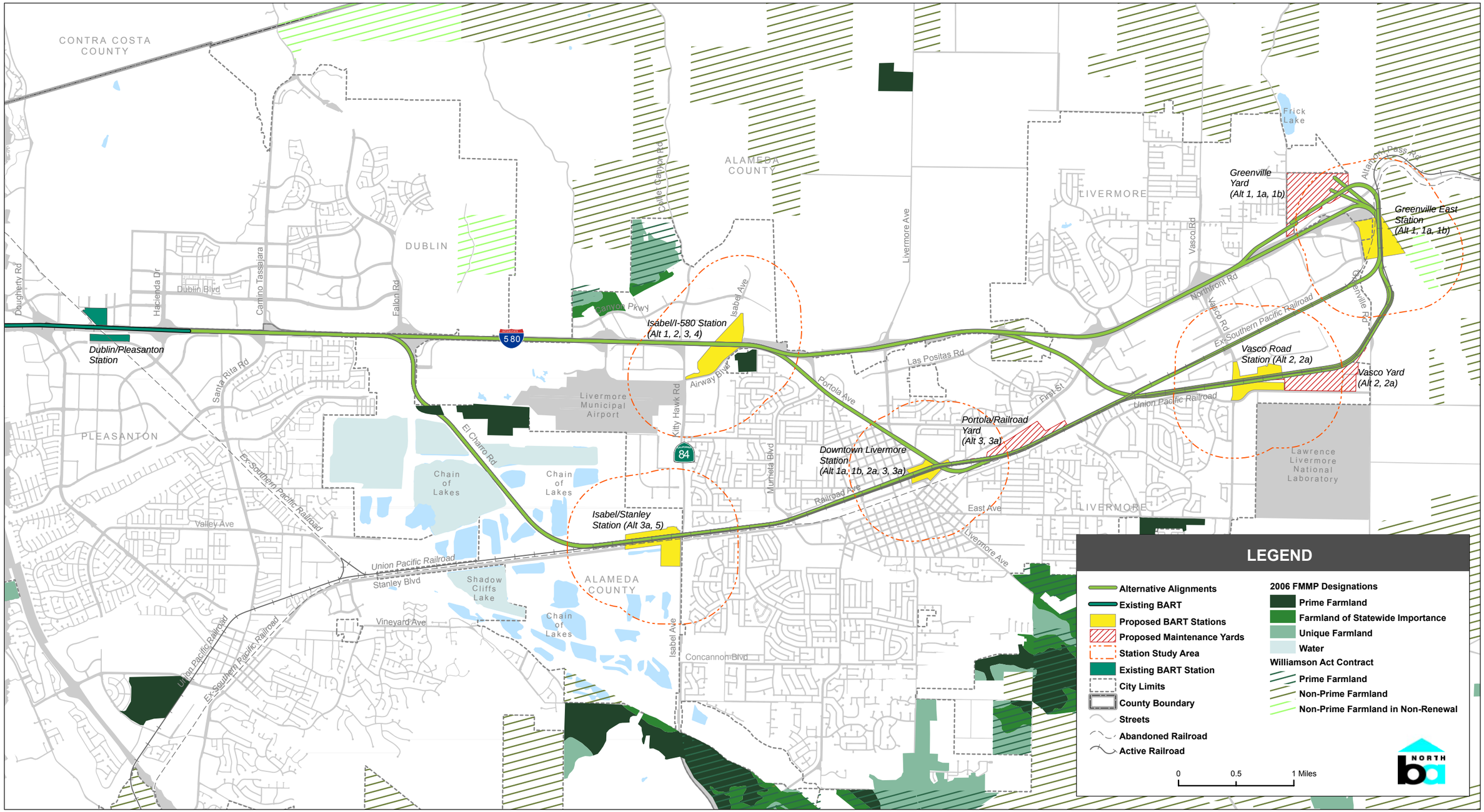
Resource	City of Livermore	Unincorporated County	Study Area Total	Percent of Total
1 – Greenville East				
Important Farmland	8	12	20	<1%
Williamson Act	0	305	305	5%
Total	**8**	**317**	**325**	**6%**
1a – Downtown Greenville East via UPRR				
Important Farmland	0	25	25	1%
Williamson Act	0	250	250	4%
Total	**0**	**275**	**275**	**5%**
1b – Downtown Greenville East via SPRR				
Important Farmland	0	25	25	1%
Williamson Act	0	250	250	4%
Total	**0**	**275**	**275**	**5%**
2 – Las Positas				
Important Farmland	8	12	20	<1%
Williamson Act	0	55	55	1%
Total	**0**	**75**	**75**	**2%**
2a – Downtown-Vasco				
Important Farmland	0	25	25	<1%
Williamson Act	0	0	0	0%
Total	**0**	**25**	**25**	**<1%**
3 – Portola				
Important Farmland	8	12	20	<1%
Williamson Act	0	0	0	<1%
Total	**7**	**12**	**20**	**1%**
3a – Railroad				
Important Farmland	0	25	25	<1%
Williamson Act	0	0	0	0%
Total	**0**	**25**	**25**	**<1%**
4 – Isabel/I-580				
Important Farmland	8	12	20	<1%
Williamson Act	0	0	0	0%
Total	**8**	**12**	**20**	**<1%**
5 – Quarry				
Important Farmland	0	25	25	1%
Williamson Act	0	0	0	0%
Total	**0**	**25**	**25**	**1%**

Source: California Department of Conservation, 2009.

Notes:

a. There are no agricultural resources in the cities of Dublin and Pleasanton within the study area.

b. All values rounded to the nearest acre.



Source: California Department of Conservation, 2008.

AGRICULTURAL RESOURCES IN BART TO LIVERMORE STUDY AREA
FIGURE 3.3-3

Table 3.3–5
Agricultural Resources within the BART to Livermore Station Areas

	Isabel/I-580 Station Area		Isabel/Stanley Station Area		Downtown Livermore Station Area		Vasco Road Station Area		Greenville East Station Area	
Resource	Acres	Percent Total Area	Acres	Percent Total Area	Acres	Percent Total Area	Acres	Percent Total Area	Acres	Percent Total Area
Important Farmland	20	2%	0	0%	0	0%	0	0%	0	0%
Williamson Act	0	0%	0	0%	0	0%	0	0%	250	25%
Total	**20**	**2%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**250**	**25%**

Source: California Department of Conservation, 2009.

Note:

All values rounded to the nearest acre.

Applicable Policies and Regulations

The location and spatial characteristics of special planning areas and regulations presented in this discussion are shown in Figure 3.3–4. As noted in the "Introduction" section, BART is exempt from complying with local land use plans, policies, and zoning ordinances. For informational purposes and consistent with BART's policy goal of coordinating system expansion with local land use planning, this section describes important local land use policies and regulations.

Planning Documents. Land use patterns within the study area are determined largely by the General Plans and specific plans of the cities of Livermore, Pleasanton, and Dublin, and County of Alameda. The Livermore General Plan, adopted in 2004, is the City's overarching land use and growth-related policy document, intended to guide development and conservation in the City through 2025. The City of Pleasanton General Plan Update guides land use and development in Pleasanton through 2025; this plan was adopted in July 2009. The City of Dublin General Plan, that City's overarching land use policy document, was adopted in 1985. It was partially updated in 2008 and is effective through 2025. Finally, Alameda County's East County Area Plan, revised under Measure D in 2000, communicates the County's intent concerning long-range development and resource conservation within the unincorporated, 418-square-mile East County Area. Various special planning areas and regulatory boundaries are also in place in each city to achieve targeted development goals in specific areas. Each of these areas is described below.

East County Area General Plan Goals and Policies. The study area surrounding the eastern end of the I-580 corridor extends into unincorporated Alameda County. Thus, the following goals, policies, and programs related to land use, transportation, and environmental health from the East County Area General Plan are relevant to the evaluation of the extension alternative's effectiveness in meeting BART's policy goal of coordinating system expansion with local land use planning.

The UGB of the East County Area of Alameda County limits the encroachment of urban development onto open spaces and agricultural lands (see Land Use Policy 1, below). The goal of the County UGB is to focus urban development in or near existing cities, where it will be efficiently served by existing facilities.[5]

In November 2000, Alameda County voters approved Measure D. Passage of the initiative suggests residents' desire to further preserve agricultural lands, maintain the natural environment, and protect local wildlife and habitat areas. Included in the initiative were amendments to portions of the existing East County Area Plan, one of which was the redrawing of East County's UGB. Under the resulting UGB, a portion of the North Livermore area was removed from the possibility of urban-style development (see Figure 3.3-4). The study area for Alternatives 1, 1a, 1b, and 2a extends eastward beyond the current East County UGB into areas intended to remain in open space or agricultural uses.

Land Use Policy 1. The County shall identify and maintain a County UGB that divides areas inside the Boundary, next to existing cities, generally suitable for urban development from areas outside suitable for long-term protection of natural resources, agriculture, public health and safety, and buffers between communities (see Figure 3.3–4).

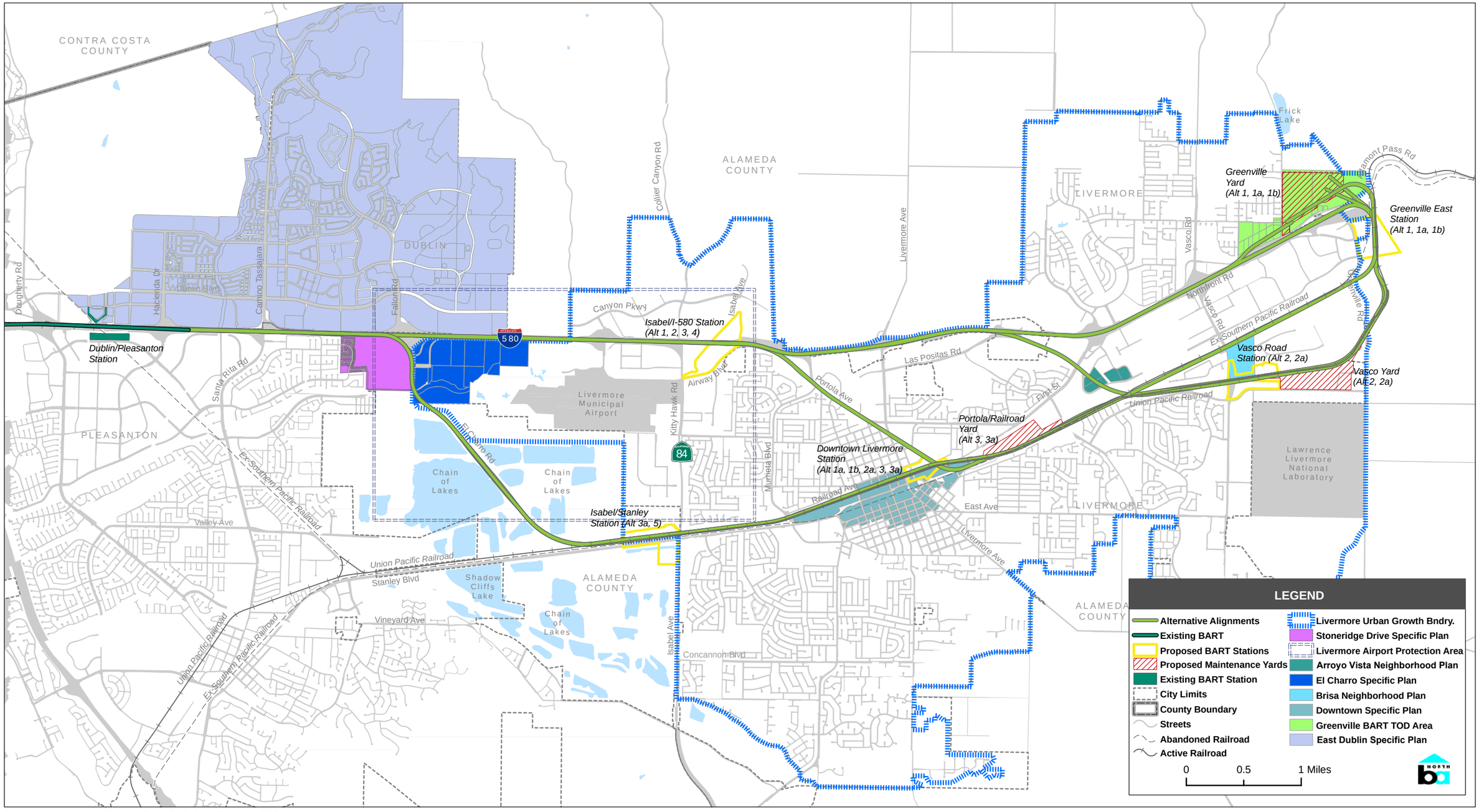
Land Use Policy 71. The County shall conserve prime soils (Class I and Class II, as defined by the USDA Soil Conservation Service Land Capability Classification) and Farmland of Statewide Importance and Unique Farmland (as defined by the California Department of Conservation Farmland Mapping and Monitoring Program) outside the UGB.

Land Use Policy 86. The County shall not approve cancellation of Williamson Act contracts within or outside the County UGB except where findings can be made in accordance with state law, and the cancellation is consistent with the Initiative. In no case shall contracts outside the UGB be canceled for purposes inconsistent with agricultural or public facility uses. Prior to canceling any contract inside the County UGB, the Board of Supervisors shall specifically find that there is insufficient non-contract land available within the Boundary to satisfy state-mandated housing requirements. In making this finding, the County shall consider land that can be made available through reuse and rezoning of non-contract land.

Transportation Policy 203. The County shall support construction of a light rail or other transit system along either the I-680 corridor or the former Southern Pacific San Ramon branch line, or a combination of each, from Pleasanton to Walnut Creek, and, if feasible, along the County's Transportation Corridors and remaining Southern Pacific rail line from Tracy to Fremont, and rail extension of the BART system along the I-580 corridor.

Transportation Policy 205. The County shall encourage BART to locate new BART stations in areas that can be developed at high densities and intensities to maximize transit patronage.

[5] County of Alameda, *East County Area Plan*. November, 2000, page ii.



Source: City of Livermore, 2008; City of Dublin, 2008; City of Pleasanton, 2008; Alameda County, 2008.

REGULATORY BOUNDARIES AND SPECIAL PLANNING AREAS
FIGURE 3.3-4

Transportation Policy 206. The County shall encourage BART to extend service to the Livermore area by the year 2010. This could be facilitated by including a portion of the costs of the rail extension to the planned Livermore stations using funds to be collected from the proposed subregional transportation fee being developed by the Tri-Valley Council.

City of Livermore General Plan Goals and Policies. The Land Use Element of the City of Livermore General Plan includes a number of goals, policies, and objectives that are pertinent to evaluation of the study area. The Community Character, Circulation and Open Space and Conservation Elements also contain relevant goals, policies, and objectives.

Objective LU-3.1. Create neighborhoods near transit that include a mix of uses and a range of housing types to meet the needs of all residents.

LU-3.1.P1 Prior to or concurrent with approval of any development applications, a specific plan shall be prepared and approved for the Greenville BART transit-oriented development (TOD). The specific plan shall provide detailed guidance for project-related land use, provision and financing of public services and facilities, open space preservation (including appropriate setbacks and buffers from adjacent open space areas), visual resources, and recreational amenities, and shall include mitigation measures to reduce the impacts of individual projects on existing neighborhoods and environmental resources. The highest density shall be located nearest to the BART station and shall feather to lower densities as it approaches the existing, surrounding single-family neighborhoods.

LU-3.1.P2 Development of the BART TOD shall be contingent upon BART establishing a firm timeframe and funded extension of full BART rail services from Dublin/Pleasanton to the Greenville area. Until such a commitment is made for full BART rail service, land uses in the Greenville BART TOD shall be consistent with Agriculture/Viticulture (AGVT).

Objective LU-4.4. Protect the Municipal Airport from encroachment by incompatible uses.

LU-4.4.P2 New residential land use designations or the intensification of existing residential land use designations shall be prohibited within the Airport Protection Area (APA). The APA includes the area located within 7,100 feet west of the western end of runway 7L-25R, 5,000 feet north of the northern edge of runway 7L-25R, 5,000 feet east of the eastern end of runway 7L-25R, and 5,000 feet south of the southern end of runway 7L-25R (see Figure 3.3–4).

Objective LU-5.1. Maintain an UGB to protect open space and agricultural uses in North Livermore**.**

Objective LU-5.2. Carefully regulate land uses in North Livermore

LU-5.2.P4 Only the following uses, and their normal and appropriate accessory uses and structures, (as well as uses preemptively authorized by Federal and State law) may be permitted in North Livermore, provided that they comply with all the provisions of this plan:

(1) One single family residence per parcel, additional dwelling units to the extent that clustering is permitted on a single parcel under Objective LU-5.3, secondary units required by State law, and farm labor housing necessary for bona fide farm workers employed full-time;

(2) agriculture, including horticulture and grazing of ruminants, but not including large or medium size commercial feed lots and pig farms;

(3) packaging, processing, storage or sale of agricultural produce or plants, a substantial portion of which were grown in the Livermore area, but not canneries and freezing facilities;

(4) rearing, custodianship, training or care of animals, other than ruminants which are not subject to this subsection but are agriculture covered by LU-5.2.P4(2), provided that the use does not cause appreciable environmental harm;

(5) additional commercial uses, limited to the following:

(*i*) outdoor recreation and pastimes predominantly for active participants, not spectators;

(ii) nature observation, study or enjoyment

(iii) home occupations and offices;

(iv) rental of rooms to lodgers;

(v) uses in historic structures;

(vi) physical and mental convalescence and rehabilitation;

(vii) veterinary offices and facilities;

(viii) cemeteries, not to exceed twenty acres;

(ix) accommodations for short term visitor occupancy and for provision of food and drink that accord with a rural, agricultural environment

(6) institutional and other non-profit uses that primarily serve North Livermore residents;

(7) City and other government facilities and infrastructure, and public utilities, that are limited to meeting the needs created by permitted uses in North Livermore.

Objective CIR-3.1. Provide viable alternatives to single-occupant vehicle travel.

Action 3 Advocate the extension of BART to Greenville Road in the I-580 median as the City's preference.

Action 5 Preserve right-of-way adjacent to I-580 to allow widening for HOV lanes, auxiliary lanes, and BART.

Objective OSC-6.1. Minimize air pollution emissions.

OSC-6.1.P7 The City shall support programs to encourage the development and maximum use of regional and local mass transit systems. To this end, the City shall actively support:

a) Funding and construction of a BART or light/commuter rail extension to Livermore.

In addition, the City, like the County, has adopted its own UGB limits, one for North Livermore and one for South Livermore. The UGB for these areas was approved by the voters of the City as initiatives. The boundary provides a clear demarcation beyond which urban uses would not be permitted and City water and sewer services would not be extended. The initiatives were expressions of the community's intent to preserve its surrounding agricultural and open space resources and protect against urban sprawl. Modifications to the boundaries shall only be permitted with voter approval. For the South Livermore UGB, which was approved in March 2000, "urban use" and "urban development" includes any use that is not permitted on lands with a general plan use designation of Limited Agriculture; General Agriculture; Viticulture; Agriculture/Viticulture; Parks, Trailway and Recreation, Corridor, and Protected Areas; or Range and Grassland, as those designations existed on December 6, 1999.[6] The South Livermore UGB cuts through the Isabel/Stanley Station area, as shown in Figure 3.3-4. For the North Livermore UGB, which was approved in December 2002, permitted uses in North Livermore are limited to single family dwelling units; agricultural uses; very limited commercial uses; and institutional, non-profit, governmental and utility uses needed to serve the area.[7] The North Livermore UGB connects to the existing South Livermore UGB to form a continuous UGB around the entire City. The North Livermore UGB cuts through the Greenville East Station area, as shown in Figure 3.3-4.

Livermore Downtown Specific Plan. Originally adopted in February 2004 and updated in 2009, the intent of the Livermore Downtown Specific Plan (LDSP) is to reestablish downtown as a viable city center. The LDSP calls for commercial and cultural amenities in the 272-acre Plan Area, as well as a network of evenly distributed housing and associated open spaces. The goals of the Plan are

[6] City of Livermore, City of Livermore General Plan: 2003-2025, Appendix B, South Livermore Urban Growth Boundary Initiative (2000), 2004.

[7] City of Livermore, City of Livermore General Plan: 2003-2025, Appendix A, North Livermore Urban Growth Boundary Initiative (2002), 2004.

implemented via a set of overall guiding principles, as well as development standards and design guidelines for five distinct plan areas.

The Downtown Livermore Station is located immediately adjacent to the eastern end of the Plan Area. As a result, the Downtown Transit Gateway and Downtown Core plan area districts are partly contained in the half-mile station study area. The Downtown Transit Gateway District, centered along east First Street, is intended to provide an area for transit-oriented development, due to the close proximity of the ACE/LAVTA stations, as well as its potential as a location for a light rail station in the future.

El Charro Specific Plan. The El Charro Specific Plan, adopted in 2007, is intended to guide the development of a regional retail destination at the western gateway to the City of Livermore. The approximately 250-acre Plan Area is bordered by I-580 to the north, El Charro Road to the west, Livermore Municipal Airport and Municipal Golf Course to the east and mining quarries to the south. The Plan is a land use framework that includes 152 acres of regional serving retail and 97 acres of open space. Alternatives 1, 2, 3, and 4 would operate in the median of I-580 along the north edge of the Plan Area. Alternatives 1a, 1b, 2a, 3a, and Alternative 5 encroach into the Plan Area in its southwestern-most corner along El Charro Road.

Brisa Neighborhood Plan. The Brisa Neighborhood Plan (BNP) was adopted in February 2007. The BNP is a conceptual framework for an area within the City of Livermore containing standards and guidelines for developing 37.5 acres of vacant land into a residential neighborhood, with 510 dwelling units, two public parks, and a connective trail network. The Plan Area is adjacent to, and east of, Vasco Road; immediately north of the UPRR tracks. Alternatives 1a, 1b, 2, and 2a would run adjacent to the boundary of the Plan Area, and the southern portion of the Plan Area lies within the Vasco Road Station area. The entire Plan Area is contained in the half-mile study area surrounding the station.

Arroyo Vista Neighborhood Plan. The Arroyo Vista Neighborhood Plan, approved in July 2007, is a policy framework for an area within the City of Livermore to implement the orderly, compatible development of a residential neighborhood with a density range of 14 to 18 dwelling units per acre. The Plan Area is an approximately 28-acre site composed of six vacant parcels. It is located in a predominantly industrial district on the eastern side of the City, bordered to the north by Arroyo Vista Road, to the west and south by Las Positas Road and to the east by Bennett Drive. It is intersected by the Arroyo Seco Channel. The Plan is relevant to evaluation of the Alternative 2 alignment, which intersects the Arroyo Vista Neighborhood Plan Area.

City of Pleasanton General Plan. From the existing Dublin/Pleasanton BART Station to Dublin's eastern boundary, the study area surrounding the I-580 alignment alternatives extends south into Pleasanton. As a result, the following goals, objectives, policies and actions from the City of Pleasanton General Plan are relevant to the land use evaluation.

Land Use Policy 18. Establish a well-planned mixture of land uses around the BART Stations.

Transportation Policy 15. Reduce the total number of average daily traffic trips throughout the city.

Program 15.3 Maximize transportation opportunities, enabling more people to live close to their places of work, such as with TOD.

Transportation Policy 18. Encourage the extension of BART from Pleasanton to Livermore and beyond.

Program 18.3 Encourage a more direct and convenient connection of BART with ACE rail service.

Stoneridge Drive/Staples Ranch Specific Plan. The Stoneridge Drive Specific Plan (SDSP) is land use framework adopted in October 1989. The 293-acre Plan Area is located in the northeast corner of the City of Pleasanton, adjacent I-580 to the south and El Charro Road to the west. Although the entire Plan Area is within Pleasanton's Sphere of Influence (SOI), 196 acres are within unincorporated Alameda County.

The SDSP designates 128 acres of the Plan Area for residential uses, 78 acres for service commercial/light industrial uses, 30 acres for commercial uses, and 33 acres for parks, schools and institutional uses. The remaining undeveloped portion of Plan Area, 124-acre Staples Ranch, is the subject of a Memorandum of Understanding between the City and the Alameda County Surplus Property Authority, for future development of a continuing-care retirement community, auto dealerships, additional commercial development, and a public park. The Staples Ranch property is just south of I-580 and west of El Charro Road. In February 2009, a Specific Plan Amendment was approved and an EIR was certified by the City of Pleasanton to facilitate development of an auto mall, a senior care community, retail and commercial uses, and a community park. A four-rink ice center is being considered as part of the community park. El Charro Road lies within the Pleasanton SOI and is currently proposed for annexation as part of the Staples Ranch Specific Plan. During the community scoping and comment process, Pleasanton city officials highlighted possible City uses for El Charro Road, and expressed concern over the potential routing of a BART extension alternative along El Charro Road.

City of Dublin General Plan. Within each Element of the General Plan, policies are separated into three groups pertaining to three individual planning areas, the Primary, Western Extended, and Eastern Extended Planning Areas. From the existing Dublin/Pleasanton BART Station to Dublin's eastern boundary, the study area surrounding the I-580 alignment alternatives extends north into Dublin's Eastern Extended Planning Area, which is also encompassed in the East Dublin Specific Plan area. As a result, the following goals, objectives, policies and actions are relevant to the land use evaluation.

Transit Policy C. Urge BART cooperation in maintaining standards for review of public and private improvements in the vicinity of BART stations that take account of both future traffic needs and development opportunities.

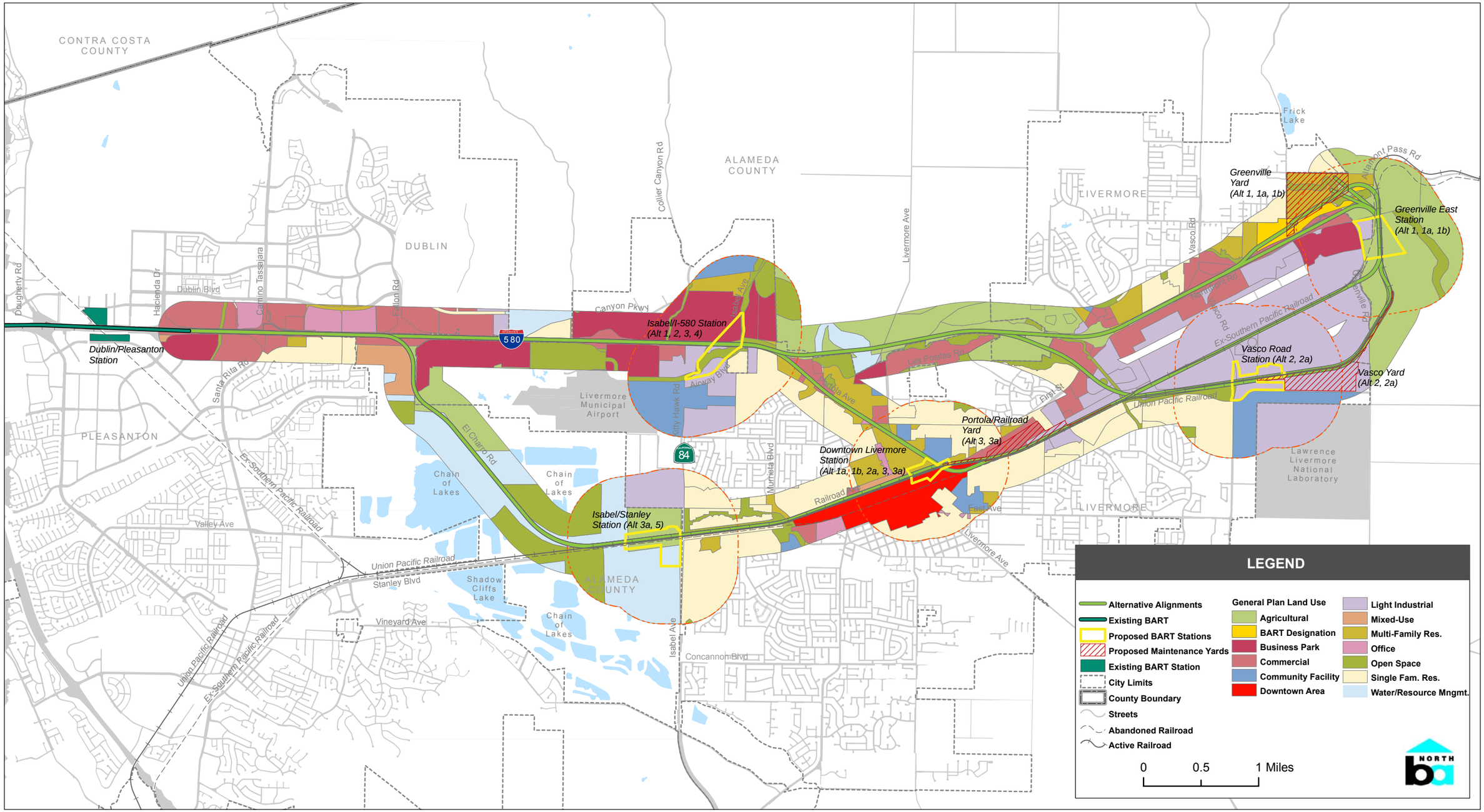
Transit Policy F. Capitalize on opportunities to connect into and enhance ridership on regional transit systems including BART, LAVTA, and any future light rail systems.

General Plan Land Uses Designations in Study Area. The following section describes General Plan land use designations within the study area. Land use designations from the Dublin, Pleasanton, and Livermore General Plans are identified, as well as designations from the County of Alameda East County Area Plan. The following subheadings do not correspond to the alternatives; they are presented in order to organize the description of General Plan land uses in the entire study area. General Plan land use designations are shown in Figure 3.3–5.

I-580. The portion of the study area in the I-580 corridor runs from the origin of the study area at the existing BART end-of-track in Pleasanton to the study area terminus, just beyond the eastern boundary of Livermore. It traverses the cities of Dublin, Pleasanton, and Livermore, as well as unincorporated Alameda County.

General Plan land uses within city limits are primarily large parcel, highway-oriented commercial and business park designations. Portions of this corridor within unincorporated Alameda County are primarily designated for resource management, open space, or agriculture. Exceptions to this pattern include the area just east of Santa Rita Road and south of I-580, in Pleasanton. This area is dominated by medium-density, single-family residential land uses. Just west of Airway Boulevard in Livermore, a large parcel of land is designated open space (Las Positas Golf Course); immediately eastward land use designations shift from a mix of low-intensity industrial and commercial uses to a combination of single-family and multifamily residential uses, with small areas of associated commercial and open space designations. Finally, east of Vasco Road in the City of Livermore north of I-580, an area designated for single-family and multifamily residential uses is followed by a swath of land along Altamont Pass Road that is designated Community Facilities-BART (CF-BART) by the Livermore General Plan. This designation allocates the area specifically for future uses related to the BART system, and is different than the Greenville BART Transit-Oriented Development (TOD) Transitional Area, as shown in Figure 3.3-4. According to the Livermore General Plan, the purpose of the Greenville BART TOD area is to provide for a land use mix appropriate to the area surrounding a future commuter transit station. At the time that the City receives a commitment from BART to extend the rail system, a specific plan targeting TOD-oriented mixed and residential uses is to be prepared for this area.

The Isabel/I-580 Station footprint, which is bisected by I-580, is designated Business Park above I-580 and a mix of Open Space and Light Industrial below I-580. The entire Isabel/I-580 Station area is within the City of Livermore, with the exception of a small area at the eastern edge, which is designated a mix of agricultural and open space by the East County Area Plan. Like the station footprint, the station area is bisected by I-580, and a creek-oriented open space corridor runs southwest-northeast through it. Immediately north of I-580, the land is dominated by parcels designated for business parks. Farther north of I-580, the land use designation shifts to multifamily residential uses and Community Facility-Community College. To the south of I-580, a large area of



Source: County of Alameda, 1996; City of Livermore, 2003; City of Pleasanton, 2003; City of Dublin, 2008.

GENERAL PLAN LAND USE DESIGNATIONS IN BART TO LIVERMORE STUDY AREA

FIGURE 3.3-5

light industrial and business park land uses is surrounded by smaller areas designated Community Facility for the airport and the water treatment to the west and single family residential uses to the east.

The Greenville East Station footprint is designated primarily agricultural, although a small area of the western portion of the footprint is designated for light industrial uses. The entire southwest corner of the Greenville East Station area is designated for either light industrial uses or business parks in the Livermore General Plan. To the north and east, the station area intersects unincorporated County land, the majority of which is designated for agricultural uses. A small area, designated for multiple-family residential uses, is located in the northwest corner of the station area, just north of I-580.

The Greenville Maintenance Yard site is currently designated primarily for multifamily residential and open space uses in the City of Livermore General Plan. The site, which lies within the City's UGB, is also proposed on the City of Livermore's General Plan as the Greenville BART TOD transitional area. This area, described earlier in this section, has been allocated for a future mix of land uses that would complement a potential BART station.

El Charro Road, I-580 to UPRR. This portion of the study area extends southeast from I-580 to the Isabel/Stanley Station, at Stanley Boulevard, just west of the western border of Livermore. It is primarily unincorporated County land, the great majority of which is designated for resource management or open space uses. A small portion of this corridor, just south of I-580, is designated for regional commercial uses, including mixed-use and business park, as part of the El Charro Specific Plan. A portion of El Charro Road, just south of I-580, lies within the Pleasanton SOI and is currently proposed for annexation as part of the Staples Ranch Specific Plan.

Portola Avenue, I-580 to Downtown Livermore. The portion of the study area along Portola Avenue from I-580 to Downtown Livermore—all of which is within the City of Livermore—is the only section of the study area that is primarily designated for residential land use. West of Portola, it is mostly designated single family residential uses by the City of Livermore General Plan. East of Portola, multifamily residential uses are the predominant land use designations. This portion of the study area also includes two large parcels designated Community Facility-Schools, as well as an area designated Downtown Area. The Downtown Area designation applies to Downtown Livermore and allows for a mix of uses targeting a locally-oriented, pedestrian-friendly shopping environment.

Las Positas Road, I-580 to UPRR. The portion of the study area that runs southeast from I-580 to the UPRR along Las Positas Road lies in the City of Livermore. It is characterized by light industrial and commercial General Plan land use designations. A small area of this industrial land is designated Low Intensity Industrial/Urban High Residential that also allows for high-density residential development. This is the area associated with the Arroyo Vista Neighborhood Plan (see Arroyo Vista Neighborhood Plan above and Figure 3.3-4). Finally, a small area just south of I-580 and west of Las Positas Road is designated for single family residential uses.

UPRR Corridor. Like the portion of the study area along I-580, this UPRR portion of the study area traverses nearly the entire length of the City of Livermore. Unlike the I-580 corridor, it is dominated by residential land use designations until the eastern end of Livermore, where industrial designations are prevalent.

The western portion of the Isabel/Stanley Station area, including the entire station footprint, is in unincorporated Alameda County. This land is designated for light industrial, resource management and open space uses. Nearly the entire station footprint is designated for light industrial uses. The eastern portion the station area is in Livermore and is designated for single family residential uses, with small areas designated for multifamily residential and open space uses.

From the western Livermore boundary to Downtown Livermore, nearly all of this area is designated for residential land use. It is designated primarily for single family residential uses, although there are small areas of multifamily residential and open space designations. This portion of the study area then intersects Downtown Livermore, which is primarily designated for mixed use and urban-oriented, multifamily residential land uses.

This Downtown Livermore Station area is bisected by east-west running Railroad Avenue. The northern half of the study area is composed of a mix of single family residential and multifamily residential land use designations and the Community Facility-Schools designation described above under the Portola Avenue portion of the study area. South of Railroad Avenue, General Plan land use is dominated by the Downtown Area designation, with an area of single family residential south of that. The station footprint is designated both multifamily residential and Downtown Area.

East of the Downtown Livermore Station area to Vasco Road, this portion of the study area is dominated by the light industrial land use designation in the area north of the existing railroad alignment, although the Portola/Railroad Yard footprint is designated primarily for commercial uses. South of the railroad, the area is designated for single family residential land use, with small pockets that are designated for park uses. The eastern end of this corridor extends beyond the City of Livermore and into unincorporated Alameda County; all of this unincorporated land is designated for agriculture.

Most of the northern half of the Vasco Road Station area, including the majority of the station footprint, is designated High Intensity Industrial in the City of Livermore General Plan. However, a large parcel adjacent to the station footprint to the north is designated High Intensity Industrial/Urban High Residential. This is a City of Livermore industrial land use designation that also provides for high-density residential development. The area under this designation is the Brisa Neighborhood Plan area (see Brisa Neighborhood Plan above and Figure 3.3-4). The southwestern corner of the station area, also in the City of Livermore, is designated for single family residential uses with a small area for a park. The southeast corner, which includes an area of unincorporated land occupied by the Lawrence Livermore National Laboratory, is designated Community Facility by the Livermore General Plan and Light Industrial by the East County Area Plan.

SPRR Corridor, Mines Road to Greenville East Station. A small portion of the study area is a corridor surrounding the former SPRR alignment, beginning at Contractors Street, the point at which it merges with the UPRR, and terminating just east of Greenville Road. This portion of the study area, which includes the Vasco Yard, is almost entirely designated for light industrial land use by the City of Livermore General Plan. It extends just east of the Livermore boundary into unincorporated Alameda County, and is designated for open space use by the East County Area Plan.

BART System Expansion Policy. BART's System Expansion Policy calls for communities proposed to be served by a BART extension to prepare Ridership Development Plans if their existing General Plan land use designations in the station areas do not yield sufficient ridership for the corridor. These plans seek to promote BART ridership by encouraging more intensive development and/or enhancing access to proposed BART stations. The Ridership Development Plans can be implemented as general plan amendments, specific plans, and/or rezonings. By allowing additional housing development within station areas, growth projected to occur within the City would be redirected and targeted for the station areas.

Trail Improvement Policies and Proposals. Proposed trails and multi-use paths in the study area are included in plans for the cities of Dublin, Pleasanton, and Livermore as well as Alameda County. Individual descriptions of these trail plans in the project study area are provided in the Section 3.2, Transportation, because they concern the circulation system in the study area; however, the BART extension alternatives' effects on these proposals as recommendations of adopted plans are considered in this section.

Impact Assessment and Mitigation Measures

This analysis considers the potential effects of the BART extension alternatives on adjacent land uses, as well as the program's consistency with relevant planning policy and established land use goals. Because of the broad nature of the topic, the land use-related impacts of new development can manifest themselves in many ways, for example, increased traffic and resulting air quality issues, or impacts to the local visual quality due to changes in the built landscape. For that reason, the reader is directed to other sections of this document that address related impacts. These include Section 3.4, Population and Housing; Section 3.5, Visual Quality; Section 3.10, Noise and Vibration; Section 3.11, Air Quality; and Section 3.13, Community Services.

As noted in the "Introduction" to this section, California Government Code Section 53090 exempts BART from complying with local land use plans, policies, and zoning ordinances. As such, an inconsistency with such policies would not constitute a significant impact requiring mitigation. Nevertheless, for informational purposes and consistent with BART's policy goal of coordinating system expansion with local land use planning, the following analysis includes a discussion of the consistency of the BART extension alternatives with local land use policy.

Standards of Significance

This analysis relies on standards of significance developed by BART on the basis of accepted land use planning practice. Impacts related to land use are considered significant if a BART extension alternative would result in any one of the following:

- Incompatibility with adjacent and surrounding land uses caused by degradation or disturbances that diminish the quality of a particular land use;
- Physical division of an established community; or
- Premature conversion of land under a Williamson Act land contract or land designated as Important Farmland.

Although not a Standard of Significance, the following analysis also includes an analysis to determine whether the extension alternatives are consistent with appropriate local land use policies and goals. This analysis does not, however, make a significance finding, based on the provisions of State Government Code, Section 53090. The policy consistency analysis is provided within this impact analysis, following the discussion of Impact LU-3.

For each land use impact analyzed below, a level of significance is determined for each project alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, LU refers to Land Use.

Methodology

The following methods were used to evaluate the three standards of significance listed above.

Compatibility with Existing Land Uses. To evaluate land use compatibility, existing or "on-the-ground" land uses within the nine alignment study areas were identified based on windshield and photographic surveys. In addition, Geographic Information Systems (GIS) data layers and aerial photography were used to identify the proximity of each alignment alternative to sensitive land uses such as schools and hospitals. Compatibility-related impacts were measured by the degree to which land use changes and physical improvements related to the BART facilities (e.g., the track work, station, or maintenance yard) would conflict or not with existing land uses.

Physical Division of Communities. A potential impact on a community or neighborhood was identified if an alignment alternative, including a new station, would act as a physical barrier that would effectively isolate one part of an established community from another, thus potentially disrupting community cohesion. In order to identify such an impact, GIS mapping was used to evaluate each potential alignment against relevant land use data, such as community plan area boundaries, established

neighborhood boundaries, school district boundaries, connective transportation corridors, and neighborhood commercial land use designations with associated residential areas.

Conversion of Agricultural Resources. Assessment of the potential impact of each alternative on Important Farmland or land under a Williamson Act contract was based on the proximity of farmland to a particular alignment, including required right-of-way land acquisition.

Information from the California Department of Conservation FMMP and local jurisdictions was used to identify all Important Farmlands and properties under a Williamson Act Contract within 50 feet (15 m) of both sides of the centerline for each alignment alternative. Impacts were labeled significant when the construction of the alternative would require the premature conversion, division or acquisition of farmland.

Environmental Analysis

Table 3.3–6 summarizes the land use-related, operational impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. As shown in Table 3.3–6, Alternatives 3 and 3a would have potentially significant impacts resulting from incompatibility with existing land uses, none of which would be mitigated to less-than-significant levels. In terms of physically dividing established communities, the impact of all the extension alternatives would be less than significant. Finally, Alternatives 1, 1a, and 1b would have potentially significant indirect impacts to agricultural resources, none of which would be mitigated to less-than-significant levels. The impact of agricultural resource by the other alternatives would be less than significant. An explanation of these conclusions is provided under the subsequent discussions of each land use impact.

Table 3.3–7 includes a comparative summary of land use impacts focused on the key differences among the alternatives. A more detailed description of impacts for each alternative follows.

LU-1 Incompatibility with Adjacent and Surrounding Land Uses

The discussion of compatibility in this section addresses overall compatibility of the BART to Livermore Extension Program with existing land uses, as well as potential impacts to sensitive receptors such as schools and churches. The compatibility of land uses within station areas and maintenance yards is evaluated first. Each alternative is then assessed individually, accompanied by a determination of significance. Impacts related to the acquisition of property and displacement are assessed in Section 3.4, Population and Housing. The compatibility of station area land uses with future TOD, including potential constraints to development resulting from proximity to highway and rail rights-of-way, is assessed under Impact LU-4, consistency with local land use policy, and under Regional Transit-Oriented Development Policies in Section 5, Program Merits. Impacts related to future development around the station are addressed in this document, although such development would be subject to its own environmental review.

Land Use Compatibility with Stations and Maintenance Yards. The compatibility of land uses within station areas is a key determinant in analyzing the overall land use compatibility of an alternative. Because each station is a shared element of at least two alternatives, this analysis begins with assessments of land use compatibility within station/maintenance areas, to avoid repetition.

Isabel/I-580 Station Area. This station area consists primarily of undeveloped and open space land. Although the station footprint is contained within Livermore's UGB, the northeast portion of the one-half--mile station area extends east of the UGB. Residential areas at the northwest and southeast areas of the site would be separated from the proposed station by surrounding undeveloped and open space areas, as well as Airway Boulevard and a planned Isabel Avenue interchange, both of which are major roadways that would border the station footprint. The remainder of the station area is composed of business park and institutional land uses, including a portion of the Livermore Municipal Airport. A proposed BART station would not adversely affect the ongoing operations and activities at these uses.

Table 3.3–6
Summary Comparison for Land Use Impacts
in the BART to Livermore Extension Study Area

	Incompatibility with Existing Land Uses		Physical Division of Established Community		Premature Conversion of Agricultural Resources	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA	NI	NA
1 - Greenville East	LTS	NA	LTS	NA	PS	No
1a - Downtown Greenville East via UPRR	LTS	NA	LTS	NA	PS	No
1b - Downtown Greenville East via SPRR	LTS	NA	LTS	NA	PS	No
2 - Las Positas	LTS	NA	LTS	NA	LTS	NA
2a - Downtown-Vasco	LTS	NA	LTS	NA	LTS	NA
3 - Portola	PS	No	LTS	NA	LTS	NA
3a - Railroad	PS	No	LTS	NA	LTS	NA
4 - Isabel/I-580	LTS	NA	LTS	NA	LTS	NA
5 - Quarry	LTS	NA	LTS	NA	LTS	NA

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant
NI = No Impact NA = Not Applicable

Table 3.3–7
Comparative Land Use Impacts of BART Build Alternatives

Alternative	Land Use Compatibility	Physical Division of Existing Community	Premature Conversion of Agricultural Resources
1 - Greenville East	Impact of alignment would be limited, as 10 of 11.5 total miles are within I-580 median. While future Isabel/I-580 Station area development may be restricted because a portion is in the Livermore Airport Protection Area (APA), a portion is outside the Urban Growth Boundary (UBG), and residential uses adjacent to high-volume roadways need to be evaluated in accordance with the California Air Resources Board's (CARB's) guidelines, this alternative has relatively few existing compatibility issues compared to other alternatives.	The alignment runs almost exclusively in the median of I-580, which already separates communities to the north and to the south. This alternative would not add substantially to this existing barrier.	Footprints of Greenville East Station and Maintenance Yard would not affect Important Farmlands or Williamson Act lands. There are, however, 250 acres of non-prime Williamson Act contracted land in Greenville East Station area that would be subject to development pressure if there were future plans for station area development. Thus, this alternative with the Greenville East Station would pose possible indirect impacts on agricultural resources.
1a - Downtown Greenville East via UPRR	Potential for compatibility impacts is reduced due adherence to existing highway and rail corridors and elevated alignment along El Charro Road. Although proximate to sensitive uses Downtown, this alternative would be largely compatible with existing Downtown activity.	Alignment would operate within I-580, on aerial structure through an area where there is no community (industrial, aggregate, and vacant parcels), or within the existing UPRR right-of-way. As a result, it is not expected that Alternative 1a would result in physical division of a community.	The agricultural conversion issues described for Alternative 1 apply to this alternative. In addition, this alternative would pass Important Farmlands along the portion of the alignment that runs along El Charro Road. The alignment would pass through in an aerial configuration and thus would not directly encroach into the Important Farmland-designated area.
1b - Downtown Greenville East via SPRR	The compatibility issues described for Alternative 1a apply to this alternative.	The community division issues described for Alternative 1a apply to this alternative.	The agricultural conversion issues described for Alternative 1a apply to this alternative.
2 - Las Positas	Alignment impacts are limited where BART would operate in the I-580 median and the existing rail corridor. Additionally, existing land uses beneath proposed Las	Alignment would operate within I-580, on aerial structure through an area where there is no existing community (vacant or industrial parcels), or	Agricultural resources in this alternative's study area around the Isabel/I-580 Station area have already been compromised. As a result, Alternative 2 would have a

Table 3.3–7
Comparative Land Use Impacts of BART Build Alternatives

Alternative	Land Use Compatibility	Physical Division of Existing Community	Premature Conversion of Agricultural Resources
	Positas elevated section are not sensitive. There are, however, potential incompatibility impacts because the Isabel/I-580 Station lies in the Livermore APA, a portion is outside the UGB, and residential uses adjacent to high-volume roadways need to be evaluated in accordance with the CARB guidelines. The elevated portion of this alternative would run through the proposed residential Arroyo Vista area; land use conflicts here would depend on the timing of the projects. At the time of project-level environmental review, if the area has not developed residentially, there would be no land use compatibility concerns.	within the existing UPRR right-of-way. Aerial alignment could impact future residential community associated with City of Livermore's Arroyo Vista Neighborhood Plan, but this plan has not built out and there is no established community currently.	limited impact on agricultural lands.
2a - Downtown-Vasco	The compatibility issues described for Alternative 1a apply to this alternative.	The community division issues described for Alternative 1a apply to this alternative.	Although this alternative would pass Important Farmlands along the portion of the alignment that runs along El Charro Road, it would not directly encroach into the Important Farmland-designated area due to its aerial configuration.
3 - Portola	Although the alignment adheres to existing corridors or is in a subway configuration, there is potential for significant compatibility impacts due to proposed location of the Portola/Railroad Yard, adjacent to a City-designated residential historic district.	Alignment would operate within I-580, in subway through an area where there would be potential for community division if the alignment were at or above grade (along Portola Avenue) or within the existing UPRR right-of-way. As a result, it is not expected that Alternative 3 would result in physical division of a community.	The agricultural conversion issues described for Alternative 2 apply to this alternative.

Table 3.3–7
Comparative Land Use Impacts of BART Build Alternatives

Alternative	Land Use Compatibility	Physical Division of Existing Community	Premature Conversion of Agricultural Resources
3a - Railroad	Although 3a follows the same alignment as the first stretch of Alternative 1a, compatibility impacts are considered potentially significant due to aboveground alignment through Downtown. The elevated profile could adversely affect sensitive Downtown land uses. Also, as noted under Alternative 3, there is potential for significant compatibility impacts associated with the Portola/Railroad Yard.	The community division issues described for Alternative 1a apply to this alternative. Elevated portions of this alignment through downtown could impact future land use and design efforts of the Livermore Downtown Specific Plan; however, there is not an established community that would be significantly divided.	The agricultural conversion issues described for Alternative 2a apply to this alternative.
4 - Isabel/I-580	Alignment compatibility impacts are limited because BART would operate in the I-580 median. Although future station area development may be restricted due to the Livermore APA, UGB restrictions, and CARB guidelines regarding residential development near high-volume roadways, this alternative would have the least compatibility impacts.	The alignment runs exclusively in the median of I-580, which already separates communities to the north and to the south. This alternative would not add substantially to this existing barrier.	The agricultural conversion issues described for Alternative 2 apply to this alternative.
5 - Quarry	Land use incompatibility impacts would be the same as those associated with the portion of Alternative 3a through the Isabel/Stanley Station. The distance of sensitive land uses in this station area from BART facilities and operations greatly reduces the potential for incompatibility impacts. This alternative would not extend further east toward Downtown Livermore and, thus, would not have the Downtown Livermore compatibility impacts identified for Alternative 3a.	The community division issues described for Alternative 1a apply to this alternative.	The agricultural conversion issues discussed for Alternative 2a apply to this alternative.

There is one sensitive receptor within this station area, a church about 0.25 miles west of the proposed Isabel/I-580 Station and approximately 0.17 miles south of I-580. This church is already affected by traffic volumes on I-580 and is separated from the Isabel/I-580 Station by Kitty Hawk Road. Furthermore, the church is surrounded by commercial and industrial uses. Accordingly, the Isabel/I-580 Station, its facilities, and operation would not create land use conflicts with this sensitive receptor.

The station footprint itself would be bisected by I-580, with the platform in the I-580 median and a pedestrian bridge connecting station elements on either side of I-580. The station would be accessed on the north side from a reconfigured Isabel Avenue, a Caltrans project currently in the planning stages. On the south side, the station would be accessible directly from Airway Boulevard. As a result, commuters would not be routed through or adjacent to residential areas on either side of I-580. Although the station could include multiple four- to six-level parking structures and surface lots on both sides of I-580, they would be compatible with the existing freeway-oriented built environment, which is composed primarily of large, business park-oriented commercial structures with large, surface parking lots.

The entire Isabel/I-580 Station footprint would be located within Livermore's Airport Protection Area (APA), as well as most of the station area. The Alameda County Airport Land Use Commission (ALUC) recognizes that certain land uses conflict with airports can reduce their functionality, safety, and overall economic viability. For that reason, as per Policy LU-4.4.P2 of the Livermore General Plan, intensification of existing land use, particularly residential land use, is prohibited within the APA. A BART station would not conflict with the APA or the Airport Land Use Plan (ALUP) provided that the small portion of the station footprint that lies within an airport safety zone (as defined in the ALUP) is used only for parking or circulation and does not present a hazard to air navigation as determined by the Federal Aviation Administration. Based on an initial assessment, the station footprint is not likely within the FAA-defined runway safety area, runway protection zone, or other FAA-defined areas on the ground. Because of the small and oddly configured portion of the station footprint within the local airport safety zone, it is expected that this area could only be used for access roads and surface parking, neither of which would conflict with the APA restrictions.

In accordance with BART's System Expansion Policy, if an alternative involving this station location were selected, the City of Livermore is anticipated to develop plans for transit-supportive land use and access in the vicinity of the BART station. This station area, according to Table 3.3-2, has about 167 acres of undeveloped land, 31 acres of agricultural lands, and 213 acres of open space. Future development plans would need to conform to the safety and land use compatibility provisions of the ALUP, which would restrict residential uses, as well as any applicable FAA-related requirements. For further discussion of safety zones associated with the Livermore Airport, see Section 3.12, Public Health and Safety. In addition, the California Air Resources Board (CARB) has identified potential health risks related to exposure to high concentrations of diesel particulate matter, as may be found along high-volume roadways. In these locations, which would include the Isabel/I-580 Station area,

residential uses within 500 feet of the roadway should be evaluated for potential health risks. Finally, the City has General Plan policies intended to protect areas outside the UGB and scenic views from I-580, which could affect the location and intensity of development around the Isabel/I-580 Station (see Section 3.5, Visual Quality). As a result, future TOD around the Isabel/I-580 Station may be constrained in its range of land uses and development intensities in order to comply with the ALUP, CARB, and City guidelines.

Isabel/Stanley Station Area. Approximately one half of this station area, including most of the area west of Isabel Avenue/State Route (SR) 84, is composed of land dedicated to quarries and resource management. Remaining land in the area west of Isabel Avenue is undeveloped. A single-family, residential neighborhood comprises the entire portion of the station area east of Isabel Avenue. Because the entire station footprint is located west of Isabel Avenue, it presents no immediate compatibility conflicts with the residences. Although the neighborhood would be adjacent to the station, it would be separated from the station by both Isabel Avenue, which is an existing major roadway, and a band of undeveloped open space that runs just east of the roadway through the entire station area. In addition, the edges of the neighborhoods that parallel Isabel Avenue and Stanley Boulevard are the "back sides" of the neighborhoods, and are inaccessible from any point along roadways within the station area. This orientation of the neighborhoods would effectively isolate the residential land from the station, as well as reduce the potential traffic impacts to those residences associated with vehicular access to the station.

There are two sensitive land uses within the station area, two public parks located within the residential neighborhood to the east. The larger and closer of the parks is 0.2 miles east of the Isabel/Stanley Station and about 0.21 miles south of the proposed alignment. The other park is located at the southern edge of the station area, just under 0.5 miles from the Isabel/Stanley Station footprint. Because these parks are in the interior of the residential neighborhood, they would neither be directly or indirectly affected by the BART station, its facilities, or operations.

In accordance with BART's System Expansion Policy, if an alternative involving this station location were selected, the City of Livermore is anticipated to develop plans for transit-supportive land use and access in the vicinity of the BART station. This station area, according to Table 3.3-2, has 175 acres of undeveloped land and 25 acres in open space. Future development plans would need to conform to the safety and land use compatibility provisions of the ALUP, which would restrict residential uses. For further discussion of safety zones associated with the Livermore Airport, see Section 3.12, Public Health and Safety. In addition, the portion of the station area that is west of Isabel Avenue and south of Stanley Boulevard is outside the South Livermore UGB and is designated as a mineral resource area (see Section 3.7, Geology, Soils, and Seismicity, for a further description of this mineral designation). Future TOD in this portion of the station area could only occur if the voters of Livermore approved a change to the UGB. If the expansion to the UGB accommodated land to the southwest, it is still unlikely that this area could be developed without conflicting with

existing mining activities. For these reasons, future TOD around the Isabel/Stanley Station would be constrained in its range of land uses and development intensities.

Downtown Livermore Station Area. The pattern of land use within this station area is one of community-oriented or village core commercial and mixed uses, surrounded by increasingly lower density residential uses. Established, single-family neighborhoods with associated public and community amenities dominate the outer portions of the study area. Much of the station itself would be developed as part of the existing Downtown Livermore ACE Station/Livermore Transit Center. As such, the station is considered generally compatible with the downtown area, increasing accessibility, bringing customers to surrounding businesses, providing commute options for downtown employees, and building on an existing commuter transit line. In addition, both the downtown area and surrounding residential areas have high potential for infill-based redevelopment and TOD, which would be consistent with a BART station in this area.

The above general compatibility assessment notwithstanding, there are a number of sensitive land uses within the Downtown Livermore Station area that could be adversely affected by the station. The outer portions of the station area contain four public schools, three public parks, and five churches. Because these sensitive land uses are not proximate to the station or alignment, land use compatibility impacts, or conflicts, would not be expected. On the other hand, Junction Avenue Middle School and a local church are located immediately across Junction Avenue from the station itself. These sensitive land uses are currently exposed to the traffic and noise associated with the downtown area, an ACE station, and a freight corridor; the introduction of a BART station would increase the level of activity in the Downtown area. The increase in activity would be consistent with the intent of the Livermore Downtown Specific Plan but those alternatives that call for the alignment and station to be elevated above ground could conflict with nearby residences and sensitive land uses.

In accordance with BART's System Expansion Policy, if an alternative involving this station location were selected, the City of Livermore is anticipated to develop plans for transit-supportive land use and access in the vicinity of the BART station. This station area, according to Table 3.3-2, has 8 acres of undeveloped land and 7 acres of open space. Higher intensity uses, particularly residential development, would be compatible with the nearby uses and is already proposed as part of the Livermore Downtown Specific Plan. This more intensive TOD would not be expected to conflict with the concentration of schools and churches in the vicinity. These uses are generally considered sensitive because of changes in the noise environment, and the TOD with its emphasis on using transit would contribute some, but not likely substantial, changes to the noise environment that would degrade the quality of these sensitive uses.

Portola/Railroad Maintenance Yard. The western portion of this yard is located in the Downtown Livermore Station area. The eastern end of the yard would be adjacent to the residences of Trevarno Road, a City-designated historical district. The activities and uses associated with a rail maintenance yard are considered potentially incompatible because they

could disturb the nearby residences (due to the hours of activity, noise, light and glare, and alteration to the visual setting) and have indirect physical effects (primarily alterations to the noise and visual environments) on the designated residential historic district.

Vasco Road Station Area. This station would be generally compatible with surrounding light industrial, vacant, and park land uses. Not only would a BART station increase accessibility to the light industrial and commercial uses north of the existing ACE line, but it would provide an additional commute option for employees of the Lawrence Livermore National Laboratory, located just south of the station site. The Brisa Neighborhood Plan encompasses the vacant lands within and north of the station footprint. A BART station at this location would be compatible with the moderate to high density residential uses proposed by the plan.

Vehicular access to the station would be provided from both an existing driveway extending west from Vasco Road and a driveway off Brisa Road. These primary access routes and associated driveways would not route vehicles through the existing residential area southwest of the station footprint.

Although a public park is located just west of this station area, the majority of the park is composed of a ballfield and BMX track. While these are both recreational uses, neither use is particularly noise- or vibration- sensitive, nor is either commonly utilized by the very young or the elderly. A second public park in the station area would be separated from the alignment by approximately one-half mile, with an established residential neighborhood in between. This distance and intervening development would buffer the park from adverse noise-related impacts and route traffic resulting from the proposed station away from the park. As such, incompatibilities with sensitive land uses are not likely to result from development of the Vasco Road Station.

In accordance with BART's System Expansion Policy, if an alternative involving this station location were selected, the City of Livermore is anticipated to develop plans for transit-supportive land use and access in the vicinity of the BART station. This station area, according to Table 3.3-2, has 97 acres of undeveloped land and 2 acres of open space. Higher intensity uses, particularly residential development, would be compatible with the nearby uses and is already proposed as part of the Brisa Neighborhood Plan. As noted above, this station area does not have land uses that would be sensitive to more intensive TOD.

Vasco Yard. This 52-acre maintenance yard would be surrounded by light industrial and utility-oriented land uses, as well as Lawrence Livermore National Laboratory directly to the south. These uses are generally compatible with the activities and impacts that would result from a BART maintenance yard. There are no sensitive land uses proximate to the footprint of this facility, so that the yard is not expected to result in land use conflicts or incompatibilities.

Greenville East Station Area. Fifty-four percent of the Greenville East Station area is devoted to agricultural land use. This land use dominates the eastern and northern portions of the station area and includes 250 acres of Williamson Act contracted land adjacent to the station

footprint. The presence and operation of a BART station would not conflict with the agricultural or open space grazing activities, although such uses are not supportive of transit uses or ridership. A BART station at this location would be compatible with the industrial and commercial uses in the western portion of the station footprint.

The station area is located in an area of existing transportation corridors, including I-580 and the UPRR. It would be accessed directly from Greenville Road. All parking, in the form of surface lots and garages, would be located in the open spaces east of Greenville Road. As a result, the Greenville East Station would not result in land use conflicts. Thus, this station would not result in direct land use compatibility impacts. In accordance with BART's System Expansion Policy, if an alternative involving this station location were selected, the City of Livermore is anticipated to develop plans for transit-supportive land use and access in the vicinity of the BART station, as it has already done for the previously targeted Greenville Station site on the north side of I-580. The station area, according to Table 3.3-2, has 25 acres of undeveloped land, 533 acres of agricultural lands, and 9 acres of open space. Much of the station area that is available to accommodate TOD lies outside the North Livermore UGB and is under Williamson Act contracts to preserve agriculture and open space. Modifications to the UGB to allow urban uses to the east would require voter approval and annexation of this unincorporated area. I-580 also traverses the station area, and CARB's guidelines regarding the sensitivity of residential development near high-volume roadways would need to be taken into consideration. Finally, the City has General Plan policies intended to preserve scenic views along I-580, Greenville Road, and Altamont Pass Road, which will affect the location and possibly the intensity of future station area development. For these reasons, future TOD around the Greenville East Station would be constrained in its range of land uses and development intensities.

Greenville Maintenance Yard. The entire footprint of this approximately 120-acre maintenance yard contains un-irrigated agricultural land, with the exception a small parcel of industry-oriented commercial land. Additionally, this yard is located within the City of Livermore's Greenville BART TOD Transitional Area, an area set aside for a BART station, maintenance yard, and associated mixed-use development. East of the maintenance yard footprint is unincorporated land used for agricultural and grazing activities. BART maintenance yard operations and activities would not be incompatible with these uses.

There is a church and public park located north of I-580 about 0.42 miles west of the maintenance yard site. Both of these are associated with the surrounding residential community, and they would be sufficiently removed and buffered from the Greenville Maintenance Yard and track leads such that they would not be adversely affected by activities and operations at the yard. Thus, the maintenance yard would not result in significant direct land use compatibility impacts. Indirect impacts from development pressure potentially leading to conversion of agricultural lands are discussed below under Impact LU-3.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including

modification of I-580 to accommodate high occupancy vehicle lanes. Land use compatibility impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts in regards to land use compatibility.

Alternative 1. The alignment configuration of this BART extension alternative would not result in significant land use compatibility impacts. This is because the majority of alignment sections would be located in the I-580 median, where transportation uses and operations define the existing conditions. In and around the elevated I-580 flyover section of this alternative, land uses along the alignment are generally not sensitive and would not be adversely affected by BART operations. The impact of this alternative related to land use incompatibility is therefore considered less than significant.

However, as noted in the above discussion of station areas, future TOD in support of BART stations at the Isabel/I-580 and Greenville East sites, in accordance with BART's System Expansion Policy, would not conflict with surrounding uses. However, intensification of the area would be difficult because it would need to conform to the safety and land use compatibility provisions of the ALUP, consider CARB's air quality guidelines, and comply with the City's scenic protection policies along I-580 and the North Livermore UGB initiative.

Alternative 1a. As would be the case with Alternative 1, the alignment of Alternative 1a would not result in significant land use compatibility impacts, since it would either be located in the I-580 median or follow existing rail corridors. Although this alternative would include an elevated section above El Charro Road, surrounding land uses are not sensitive and would not be adversely affected by BART operations. The Downtown Livermore Station would be developed on the existing Livermore ACE Station/Livermore Amador Valley Transit Authority (LAVTA) Livermore Transit Center, including an at-grade station platform adjacent to the existing ACE platform. As a result of this integrated design, the station would remain compatible with the existing pattern of downtown land uses. In addition, operation of a new BART station and associated infill-oriented TOD would be generally consistent with existing land use pattern in the station area. Although the introduction of a BART station would increase the frequency of trains and general level of activity in an area with numerous schools, churches and residences, potential impacts to these sensitive receptors would not result from the proposed station. The station would be consistent with and supportive of the City's TOD infill policies and the desire to increase activity in the Downtown Livermore area. Other potential impacts of the Downtown Livermore Station on surrounding sensitive land uses are assessed elsewhere this report, including Section 3.3, Visual Quality, Section 3.10, Noise, and Section 3.11, Air Quality. To conclude, the impact of this station with regard to land use incompatibility would be less than significant. The analysis of Greenville East Station's compatibility with existing land uses would be the same as described earlier under Alternative 1.

As noted in the above discussion of station areas, future TOD in support of BART station at the Downtown Livermore site, in accordance with BART's System Expansion Policy, would generally be compatible with existing Downtown land uses. Development around the Greenville East Station would not conflict with surrounding uses but would be difficult, because it would need to consider CARB's air quality guidelines, and comply with the City's scenic protection policies along I-580 and the North Livermore UGB initiative.

Alternative 1b. For the reasons cited under Alternative 1a above, the impact of Alternative 1b on land use compatibility is considered less than significant. Future TOD around the Downtown Livermore and Greenville East Station sites would have the same land use compatibility impacts as noted under Alternative 1a.

Alternative 2. Like the above alternatives, most of the Alternative 2 alignment would be in existing transportation corridors. However, it would contain an elevated section along Las Positas Road. Most of the lands along Las Positas Road are vacant or industrial, and there are no sensitive land uses (see Figure 3.3-2). It is noted, however, that the alignment would pass a single family residential subdivision in the southwest quadrant of Las Positas Road and First Street. The residential development is set back from Las Positas Road and screened partially by trees and the topography in the area, so that BART operations would affect this residential area but would not be expected to diminish the quality of the area. In addition, the City of Livermore has adopted the Arroyo Vista Neighborhood Plan in this stretch. The plan calls for medium to high density residential development. The BART alignment under Alternative 2 would cross through the western portion of the plan area. The aerial alignment would have potentially significant visual and noise impacts that would contribute to land use conflicts with this proposed residential area. Since the existing land uses would not be incompatible with an aerial guideway, Alternative 2 would not result in land use conflicts; the impact is considered less than significant. However, this analysis would be revisited depending on the status of development in the Arroyo Vista Neighborhood at the time of project-level environment review for a BART to Livermore extension.

Future development plans in support of the Isabel/I-580 Station site, in accordance with the BART System Expansion Policy, would have the same land use compatibility impacts as noted under Alternative 1. Future TOD around the Downtown Livermore Station would not be expected to conflict with existing uses and would have a less-than-significant land use compatibility impact.

Alternative 2a. For the reasons cited under Alternative 1a above, the land use compatibility impact of Alternative 2a is considered less than significant. Future development plans to support the Downtown Livermore and Vasco Road Stations, in accordance with the BART Expansion Policy, would not be expected to result in land use conflicts, since both of these areas contain a mix of land uses, and higher intensity TOD would be compatible with the existing uses.

Alternative 3. Like Alternatives 1a, 1b and 2a, this alternative would include the Downtown Livermore Station. Yet unlike those alternatives, Alternative 3 would include the Portola/Railroad Yard, which, as noted above, would be adjacent to the Trevarno Road residential historic district. As such, operation of Alternative 3 may disturb residences along Trevarno Road and adversely affect the setting of the historic district that has been adopted by the City. Given the proximity of the transit maintenance yard to a City-identified historic district, the impact of Alternative 3 is considered potentially significant. Further discussion of these impacts is presented in Section 3.3, Visual Quality; Section 3.6, Cultural Resources; and Section 3.10, Noise.

Future TOD in support of the Isabel/I-580 Station, in accordance with the BART System Expansion Policy, would not be incompatible with existing land uses but would be difficult as described earlier for Alternative 1. By contrast, future TOD around the Downtown Livermore Station is anticipated to be compatible with the existing uses in this area.

Alternative 3a. Like all other alternatives, Alternative 3a would primarily adhere to existing transportation corridors. However, Alternative 3a is different in that it would include an aboveground section (either retained fill or aerial) through Downtown Livermore. Although much of this elevated alignment would be proximate to commercial uses, there are nearby sensitive land uses, including residences, a church, a school and multiple recreational uses. The visual proximity, potential noise exposure, and level of activity associated with BART operations could collectively conflict with nearby multifamily residences and nearby sensitive land uses in and around this section of the alignment. In addition, as noted under Alternative 3 above, the Portola/Railroad Yard presents potential residential incompatibility issues in and of itself. As a result, the impact of Alternative 3a with regard to land use compatibility is considered potentially significant.

Future TOD in support of the Isabel/Stanley Station, in accordance with the BART System Expansion Policy, could pose possible land use conflicts because the area to the east is developed with single family residential units, which could be adversely affected by station-related activity and traffic. Future TOD to the north could not include residential uses because that area would be subject to the APA restrictions. Furthermore, the area to the south and west would be outside the South Livermore UGB and new urban uses would require voter approval. By contrast, future TOD around the Downtown Livermore Station is anticipated to be compatible with the existing uses in this area.

Alternative 4. Alternative 4 would be exclusively in the I-580 median and would provide only one new station, the Isabel/I-580 Station. The impact of this alternative on land use compatibility is considered less than significant. Future TOD to support the Isabel/I-580 Station would not conflict with existing uses but would be difficult as described earlier for Alternative 1.

Alternative 5. Alternative 5 would be in the I-580 median then, as is the case with Alternatives 1a, 1b, 2a, and 3a, run on an aerial structure above El Charro Road. As discussed

previously, neither of these configurations would result in significant land use incompatibility impacts. Alternative 5 would offer only one new station, the Isabel/Stanley Station. As noted in the above discussion of station area land use, the location of residences and parks in this station area is such that they would not be impacted by station development. For these reasons, the existing land use compatibility impact of Alternative 5 is considered less than significant. By contrast, future TOD around this station area would be constrained and could pose land use conflicts as described for Alternative 3a.

MITIGATION MEASURES. Mitigation Measure LU-1.1 would apply to Alternative 3a. Mitigation Measure LU-1.2 would apply to Alternatives 3 and 3a. These measures in combination with Mitigation Measure VQ-4.1, regarding lighting design, in Section 3.4, Visual Quality, and Mitigation Measure CR-1.1, regarding protection of historic resources and their setting, in Section 3.6, Cultural Resources, would reduce potential land use conflicts caused by the aerial Downtown Station and the Portola/Railroad Yard. In addition, adherence to the BART Facility Standards would reduce potential noise and light and glare concerns. Collectively, these measures would reduce the potential land use incompatibilities but it is not clear at this stage that such efforts would effectively reduce them to less than significant. For these alternatives, land use incompatibilities are conservatively considered to be potentially significant and unavoidable, at least until more site-specific and alignment-specific designs can be developed that consider more thoroughly the proximity of sensitive land uses. (PSU)

LU-1.1 *Develop Station Area Plans to Enhance Functional Relationships and Design Characteristics Between the Station Facilities and Surrounding Land Uses (Alternative 3a).* During project development, BART will work to site and orient station facilities in such a manner that reduces potential impacts to nearby sensitive land uses. Issues such as mass, noise, pedestrian and vehicular access, station architecture and materials, and landscaping shall be considered in developing the station plans.

LU-1.2 *Design the Portola/Railroad Maintenance Yard to Reduce Potential Land Use Conflicts with Surrounding Uses (Alternatives 3, 3a).* During the project-level planning and design phase, BART shall develop the maintenance yard to ensure efficient layout for maintenance and storage activities. In designing the layout, BART shall, to the extent feasible, avoid siting uses or activities that generate substantial noise, air emissions, and hazardous materials adjacent to residential and sensitive land uses, or provide a sufficient buffer to reduce adverse effects by maintenance yard operations on surrounding uses.

LU-2 Physical Division of an Established Community

For this discussion, the potential for extension alternatives to physically divide existing communities is analyzed. Division of established communities addresses the potential for a BART extension alternative to physically sever or interrupt the physical ties between parts of a community. For example, the introduction of retained fill to support a BART guideway

between residential areas that traditionally physically, socially, and economically interact would physically divide an established community. Following an assessment of each of the major facilities, each alternative is assessed individually.

Community Division due to the Proposed Stations and Maintenance Yards. Because the location and ultimate built form of stations and maintenance yards would determine, in part, the overall impact with regards to physical division of communities, and because each station is a shared element of at least two alternatives, an assessment of each of the stations and maintenance yards begins this analysis.

Isabel/I-580 Station Area. This station would be located entirely on undeveloped or open space land and would therefore not divide an established community. In addition, the residential community located in the southeast corner of the station area has already well defined boundaries and would not be affected by the Isabel/I-580 Station facilities.

Isabel/Stanley Station Area. This station would be located entirely on undeveloped or quarry land. Although it abuts a residential neighborhood, it would remain separate from that neighborhood due to SR 84, which already divides residential uses to the east and the station footprint and aggregate/water resource lands to the west. Therefore, this station would not physically divide a community.

Downtown Livermore Station Area. This station would be sited along an existing rail corridor in the commercial core of Downtown Livermore. This existing linear element already acts as a natural dividing feature, separating residential neighborhoods to the north and south. The Downtown Livermore Station would only reinforce this existing condition. Therefore, this station would not add a new physical division within the community.

Portola/Railroad Maintenance Yard. The yard site is defined by major transportation corridors to the north and south that already serve to divide this area east of Downtown Livermore into subareas. To the north, First Street is a major road, and to the south, the UPRR tracks are an existing boundary for uses on either side of the track. The introduction of the Portola/Railroad Yard would not divide an established community.

Vasco Road Station Area. This station would be located on light industrial and undeveloped land. The site is well defined by Patterson Pass Road on the south and Vasco Road on the west. The station site would require the acquisition of industrial parcels but would not physically divide or separate industrial uses that are functionally related as a community.

Vasco Maintenance Yard. This yard would be located in an area dominated by light industry and without residential land uses. The site is well defined by railroad tracks to the north and Patterson Pass Road to the south. The footprint of the yard would require acquisition of industrial parcels but they are not functionally related to the adjacent uses sufficiently to be considered a community. As a result, the Vasco Maintenance Yard would not result in the physical division of an existing community.

Greenville East Station Area. This station would be located entirely on industrial and undeveloped land. There are no residential or neighborhood-oriented land uses in the station area. Therefore, development of the station in and of itself would not physically divide an existing community.

Greenville Maintenance Yard. Although this yard would be located adjacent to a residential area, it would not physically divide that neighborhood. Rather, it would be located in an area that contains un-irrigated agricultural land and without a street network. As a result, the yard would not work to further divide an existing community.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Impacts related to division of established communities within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts in regards to division of established communities.

All BART Extension Alternatives. As described above, none of the BART extension alternative facilities (i.e., stations and yards) would physically divide an established community. Also, as noted in Impact LU-1, the portions of the BART extension alternatives that would operate in the median of I-580 or at-grade along existing rail lines would be within existing transportation corridors that already serve as physical barriers. The introduction of BART operations in these corridors would reinforce the separation, since the BART guideway would need to be grade separated and fenced; however, these corridors already exist.

The BART extension alternatives are most likely to introduce a significant new physical barriers, where the alignment would be above grade, either on retained fill or in an aerial structure (i.e., along El Charro Road under Alternatives 1a, 1b, 2a, 3a, and 5; along Los Positas Road under Alternative 2; along the UPRR through Downtown Livermore under Alternative 3a; and around the Greenville East Station or Yard under Alternatives 1, 1a, and 1b). For the reasons described below, the aerial portions of these alternatives would not physically divide an established community, and this impact is considered less than significant. There may be future communities that become established, based on adopted planning documents, but the potential for an adverse effect would depend on the alternative selected, the timing of future development, efforts made to functionally link plan areas on either side of the alignment, and the design of the guideway and the right-of-way.

- The aerial segment along El Charro Road under Alternatives 1a, 1b, 2a, 3a, and 5 would not adversely affect an established community since none exists. At the northern end, where the alignment would diverge from I-580, El Charro Road is the boundary between Livermore and Pleasanton. While uses on either side of El Charro Road are currently undeveloped, the area in Livermore is proposed to be a major retail destination area as part

of the El Charro Road Specific Plan. The area to the west in Pleasanton is proposed to also be retail and also house an auto mall, community park, and continuing care retirement community. These uses do not exist and are not physically integrated as a community. Further south along El Charro Road, the aerial alignment would run through the open ponds related to the quarry operations in the area. There are no businesses that function as a business district or residences, so that this stretch that is common to Alternatives 1a, 1b, 2a, 3a, and 5 would not pass through an established community.

- The aerial segment along Las Positas Road under Alternative 2 would pass through an area of Livermore that is predominantly devoted to commercial and industrial uses. There is a relatively large residential subdivision on the west side of Las Positas Road and north of First Street; however, this neighborhood is not linked to similar uses on the opposite sides of these roads. As a result, the aerial guideway along Las Positas Road would not divide this residential development. The aerial configuration would allow vehicular movement to continue below and across the alignment. The commercial and industrial uses on either side of Las Positas Road function independently and are not functionally integrated. Thus, an aerial structure along this corridor would not divide an existing community. While not an existing community, the Arroyo Vista Neighborhood Plan proposes residential development on vacant land between First Street and the SPRR tracks. This area would be traversed by the aerial guideway of Alternative 2. Depending on whether Alternative 2 is selected and when it might be developed (relative to the buildout of the plan area), this alignment could divide this community in the future. The relevant analysis at this stage, however, is whether the BART alternative would divide an existing established community, and since the Arroyo Vista Neighborhood Plan has not yet built out, the BART aerial guideway would have no effect. However, this analysis would be revisited depending on the status of development in the Arroyo Vista Neighborhood at the time of project-level environment review for a BART to Livermore extension.

- Under Alternative 3a, the alignment for BART service would be elevated above the ACE and freight trains that operate on the UPRR. Approaching the downtown from the west, the alignment would be on retained fill approximately 10 feet above the existing grade. Just west of P Street, the alignment would be supported on an aerial structure and the top of the BART tracks would be about 35 to 40 feet above the UPRR tracks. The Downtown Livermore Station under this alternative would be directly above the ACE station. The aerial structure would continue to nearly Gardella Plaza. The aerial configuration and station between P Street and Gardella Plaza would further divide the areas of Downtown Livermore north and south of the tracks. Physical connections on north-south running streets, such as North Livermore Avenue, would be maintained; however, because of the street layout, the actual connectivity between the northern and southern sides of the tracks is already restricted. The aerial alignment would make it more challenging to accomplish the goals for the Downtown Neighborhood – North Side as articulated in the Livermore Downtown Specific Plan. Depending on whether Alternative 3a is selected and when it might be developed (relative to the buildout of the Downtown Neighborhood – North Side),

this alignment could divide this community in the future. As noted above, the relevant analysis at this stage, however, is whether the BART alternative would divide an existing established community; the retail uses north of the tracks have little connection, physically or economically, with the retail, entertainment, and warehouse uses south of the tracks, where the core of the downtown Livermore is. Traffic between the areas is already restricted to P, L, and Livermore Streets. While the aerial guideway would be visually prominent as described in Section 3.5, Visual Quality, the elevated alignment associated with Alternative 3a would not be expected to significantly divide an established community.

- Under Alternatives 1, 1a, and 1b, the alignment would cross over I-580 to connect the Greenville East Station on the south side with the Greenville Maintenance Yard on the north side. There is no existing or proposed community in this area that would be adversely affected or divided by the aerial configuration for these alternatives.

Given the above conditions and the lack of adverse impacts associated with proposed BART facilities, the impact of all nine build alternatives with regard to the physical division of established communities is less than significant.

LU-3 Premature Conversion of Important Farmland or Land under a Williamson Act Contract

Large portions of the study area are located in primarily urbanized, incorporated areas of Dublin, Pleasanton, and Livermore. In these areas, the project alternatives would not impact agricultural resources. In those areas where impacts to agricultural resources could occur, the potential for such impacts could be either direct or indirect. A direct impact would result from the siting of a BART extension alternative facility on land considered an agricultural resource; indirect impacts could result from the siting of a BART facility near such resources, which could result in development pressure to convert nearby agricultural land. As seen in Figure 3.3–3, no BART station or maintenance facility would be placed directly on lands designated as Important Farmland or in a Williamson Act land contract. However, the station areas around each of the five stations extend generally one-half mile, which would encompass agricultural lands near the Isabel/I-580 and Greenville East Stations.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Impacts on Important Farmland or land under a Williamson Act contract within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts in regards to Important Farmland and Williamson Act contracts.

Alternative 1 – Greenville East. This study area around this alternative contains a total of 325 acres of unincorporated agricultural resources. The majority of these resources are in the

form of 250 acres of non-prime, currently inactive Williamson Act-contracted property, located adjacent to the eastern edge of the footprint of the Greenville East Station. These 250 acres, 56 of which are currently in non-renewal, represent 0.02 percent of the 140,500 total acres of Williamson Act contracted property in Alameda County. Because physical development of this alternative would not directly encroach on Important Farmlands or Williamson Act lands, it would therefore not result in the direct conversion of agricultural resources.

However, both the Isabel/I-580 Station area and Greenville East Station area include agricultural resources that could be *indirectly* converted to urban uses by future development pressures and by the benefits of being near a BART station. The Isabel/I-580 Station area contains lands designated as Prime Farmlands. The possible conversion of these lands for urban uses to take advantage of BART would only occur if the City of Livermore were to encourage and approve the development. The area near the Isabel/I-580 Station has already been designated for residential and light industrial uses in the Livermore General Plan. Thus, this area is already slated for urban development, is near the proposed Isabel/I-580 interchange, and is already bound by residential uses to the east, industrial lands to the south and west, and East Airway Boulevard and I-580 to the north. Given these conditions, the Isabel/I-580 Station would not significantly accelerate conversion of this land from agricultural activities.

The 250 acres of Williamson Act land in the Greenville East Station area could be at risk of indirect conversion due to the potential for TOD near this station. However, more than three-fourths of the Greenville East Station area lies outside the city limits of Livermore and outside the UGB. The station itself could be considered a permitted governmental or utility use and could be built outside the UGB. Additionally, it is noted that County Land Use Policy 86, which generally prohibits cancellation of Williamson Act contracts for non-agricultural uses, contains an exception allowing for public facility uses, which would include the BART to Livermore Extension. However, related TOD around this station would require extension of the UGB, which could only occur with voter approval as explained in Impact LU-1. Moreover, development of this area would be contingent on the City Council supporting urbanization of this area, which would also require cancellation of Williamson Act land contracts, annexation, and extension of urban water and wastewater services. Property owners with Williamson Act land contracts electing to file for non-renewal of the contracts would initiate a final 10-year contract term, during which the land would remain undeveloped, but could be developed at the end of this period. Alternately, Williamson Act landowners could petition to cancel their contract(s). This requires cancellation fee equal to 12.5 percent of the unrestricted fair market value of the property. To approve tentative contract cancellations, Alameda County would have to present specific findings that are supported by substantial evidence.

Thus, the selection of Alternative 1 could indirectly result in City plans that could affect Williamson Act lands, prompting property owners to file for non-renewal. If this were to occur, the City would need to conduct its own environmental review to assess the physical environmental effects of developing lands around the Greenville East Station, including the

potential loss of known agricultural resources. Because of the accessibility afforded by a Greenville East BART Station, nearby agricultural lands could be converted. Given the number of steps that must occur, it is not clear that agricultural land conversion would necessarily be premature; however, for the purposes of this Program EIR, this indirect impact of Alternative 1 is conservatively considered potentially significant. This impact will be examined again when a project-level environmental document is prepared.

Other agricultural resources in the Alternative 1 study area include a single, isolated 20-acre parcel of Prime Farmland adjacent to the footprint of the Isabel/I-580 Station and a 55-acre pocket of non-prime, currently inactive Williamson Act land at the convergence of I-580 and Las Positas Road. Due to proximity to existing infrastructure, general isolation of these areas, and their small size, these resources are already of compromised value and at risk of conversion; therefore, the premature conversion of these lands would not be considered a significant impact of the alternative.

Alternative 1a – Downtown-Greenville East via UPRR. Beyond the 250 acres of agricultural resources described under Alternative 1 for the Greenville East Station, the study area for this alternative contains about 25 acres of agricultural resources, in the form of a small cluster of Prime Farmland, located south of I-580 and just east of El Charro Road. The aerial portion of this alignment would cross above a small, nine-acre parcel of this cluster, which is owned by Jamieson and intended for gravel quarry uses. All of this land is located outside of any station area, is currently un-irrigated and isolated, and is proposed for quarry activities. Because the 250 acres of agricultural resources around the Greenville East Station could be indirectly at risk of conversion due to future development that could occur around the station (as described above for Alternative 1), Alternative 1a would have a potentially significant impact related to the indirect conversion of existing agricultural resources.

Alternative 1b – Downtown-Greenville East via SPRR. Similar to Alternatives 1 and 1a, the 250 acres of Williamson Act-contracted land in the Greenville East Station area would be at risk of conversion to non-agricultural uses under Alternative 1b. As a result, this alternative would likewise have a potentially significant impact related to the indirect conversion of existing agricultural resources.

Alternative 2 – Las Positas. Like Alternative 1, the Alternative 2 study area contains a 20-acre parcel of Prime Farmland adjacent to the Isabel/I-580 Station and intersects a 55-acre cluster of non-prime Williamson Act land located at Las Positas Road/I-580. The first area is immediately adjacent to the I-580 and surrounded by urban development, and the latter area is located outside of a station area and is already intersected by I-580. Therefore, these resources are already compromised for agricultural use and subject to development pressure, a situation that would not be exacerbated further by this alternative. Thus, the impact of Alternative 2 on existing agricultural resources is considered less than significant.

Alternative 2a – Downtown-Vasco. The approximately 5,000-acre Alternative 2a study area contains less than 25 acres of agricultural resources; this Prime Farmland is south of I-580 and

east of El Charro Road, and is the same area targeted for quarry activities as described under Alternative 1a. The Vasco Road Station area contains no agricultural resources. As such, the impact of Alternative 2a on agricultural resources is considered less than significant.

Alternative 3 – Portola. Agricultural resources within the Alternative 3 study area are limited to the single, non-operational 20-acre parcel of Prime Farmland adjacent to the footprint of the Isabel/I-580 Station and immediately south of I-580. As explained above for Alternative 2, this land is already compromised for agricultural production. Consequently, the impact of Alternative 3 on agricultural resources would be less than significant.

Alternative 3a - Railroad. Agricultural resources in the Alternative 3a study area are limited to the 25 acres of Prime Farmland described under Alternatives 1a, 1b, and 2a near El Charro Road. Therefore, the impact of Alterative 3a related to the conversion of agricultural resources is considered less than significant, the same as for Alternatives 1a, 1b, and 2a. The Isabel/Stanley and Downtown Livermore Station areas contain no agricultural resources.

Alternative 4 – Isabel/I-580. Alternative 4 is similar to Alternative 3 in terms of proximity to agricultural resources. Thus, for the same reasons as described for Alternative 3, the impact of Alterative 4 related to the conversion of agricultural resources would be less than significant.

Alternative 5 – Quarry. This alternative follows the same route as Alternative 3a, but terminates just beyond Isabel Avenue and only includes the Isabel/Stanley Station. As with Alternative 3a, no agricultural land would be converted under this alternative. Therefore, the impact of Alterative 5 related to the conversion of agricultural resources is considered less than significant.

MITIGATION MEASURES. Potentially significant impact to agricultural resources would occur with Alternatives 1, 1a, and 1b. The loss would be an indirect effect of the Greenville East Station, the development of which could spur related development in the immediate vicinity. Such development would not be approved by BART but would occur only with the approval by the City, which would need to modify the UGB and annex adjacent lands. These actions and the proposed development around the station would require environmental review at which time the loss of agricultural resources would need to be mitigated. At this stage, sufficient information is not available at the program-level to develop mitigation that would reduce above impacts to a less-than-significant level, and it is uncertain that the UGB would be modified by the voters to allow conversion of agricultural lands for TOD. Therefore, for purposes of this Program EIR, the impacts related to the indirect conversion of Williamson Act land are considered potentially significant and unavoidable. (PSU)

LU-4 Consistency with Local Land Use Policy

As noted earlier in this section, California Government Code exempts BART from complying with local land use plans, policies, and ordinances. Nevertheless, for informational purposes

and consistent with BART's policy goal of coordinating system expansion with local land use planning, consistency with local plans is discussed in this section.

Due to their proximity to one another, all nine extension alternatives can be evaluated with respect to land use regulations of the County of Alameda and the cities of Livermore, Pleasanton, and Dublin. The consistency analysis of these regulations applies to all nine extension alternatives. Localized or specific land use policies that would only apply to certain alternatives are assessed individually below.

Applicable Policies under Consideration. The following analysis includes a discussion of the consistency of the extension alternatives with local General Plans, land use and trail proposals, and the UGB. Consistency with other regulations such as those of the Livermore Municipal Airport is reviewed in Section 3.12, Public Health and Safety.

General Plan Policies. The BART extension alternatives are consistent with transit and TOD policies in both the County General Plan and the General Plans of all three cities. All of these documents contain goals, policies, and/or programs to increase investment in and use of public transit; create balanced, multi-modal transport systems; decrease traffic via public transit options; and/or encourage TOD. In particular, the East County Area General Plan contains specific policies in support of a BART extension along the I-580 corridor to Livermore (Transportation Policies 203-206); the Pleasanton General Plan contains a program to encourage connectivity between BART and ACE (Transportation Program 18.3); and the Livermore General Plan both encourages a BART extension into the City and establishes the Greenville BART TOD Area (Land Use, Section H), which is an area targeted for future BART-oriented housing. The area designated for the Greenville BART TOD is on the north side of I-580 and is approximately where the Greenville Yard is proposed.

Additionally, both the East County Area Plan and Livermore General Plan contain policies aimed at the protection of agricultural resources, including Important Farmland and parcels under Williamson Act contracts. Examples include East County Area Plan, Land Use Policy 71, which targets the conservation of Prime soils, and Land Use Policy 86, which prohibits the cancellation of Williamson Act contracts except for public facility uses. Livermore General Plan Open Space and Conservation Goal OSC-3 targets the general protection of agricultural open space in the City of Livermore planning area. As explained under Impact LU-3, above, there are 250 acres of non-prime, Williamson Act-contracted property in the Greenville East Station area, all of which would be at potential risk of premature conversion due to expected development pressure around the transit station. Alternatives 1, 1a, and 1b, all of which would include the Greenville East Station, could trigger development that would be considered inconsistent with the above agricultural policies but supportive of the earlier transit-oriented development policies. In this instance, the City will consider the tradeoffs of adjusting the UGB, extending urban services, and promoting transit-oriented development or protecting an important productive resource. Finally, the Livermore General Plan contains policies intended to protect scenic views, resources, and corridors. While these policies would not pertain to

BART facilities, they would guide and influence TOD that might be associated with the BART to Livermore Extension stations. These policies and the designated corridors are discussed in detail in Section 3.5, Visual Quality.

Urban Growth Boundaries (UGB). Both the Alameda County and City of Livermore General Plans include UGBs intended to contain urban development within certain areas and limit such development outside those areas (see Figure 3.3–4). The nine BART extension alternatives would extend beyond the County and Livermore UGBs in three places. The consistency of each of the alternatives with the UGBs is described below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Impacts related to policy consistency associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts in regards to inconsistency with local land use policy.

Alternative 1 – Greenville East. A portion of the Isabel/I-580 Station area lies outside the City of Livermore UGB; the station itself would be within the city limits and UGB. The Greenville East Station area would be located just east of both the Alameda County and City of Livermore UGBs. Development of the station itself could occur outside the UGB, since the North Livermore UGB initiative allows governmental and utility uses to be constructed when they are needed to serve the area. However, expansion of the UGB, especially at the Greenville East Station, would be required to accommodate TOD to support the station. Both the modification of the UGB and annexation would need to follow established procedures by the City, the County, and the Local Agency Formation Commission. Each agency would need to perform necessary planning studies and conduct environmental review to determine the merits of such a change in the boundaries. The ultimate outcome is speculative at this point and it is not even known at this stage if this alternative would be selected. In the absence of the public vote and the requisite planning and environmental review documentation that may provide justification for the boundary changes, indirect effects of Alternative 1 related to station area development is considered potentially inconsistent with both Alameda County and City of Livermore UGB policy.

The General Plan designates the Greenville Yard for TOD. However, the Greenville Yard would not support the planned TOD at the site, and the yard itself would displace the TOD that was planned for the yard site. The TOD that the City planned for that location could be relocated elsewhere (e.g., around the Greenville East Station) and, if outside the UGB, would require modification of the UGB.

This alternative may also be inconsistent with a series of proposed trail improvement projects. The proposed Altamont Creek Trail is located within the Greenville Yard, the proposed Iron Horse Trail alignment bisects the Greenville East Station site, and the proposed Cayetano

Creek Trail follows the eastern boundary of the Isabel/I-580 Station site. All of these trails could be affected by the maintenance yard or station development. The widening of the Caltrans right-of-way associated with Alternative 1 is also considered inconsistent with numerous trail proposals, including the proposed Arroyo Seco Trail, proposed Cayetano Creek Trail, proposed Las Colinas Road/Lassen Road Trail and proposed Las Positas Trail.

Alternative 1a – Downtown-Greenville East via UPRR. Alternative 1a would extend beyond both the Alameda County and City of Livermore UGBs for approximately two miles, where it follows El Charro Road between I-580 and the UPRR tracks. This is not considered an inconsistency, because this section of alignment would be in an aerial structure above primarily privately-owned, quarry land. As such, there is little or no potential for a resulting increase in surrounding development and subsequent loss of open space.

In the portion of the alignment that runs along El Charro Road, the City of Pleasanton is proposing new development and modifications to El Charro Road as part of its Staples Ranch Specific Plan. Based on the preliminary alignment drawings, this alternative would run in an aerial configuration past the auto mall and the retail center planned along the frontage of El Charro Road and above the lane and intersection improvements envisioned for the roadway itself. Because the alignment drawings are not precise, there is a potential for this alignment to interfere with these proposals.

Also, because this alternative would include the Greenville East Station, for the reasons cited under Alternative 1, indirect effects of this alternative related to station area development are considered potentially inconsistent with both the Alameda County and City of Livermore UGB policy. The General Plan designates the Greenville Yard for TOD. However, like Alternative 1, the Greenville Yard would not support the planned TOD at the site, and the yard itself would displace the TOD that was planned for the yard site. The TOD that the City planned for that location may be relocated elsewhere and, if outside the UGB, would require modification of the UGB.

This alternative would also follow the alignment of several proposed trails, including the Arroyo Mocho Trail and Vasco Station trail connection designated by the City of Livermore, as well as the regional Iron Horse Trail. The proposed Arroyo Seco Trail crosses Alternative 1a east of North Mines Road. The creek is in a culvert below existing trackage; this culvert is not adequate to include a trail. Proposed segments of the regional Iron Horse Trail are bisected by the Downtown Livermore Station and Greenville East Station sites. While the actual station at Downtown Livermore is elevated under Alternative 1a, station area development could potentially impact the trail. In addition, the proposed Altamont Creek Trail is bisected by the Greenville Yard. This would be considered an inconsistency with proposed trail plans.

Alternative 1b – Downtown-Greenville East via SPRR. Like Alternative 1a, Alternative 1b would extend beyond both County and City UGBs between I-580 and Isabel Avenue, on an aerial structure over private quarry land. As noted, this is not considered inconsistent with UGB policy. Also, as with Alternatives 1 and 1a, the effect on the City of Pleasanton's Staples

Ranch Specific Plan and indirect effects of this alternative related to development around the Greenville East Station would be considered potentially inconsistent with both Alameda County and City of Livermore UGB policy. In particular, the General Plan designates the Greenville Yard for TOD, but the Greenville Yard would not support the planned TOD at the site, and the yard itself would displace the TOD that was planned for the yard site. The City could choose to relocate the TOD allocated for the yard site and, if outside the UGB, would require modification of the UGB.

Like Alternative 1a, this alternative is potentially inconsistent with proposed trail projects, with the exception of the Vasco Station trail.

Alternative 2 – Las Positas. The Alternative 2 alignment would either skirt, or be contained within, both County and City UGBs. Most of the Isabel/I-580 Station area would within the UGB; however, the eastern portion of the station area north of I-580 is outside the UGB and future TOD development in this area would require a modification of the UGB and related actions by the voters, the City, and LAFCO. The Vasco Road Station would be within the UGB. For these reasons, Alternative 2 and related station area development would be more consistent with the Alameda County and City of Livermore UGB policy than the preceding alternatives, although this alternative in the eastern portion of the Isabel/I-580 Station area would face potential conflicts with UGB policies similar to those described for this station under Alternative 1.

However, due to the proposed I-580 and Las Positas segments of this alignment, Alternative 2 may conflict with development of the proposed Cayetano Creek Trail and proposed segments of the Las Positas Trail. Additionally, the proposed Patterson Pass Road Trail is bisected by the Vasco Road Station site and the proposed Cayetano Creek Trail follows the eastern boundary of the Isabel/I-580 Station site.

Alternative 2a – Downtown-Vasco. Like Alternatives 1a and 1b, Alternative 2a would extend beyond both County and City UGBs between I-580 and Stanley Avenue, on an aerial structure over private quarry land. As noted for those alternatives, this is not considered inconsistent with UGB policy. No other elements of Alternative 2a extend beyond either UGB. Thus, Alternative 2a and related station area development would be consistent with both Alameda County and City of Livermore UGB policy.

As is the case with Alternative 1a, Alternative 2a is also potentially inconsistent with the City of Pleasanton's Staples Ranch Specific Plan and with various proposed trail development plans, with the exception of those trails that would intersect the Greenville East Station and Greenville Yard. In addition, the proposed Patterson Pass Road Trail would be bisected by the Vasco Road Station site, resulting in potential future trail policy conflicts.

Alternative 3 – Portola. The alignment for Alternative 3 is identical to Alternative 2 with respect to the UGB. For the same reasons as identified for Alternative 2, Alternative 3 and related station area development would be consistent with both Alameda County and City of

Livermore UGB policy, except for the eastern portion of the Isabel/I-580 Station area north of I-580.

As noted, portions of the alternatives associated with a proposed widening of I-580 may conflict with development of the proposed Cayetano Creek Trail. In addition, the Cayetano Creek Trail would follow the eastern boundary of the Isabel/I-580 Station site, thus increasing the potential for inconsistency between Alternative 3 and the trail.

Alternative 3a - Railroad. The southern portion of the Isabel/Stanley Station would extend beyond the UGB. Similar to the discussion for the Greenville East Station for Alternatives 1, 1a, and 1b, the City would need to adjust the UGB (following voter approval) and annex the unincorporated land in order to allow station area development to be constructed in this area. The area south of the Isabel/Stanley Station is part of the Chain of Lakes area and designated in the General Plan for Water/Resource Management. As explained in Section 3.7, Geology, Soils, and Seismicity, this area is part of a significant mineral resource area and its loss would be a significant and unavoidable impact. Thus, opportunities to expand the station area to the south to accommodate development potential would be highly limited. In the absence of the public vote and the requisite planning and environmental review documentation that may provide justification for the boundary changes, construction of the station facilities and the indirect effects of Alternative 3a related to station area development are considered potentially inconsistent with both Alameda County and City of Livermore UGB policy.

As noted for other alternatives that follow El Charro Road, Alternative 3a may conflict with the City of Pleasanton's Staples Ranch Specific Plan. This alternative also follows the alignment of several proposed trails, including the City of Livermore's Arroyo Mocho Trail and a segment of the proposed regional Iron Horse Trail. The proposed Arroyo Mocho Trail follows the northern boundary of the Isabel/Stanley Station site that also bisects the existing Stanley Boulevard Trail. Proposed segments of the regional Iron Horse Trail are bisected by the Downtown Livermore Station and border the Portola/Railroad Yard. While the actual station at Downtown Livermore is elevated under Alternative 3a, station area development could potentially impact the trail. This is considered a policy-based inconsistency.

Alternative 4 – Isabel/I-580. The alignment for Alternative 4 is identical to Alternatives 2 and 3 with respect to the UGB. For the same reasons as identified for those alternatives, Alternative 4 would be largely consistent with both Alameda County and City of Livermore UGB policy.

As noted, the proposed Cayetano Creek Trail would follow the eastern boundary of the Isabel/I-580 Station site, thus increasing the potential for inconsistency between Alternative 4 and the proposed trail.

Alternative 5 – Quarry. This alternative follows the same route as Alternative 3a, but terminates just beyond Isabel Avenue and only includes the Isabel/Stanley Station. As such, this alternative would likewise extend beyond the UGB at the Isabel/Stanley Station. For

reasons presented under Alternative 3a, Alternative 5 would be potentially inconsistent with the UGB policy. Alternative 5 may also conflict with the City of Pleasanton's Staples Ranch Specific Plan.

Like Alternative 3a, this alternative follows the alignment of several proposed trails, including the City of Livermore's Arroyo Mocho Trail, which follows the northern boundary of the Isabel/Stanley Station site. Alternative 5 also follows a segment of the proposed regional Iron Horse Trail. As a result, the alternative is considered inconsistent with proposed trail improvement projects.

Effects of UP Commuter Access Principles

Adherence to the UP Commuter Access Principles would shift Alternatives 1a, 1b, 2, 2a, 3, and 3a north of the UPRR ROW. The additional right-of-way that would be needed to accommodate the BART extension would be approximately 36 feet, running 1.7 miles from Murrieta Boulevard to First Street and then about 3,500 feet east of Mines Road.

Land Use Compatibility. The shift of the BART alignment to the north would involve additional land use acquisition (see Section 3.4, Population and Housing), bring BART activity and noise closer to the sensitive schools and churches in the downtown area and disrupt local circulation and traffic patterns. These effects collectively would diminish the quality and character of the land uses north of the UPRR right-of-way to a greater extent than if BART could use the UPRR right-of-way.

Division of an Established Community. The introduction of this additional transportation corridor as a result of compliance with the UP principles would further reinforce the existing division between areas of Livermore that are north and south of the tracks. However, the existing UP tracks already divide the City, and neighborhoods and districts on either side of the tracks already recognize the tracks as a physical barrier/area boundary. Accordingly, the introduction of BART along the north side of the existing UPRR ROW would not result in a significant impact with respect to dividing an existing community. Compliance with the UP principles could, however, require land acquisition and displacement that could detract from established communities. This potential impact is acknowledged in Section 3.4, Population and Housing.

Consistency with Local Plans. Adherence to the UP Commuter Access Principles would shift this BART extension alternative north of the UPRR ROW. As a result, compliance with the principles could cause a conflict with the Livermore Downtown Specific Plan by converting a proposed redevelopment/residential transition area along the north side of the UPRR right-of-way to BART operations.

Cumulative Analysis

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed project. A cumulative impact assessment analyzes the collective impacts of individual land use plans and projects. Cumulative impacts can result from

individually minor, but collectively substantial impacts taking place over an extended period of time. The geographic context for the cumulative land use analysis includes foreseeable future development along the six corridors where the BART extension alternatives are proposed. These corridors include I-580, the UPRR right-of-way, the SPRR right-of-way, Las Positas Road, Portola Avenue, and El Charro Road. The geographic context also includes areas surrounding the proposed stations and yards. However, it should be acknowledged that potential cumulative impacts for the BART to Livermore Extension Program would primarily occur in combination with projects in and around Livermore – the jurisdiction most traversed by the proposed BART extension alignments – and the East County Area of unincorporated Alameda County, where alignment alternatives are proposed along El Charro Road.

Foreseeable development to be analyzed under this cumulative analysis includes development proposed by the East Dublin Specific Plan for the City of Dublin, Stoneridge Drive/Staples Ranch Specific Plan for the City of Pleasanton, the El Charro Specific Plan, Downtown Specific Plan, Arroyo Vista Neighborhood Plan, the Brisa Neighborhood Plan for the City of Livermore, as well as the City of Livermore General Plan.

This cumulative analysis considers whether the BART extension alternatives, along with reasonably foreseeable growth under local General Plan, Specific Plans, and Neighborhood Plans, would result in land use conflicts, physically divide an existing community, or result in the premature conversion of existing agricultural resources.

LU-CU-5 Incompatibility with Surrounding Land Uses due to Cumulative Effects

The physical locations of the planning areas considered under the cumulative scenario, relative to both one another and the proposed BART extension alternatives, minimize the potential for significant cumulative land use incompatibility impacts. First, there is no geographical continuity among the specific and neighborhood plan areas considered in the cumulative scenario; the planning areas associated with each are isolated from one another either by distance or, as in the case of the East Dublin Specific Plan, El Charro Specific Plan and Stoneridge Drive/Staples Ranch Specific Plan, by a major highway or transportation corridor (see Figure 3.3-4). Development of each plan would not only adhere to regulations and zoning requirements designed to promote compatibility, but would occur in non-contiguous areas of land use that minimize the potential for combined incompatibility impacts.

Second, the BART to Livermore Extension Program would not contribute to cumulative land use incompatibility impacts associated with the East Dublin Specific Plan, Stoneridge Drive/Staples Ranch Specific Plan, and El Charro Specific Plan. This is because proposed project alignments would adhere to the same transportation corridors that currently form boundaries between the plan areas themselves. No proposed station areas or yards—those areas in which land use changes are likely to occur—would be located proximate to these plan areas. Likewise, the relationship of the BART to Livermore Extension Program and Arroyo Vista Neighborhood Plan would be restricted to Alternative 2, which calls for a single aerial structure through the planning area. Under this alternative, there would be no

station facility or maintenance yards, whose impacts could cumulate with those from development in the Plan Area.

Proposed station areas would intersect the Downtown Specific Plan and Brisa Neighborhood Plan areas. However, as described under "Applicable Policies and Regulations," earlier, land uses associated with a major transit district are assumed already by the Downtown Specific Plan. Development of the Brisa Neighborhood Plan would be characterized by residential uses on vacant land surrounded by industrial uses. While this plan may result in land use compatibility impacts in and of itself, TOD associated with the proposed Vasco Road Station and the station itself, acting as a possible catalyst, could gradually cause land uses to shift from industrial to residential and commercial uses through General Plan amendments and rezonings. The cumulative effect would be increased compatibility among area land uses.

Therefore, due to the physical separation of the cumulative scenario project locations, the limited intersection of the majority of those projects with the proposed BART to Livermore Extension Program, and the complementary land use strategies of the two cumulative projects with which the proposed program would intersect, the BART to Livermore Extension Program would not be expected to contribute to cumulative impacts related to land use incompatibility. In the future, during the project-level review, this impact would be revisited to understand the cumulative effects of the selected BART alignment alternative, the possible station area development, and the other foreseeable development and plans at that time.

LU-CU-6 Physical Division of an Established Community due to Cumulative Impacts

The community development strategies of the General Plans, specific plans, and neighborhood assessed in this cumulative analysis already account for the infrastructure on which the extension alternatives would be routed; in most cases, this infrastructure forms the boundaries of those plan areas. As a result, these plans do not include policies or growth that further divide local communities that exist on either side of existing roadways or railroad tracks. Although sections of the alignment alternatives would intersect the Livermore Downtown Specific Plan area, the development strategy of that Plan calls for a transit center and TOD. As a result of the manner in which the planning areas that constitute the cumulative scenario were established, foreseeable growth associated with those plans would not result in community division that could cumulate with those of the BART extension alternatives, and there would be no cumulative impact.

LU-CU-7 Premature Conversion of Important Farmland or Land under a Williamson Act Contract due to Cumulative Effects

Over the last three decades, land use in Alameda County has experienced, and continues to experience, the conversion of agricultural land to urban uses. According to the California Department of Conservation, Alameda County lost 18,168 acres of agricultural land from

1984-2008, including 5,180 acres of Important Farmland.[8, 9] From 2006 to 2008 alone, 3,499 acres of agricultural land was committed to non-agricultural uses, including 287 acres of Important Farmland.10 The total acreage of urbanized land in the County is expected to increase from 141,654 acres (2002) to 186,683 acres by the year 2030. Given the historic loss of agricultural land and Important Farmland in the County, and given that there would be a continuing increase in urbanized land into the future, there is a current substantial loss of Important Farmland or land under a Williamson Act contract. As explained under Impact LU-3, operation of the Greenville East Station under Alternatives 1, 1a, and 1b would result in adverse effects associated with the indirect conversion of 250 acres of Williamson Act contracted land that could result from station area development. The indirect loss of 250 acres would constitute a cumulatively considerable contribution to the current existing problem related to a substantial loss of Important Farmland or land under a Williamson Act contract. Conversely, Alternatives 2, 2a, 3, 3a, 4, and 5 would not include the Greenville East Station. The agricultural resources surrounding these alternatives are in the form of small, isolated pockets that are already compromised by the existing infrastructure. For these reasons, Alternatives 2, 2a, 3, 3a, 4, and 5 would not contribute to cumulative impacts.

Given the above discussion, Alternatives 1, 1a, and 1b would indirectly have a cumulatively considerable contribution to the current existing problem related to a substantial loss of Important Farmland or land under a Williamson Act contract.

MITIGATION MEASURE. There is no mitigation that would avoid or adequately reduce the indirect loss of agricultural lands resulting from Alternatives 1, 1a, and 1b, and so these alternatives would have a significant and unavoidable cumulative impact. (SU)

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[8] California Department of Conservation, Alameda County *1984 – 2008 Land Use Summary*, http://redirect.conservation.ca.gov/DLRP/fmmp/pubs/1984-Present/ala_1984-Present.xls, accessed March 15, 2009.

[9] The California Department of Conservation includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance as "Important Farmland."

[10] California Department of Conservation, *Alameda County 2004-2006 Land Use Conversion, Table A-1*. http://redirect.conservation.ca.gov/DLRP/fmmp/pubs/2006-2008/conversion_tables/alacon06.xls, accessed December 1, 2008.

3.4 POPULATION AND HOUSING

Introduction

This section presents the population, housing, and economic characteristics of the communities in the study area, focusing on existing and proposed station locations, including the Dublin/Pleasanton Station and the five station locations under consideration in the City of Livermore. In addition to discussing the existing socio-economic conditions, this section also analyzes potential of the BART extension alternatives to impact housing supply and population, including displacement of residential and business uses. Mitigation measures to avoid or reduce impacts are identified, as necessary.

Data presented in this section are based on Association of Bay Area Governments (ABAG) projections, data from the 2000 U.S. Census, demographic estimates published by Claritas, Inc., and ridership estimates prepared by Dowling Associates, Inc. Claritas is a private data vendor that offers demographic data for thousands of variables for numerous geographies, including cities, counties, and states. Using 2000 U.S. Census data as a benchmark, Claritas provides current year estimates for many demographic characteristics such as household composition, size, and income. These current year estimates are a well-regarded measure of current demographic conditions and are particularly valuable given that many areas have undergone significant change since the last decennial census was completed over nine years ago.

This section also utilizes information provided in the General Plans of the cities of Dublin, Pleasanton, and Livermore, as well as applicable specific plans. In particular, the City of Livermore's Downtown Specific Plan, El Charro Road Specific Plan, Arroyo Vista Neighborhood Plan, and the Brisa Neighborhood Plan incorporate or are located within close proximity to proposed station locations or alignments. These planning documents provide information on anticipated growth and allowable land uses in the corridor cities and various specific plan areas.

There were no concerns or questions related to this section that emerged during the scoping period or in response to the NOP.

Existing Conditions

For purposes of this Population and Housing analysis, two areas are considered: the study area, defined as the cities of Dublin, Pleasanton, and Livermore, and Alameda County; and the station areas, defined as the area encompassing a one-half mile radius around proposed station locations. For heavy rail transit, a half-mile radius is a common definition of the transit station study area. Within this radius, studies point to substantially higher levels of transit ridership by residents, compared to surrounding areas.[1]

[1] Cervero, Robert, *Transit Oriented Development's Ridership Bonus: A Product of Self-Selection and Public Policies, p*. 5, http://www.uctc.net/papers/765.pdf, accessed March 3, 2009.

Population and Household Characteristics

Socioeconomic information was gathered in order to adequately analyze the impacts of the BART extension alternatives on housing supply and population. In addition to providing a general overview of demographic characteristics, this discussion focuses on socioeconomic information that tends to correlate with transit dependency. Individuals without vehicles, youth, elderly, and lower-income households represent groups that are traditionally more dependent on having access to transit for their mobility.

According to BART's 2008 Station Profile Study, BART serves a wide range of customers. Approximately 32 percent of riders surveyed for the study reported that they did not have a vehicle available for their trip. A majority of riders (62 percent) were 35 years of age or older. As of 2008, 28 percent of passengers reported total annual household incomes of less than $50,000, while 18 percent had household incomes between $50,000 and $74,999 in 2008; another 52 percent had household incomes of $75,000 or more.[2]

Below is a summary of the socio-economic profile for the study area cities of Dublin, Pleasanton, and Livermore, and Alameda County (see Table 3.4-1).

- The BART extension alternatives would introduce additional rail transit service to an area with relatively large household sizes. With an average household size of 2.82 persons, Livermore households tend to be larger than the county average (2.75 persons) and larger than in the cities of Dublin and Pleasanton.

- The extension alternatives would also improve transit service in an area with relatively high household incomes compared to the county. As of 2008, Livermore has a median household income of approximately $90,600 compared to the county median of $67,700, while Dublin and Pleasanton also enjoy substantially higher incomes than elsewhere in the county.

- Consistent with income data, the cities of Dublin, Pleasanton, and Livermore have higher rates of homeownership than Alameda County. Among the three cities, Livermore has the highest percentage of homeowners at 72.1 percent; 71.9 percent of Pleasanton households, and 64.4 percent of Dublin households own their homes. By comparison, Alameda County has a homeownership rate of 55 percent.

- Among the cities in the study area, Livermore has the highest percentage (4.3 percent) of households without an automobile. This is somewhat higher than the county average of 3.9 percent. Households in the cities of Dublin and Pleasanton were less likely than those elsewhere in the county to have no automobile at 2.4 percent and 3.2 percent, respectively.

[2] BART, Office of External Affairs, *BART Station Profile Study*, 2008, http://www.bart.gov/docs/StationProfileStudy/2008StationProfileReport_web.pdf, accessed August 5, 2009.

- Although the City of Livermore had a higher percentage of households without access to an automobile, a smaller percentage of Livermore residents rode transit to work (3.4 percent) compared to the Dublin residents (5.1 percent) and Pleasanton residents (5.3 percent). The level of public transportation ridership to work is higher elsewhere in Alameda County, with 10.5 percent of county residents using transit.

Table 3.4-1
Demographic Data for Alameda County and BART to Livermore Study Area Cities

	Alameda County	City of Dublin	City of Pleasanton	City of Livermore
Population, 2008				
Persons	1,493,696	45,562	68,079	82,343
Households	532,396	15,003	24,718	29,145
Persons per Household	2.75	2.63	2.74	2.82
Housing, 2008				
Housing Units	556,561	16,588	25,674	30,004
Owners	54.5%	64.4%	71.9%	72.1%
Renters	45.5%	35.6%	28.1%	27.9%
Median Household Income, 2008	$67,666	$90,247	$108,996	$90,638
Age Distribution				
Under 18	24.3%	21.6%	26.9%	27.4%
18 – 24	9.1%	9.3%	8.5%	8.5%
25 – 34	13.3%	16.1%	8.9%	10.7%
35 – 44	16.0%	20.3%	15.5%	17.0%
45 – 54	15.2%	16.3%	18.0%	15.9%
55 – 64	11.2%	9.9%	12.8%	11.5%
65 and Over	10.9%	6.5%	9.4%	8.9%
Vehicle Ownership, 2008				
Households with No Automobile Available	58,277	356	793	1,259
Percentage of Households with No Automobile Available	3.9%	2.4%	3.2%	4.3%
Transit Mode, 2008				
Drive Alone	66.7%	79.8%	83.8%	79.7%
Carpool	13.7%	9.6%	8.3%	10.4%
Public Transportation	10.5%	5.1%	5.3%	3.4%

Sources: Claritas, 2008; BAE, 2008.

Station Area Profiles

Socio-economic information was also gathered for the station areas surrounding potential station locations. As previously discussed, station areas are defined as the area encompassing a one-half mile radius around proposed station locations. Below is a summary of the socio-economic profile for each with additional data shown in Table 3.4-2.

Existing Dublin/Pleasanton BART Station. With approximately 1,185 households currently living in the Dublin/Pleasanton Station area, this station area is more densely populated than any of the proposed station locations in the City of Livermore. The area surrounding the existing BART terminus at the Dublin/Pleasanton Station is characterized by smaller household sizes and a higher concentration of renters than in the cities of Dublin and Pleasanton as a whole. Approximately 61.4 percent of households in the Dublin/Pleasanton Station area rent their homes compared to 35.6 percent of Dublin households and 28.1 percent of Pleasanton households. Additionally, household incomes in the station area are lower than incomes in the cities of Dublin and Pleasanton; the median household income in the station area is $86,000. This demographic profile is consistent with the new multifamily units that have been constructed in the City of Dublin near the existing station.

As would be expected near an existing heavy-rail transit station, public transit ridership is higher in the Dublin/Pleasanton Station area than in the cities of Dublin and Pleasanton as a whole; 11.2 percent of residents use public transportation in the station area, compared to approximately 5 percent in both Dublin and Pleasanton overall.

Isabel/I-580 Station. Situated along I-580 near the Livermore Municipal Airport, the proposed Isabel/I-580 Station area has relatively few existing residential uses. There are 455 households living within one-half miles of the proposed station location. Among the housing units in the station area, most are single family detached units, and a high percentage (85 percent) are owner-occupied, compared to 72 percent of housing units citywide. With a median income of approximately $95,000, this station area is wealthier than the city overall, but otherwise has a similar demographic profile to the rest of Livermore.

Vasco Road Station. The Vasco Road Station area consists of various office and industrial parks, a portion of the Livermore National Laboratory, and a single family neighborhood. The station area includes approximately 225 households, which are typified by relatively large household sizes (3.17 persons) reflecting a large concentration of households with children under 18 years of age. The area is also characterized by high household incomes; the median household income is $112,500, compared to the City of Livermore's median of $90,600.

Table 3.4-2
Demographic Data within a One-Half Mile Radius of Potential BART Station Sites[a]

	Dublin/ Pleasanton (existing)	Isabel/ I-580	Vasco Road	Downtown Livermore	Isabel/ Stanley	Greenville East[b,c]
Population, 2008						
Persons	2,638	1,258	710	5,210	316	0
Households	1,184	455	224	1,774	109	0
Persons per Household	2.22	2.77	3.17	2.92	2.90	N/A
Housing, 2008						
Housing Units	1,351	468	227	1,841	110	0
Owners	38.6%	86.3%	76.3%	47.6%	79.8%	N/A
Renters	61.4%	13.7%	23.7%	52.4%	20.2%	N/A
Median Household Income, 2008	$86,523	$95,066	$112,500	$66,370	$100,057	N/A
Age Distribution						
Under 18	25.1%	25.8%	32.3%	28.9%	27.5%	N/A
18 – 24	5.6%	8.7%	9.6%	8.4%	8.9%	N/A
25 – 34	17.0%	9.9%	8.7%	13.4%	8.9%	N/A
35 – 44	24.3%	18.4%	16.1%	18.3%	15.5%	N/A
45 – 54	14.8%	15.7%	17.5%	14.1%	17.1%	N/A
55 – 64	8.4%	12.1%	11.3%	8.8%	14.2%	N/A
65 and Over	4.9%	9.4%	4.9%	8.0%	7.6%	N/A
Vehicle Ownership, 2008						
Households with No Automobile Available	62	19	11	148	3	N/A
Percentage of Households with No Automobile Available	5.2%	4.2%	4.9%	8.3%	2.8%	N/A
Transit Mode, 2008						
Drive Alone	70.4%	78.3%	82.3%	76.9%	82.1%	N/A
Carpool	9.5%	11.2%	8.4%	12.5%	9.5%	N/A
Public Transportation	11.2%	3.1%	2.6%	3.3%	3.6%	N/A

Sources: Claritas, 2008; BAE, 2008.

Notes:

a. Station areas are defined by a one-half mile radius around proposed stations.

b. There were no households living within a one-half mile radius of the Greenville East Station.

c. N/A is not applicable.

The Vasco Road Station area has the lowest transit ridership of the proposed stations in the City of Livermore. Approximately 2.6 percent of residents in the station area use public transportation compared to 4.3 percent in the City as a whole.

Downtown Livermore Station. The Downtown Livermore Station area is the most heavily populated of the five proposed station areas, with approximately 1,175 households located within one-half miles of the proposed station. In addition, the Downtown Livermore Station is the only proposed station area in the City of Livermore characterized by lower household incomes and homeownership rates than the City as a whole. The median household income of $66,400 is substantially lower than the City's overall median. Consistent with income data, the Downtown Livermore Station area has a much lower percentage of homeowners; 47.6 percent of households own their homes compared to over 50 percent of households in the county and over 70 percent of households in the City of Livermore.

Households in the Downtown Livermore Station area have considerably less access to a private automobile than households in the City of Livermore and the county as a whole; approximately eight percent of households in the station area do not own an automobile. Despite the larger percentage of households without access to an automobile, the Downtown Livermore Station area has a similar rate of transit ridership to work (3.3 percent) compared to the City of Livermore as a whole.

Isabel/Stanley Station. The Isabel/Stanley Station area primarily consists of undeveloped land and a quarry. As such, the area is very sparsely populated with only approximately 110 households within one-half miles of the proposed station. Households in the area have higher incomes and are more likely to be homeowners than those in the City of Livermore as a whole. Nearly 80 percent of households own their home in the area and the median income is $100,000.

Households in the Isabel/Stanley Station area are more likely to own a car than those in the City of Livermore overall; only 2.8 percent of station area households do not have access to a private automobile.

Greenville East Station. The Greenville East Station is located in a largely undeveloped area surrounded by light industrial uses. The 2000 Census indicated there were no households living within one half miles of the proposed station location. Data from Claritas, Inc. and a site visit confirmed there are no residents living within a one-half mile radius of the proposed Greenville East Station.

Employment Characteristics

ABAG estimates that there were 32,430 jobs in Livermore in 2005. Below is a discussion of the employment profile for each proposed station areas. Table 3.4-3 lists the largest employers in the City of Livermore and the radial distance to the nearest proposed BART station.

Table 3.4-3
Major Livermore Employers Near Proposed BART to Livermore Stations, 2009

Company	Use	Number of Employees	Nearest Station	Radial Distance (miles)
Activant Solutions	Business Services	363	Greenville East	0.19
Costco Wholesale	Retail	245	Isabel/I-580	0.40
Las Positas College	Community College	490	Isabel/I-580	0.60
City of Livermore	Government	656	Downtown Livermore	0.70
Livermore Area Rec. & Park District	Government	508	Downtown Livermore	0.73
Valley Care Health System	Medical Office	1,300	Downtown Livermore	0.78
WalMart Stores	Retail	265	Downtown Livermore	0.82
Kaiser Permanente Health Center	Medical Office	130	Downtown Livermore	0.84
Lowe's Home Improvement Store	Retail	150	Downtown Livermore	0.94
Target	Retail	185	Downtown Livermore	1.19
Topcon Positioning Systems	Manufacturing	394	Vasco Road	0.12
Johnson Controls, Inc.	Manufacturing	279	Vasco Road	0.20
Lawrence Livermore Natl. Lab.	Government R&D	8,750	Vasco Road	0.30
McGrath RentCorp	Equipment Rental	185	Vasco Road	0.36
Valmark Industries	Manufacturing	180	Vasco Road	0.38
Kaiser Permanente Distribution Ctr.	Warehouse and Distribution	675	Vasco Road	0.55
Sandia National Laboratory	Government R&D	910	Vasco Road	1.00
Form Factor	Manufacturing / R&D	1,000	Vasco Road	1.16
Wente Vineyards	Winery	676	Vasco Road	2.04

Sources: City of Livermore, Economic Development Department, 2009; Las Positas Community College, 2009; BAE, 2009.

Isabel/I-580 Station. There are a number of commercial office and research and development uses adjacent to the proposed Isabel/I-580 Station, including the Airport Executive Center and Airway Business Park. In addition, the Costco Wholesale retailer, one of the City's largest employers, is located within 0.4 miles of the station and the Las Positas College is within 0.6 miles.

Vasco Road Station. Five of Livermore's largest employers are located within a one-half mile radius of the proposed Vasco Road Station. The Lawrence Livermore National Laboratory, which employs over 8,700 individuals, is located 0.3 miles from the station. In addition, three large manufacturing companies are located within one-half miles of the station. The Vasco Commerce Center is located across Vasco Road from the proposed station.

Downtown Livermore Station. The proposed Downtown Livermore Station would be located near the heart of the City's Downtown area, which includes a variety of commercial businesses, such as restaurants, retail establishments, professional service offices, and theater and entertainment venues. The recently completed Livermore Valley Plaza, a mixed-use office and retail development, is adjacent to the proposed station. In addition, six of the Livermore's largest employers, including City Hall, Valley Care Health Systems, and Kaiser Permanente Health Center, are located within one mile of the proposed station.

Isabel/Stanley Station. The proposed Isabel/Stanley Station is located at the southwestern edge of Livermore. It is surrounded by single family residential neighborhoods, undeveloped land, and quarry sites owned by the Pleasanton Gravel Company.

Greenville East Station. A number of business park developments are located to the west of the proposed Greenville East Station, including the Vineyards Business Park and the Greenville Business Center. Activant Solutions, a business management solutions company that employs over 350 individuals, is located near the proposed station at the Vineyards Business Park. To the east of the proposed station site, the area is vacant and slopes uphill toward the Altamont Pass.

Population and Employment Projections

Table 3.4-4 presents population and employment projections for Alameda County and the cities of Dublin, Pleasanton, and Livermore, including their respective spheres of influence.[3]

Population. ABAG projects significant population growth in the cities of Dublin, Pleasanton, and Livermore, and Alameda County between 2010 and 2035. Among these jurisdictions, the City of Dublin is expected to be the fastest growing, with projected population increase of 65 percent over the 25-year period. The cities of Pleasanton and Livermore are projected to have more modest but nonetheless substantial population growth between 2010 and 2035, increasing in population by 28 percent and 37 percent, respectively. By comparison, Alameda County's population is projected to increase by 23 percent over the same period.

Employment. Job growth in Alameda County is expected to outpace population growth in the coming years. This trend will be highly evident in the cities of Dublin and Livermore, where the numbers of jobs in both cities are projected to increase by 117 percent and 54 percent, respectively, between 2010 and 2035. The number of jobs in the City of Pleasanton is expected to grow at approximately the same pace as population growth, increasing by approximately 27 percent over the same period.

[3] Under California law, a sphere of influence refers to the probable future physical boundaries and service areas of a city or district as determined by the Local Area Formation Commission, the body responsible for overseeing annexation processes (Government Code Section 56000).

Table 3.4-4
Demographic Projections for Study Area Communities, 2005 – 2035

				2010-2025		2010-2035	
	2010	2025	2035	Change	Percent	Change	Percent
Alameda County[a]							
Population	1,571,400	1,776,900	1,938,600	205,500	13.1%	367,200	23.4%
Households	564,880	643,030	700,090	78,150	13.8%	135,210	23.9%
Employed Residents	751,400	956,500	1,131,200	205,100	27.3%	379,800	50.5%
Jobs	781,520	968,590	1,099,550	187,070	23.9%	318,030	40.7%
Jobs-Employed Residents	1.0	1.0	1.0	0.0		-0.1	
City of Dublin[b]							
Population	50,000	69,200	82,600	19,200	38.4%	32,600	65.2%
Households	16,600	23,770	28,720	7,170	43.2%	12,120	73.0%
Employed Residents	24,240	37,560	48,890	13,320	55.0%	24,650	101.7%
Jobs	22,910	36,590	49,810	13,680	59.7%	26,900	117.4%
Jobs-Employed Residents	0.9	1.0	1.0	0.0		0.1	
City of Pleasanton[b]							
Population	73,600	85,400	94,500	11,800	16.0%	20,900	28.4%
Households	26,700	31,170	34,400	4,470	16.7%	7,700	28.8%
Employed Residents	38,670	50,600	60,660	11,930	30.9%	21,990	56.9%
Jobs	64,260	76,020	81,270	11,760	18.3%	17,010	26.5%
Jobs-Employed Residents	1.7	1.5	1.3	-0.2		-0.3	
City of Livermore[b]							
Population	88,200	107,300	120,900	19,100	21.7%	32,700	37.1%
Households	31,160	38,090	42,820	6,930	22.2%	11,660	37.4%
Employed Residents	45,960	63,060	77,000	17,100	37.2%	31,040	67.5%
Jobs	53,650	71,240	82,990	17,590	32.8%	29,340	54.7%
Jobs-Employed Residents	1.2	1.1	1.1	0.0		-0.1	

Sources: ABAG Projections, 2007; BAE, 2009.

Notes:

a. Alameda County includes incorporated cities and unincorporated areas.

b. Projections reported for city sphere of influence.

Jobs to Employed Residents. The ratio of jobs to employed residents measures the extent to which there is a balance between a community's workforce and its employment base. The ratio is low (less than 1.0) in bedroom communities and high (more than 1.0) in job centers. Alameda County and the City of Dublin have a relative balance between jobs and employed residents with ratios near 1.0. For Pleasanton, there is an imbalance between the number of jobs and employed residents, with 66 percent more jobs than employed residents in Pleasanton. According to ABAG, this imbalance is expected to improve in coming years as the population of employed residents grows more quickly than the number of jobs. By 2035, Pleasanton is projected have just 34 percent more jobs than employed residents. Livermore currently has approximately 17 percent more jobs than employed residents. This ratio is also expected to decline to in coming years with Livermore expected to have only eight percent more jobs than employed residents in 2035.

Whether the jobs-housing imbalance in Pleasanton will actually improve in coming years is subject to debate. The California Attorney General has joined a lawsuit intended to force the City of Pleasanton to repeal a growth control measure, Measure GG, which limits the total amount of housing in the City at 29,000 units. If this measure is not changed or repealed, the City's jobs housing imbalance would not improve as projected by ABAG.[4]

Applicable Policies and Regulations

California Relocation Assistance and Real Property Acquisition Guidelines. The California Government Code requires that relocation assistance be provided to any person, business, or farm operation displaced because of the acquisition of real property by a public entity for public use (Title 25 California Code of Regulations, Chapter 6, Section 6000 et seq.). In addition, comparable replacement properties must be available for each displaced person within a reasonable period of time prior to displacement. The California Relocation Assistance Guidelines mandate that certain relocation services and payments be made available to eligible residents, businesses, and nonprofit organizations displaced by construction and operation of transit-related projects. The Guidelines establish uniform and equitable procedures for land acquisition, and provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by state and state-assisted programs.

Other Applicable Policies and Regulations. Applicable land use policies and regulations that affect growth are discussed in Section 3.3, Land Use, including General Plans for the cities of Dublin, Pleasanton, and Livermore as well as pertinent Specific Plans and other neighborhood plans.

[4] Office of the Attorney General. News Release. http://ag.ca.gov/newsalerts/release.php?id=1759, accessed August 3, 2009.

Impact Assessment and Mitigation Measures

This analysis focuses on the potential effects of BART extension alternatives on population, housing, and employment. Population-driven effects related to construction are not specifically addressed in this population and housing analysis because those impacts are temporary, whereas impacts associated with changes in population related to BART operations occur over long periods of time and are not directly associated with construction activities. Future TOD impacts are not part of this analysis. The City of Livermore will undertake its own environmental review process for any future land use changes in station areas, which will provide opportunities for public review and comment.

Standards of Significance

A significant population and housing impact would occur if the BART extension alternatives would substantially affect the population, household, or community characteristics of the study area in a negative way, or would impede or detract from efforts to economically revitalize the study area. The criteria utilized to determine significance have been developed based on Appendix G of the CEQA Guidelines. These criteria include both qualitative and quantitative assessments, many of which are related to other environmental topic areas discussed in this Draft Program EIR. Based on these criteria, a significant population and housing impact would occur if the alternatives would:

- Induce substantial growth in an area either directly (e.g., by proposing new homes or buildings) or indirectly (e.g., through extension of roads or infrastructure) not in accordance with existing community or city plans;
- Displace existing businesses or housing, especially affordable housing; or
- Create a demand for additional housing that cannot be accommodated by existing housing stock.

For each population and housing resource topic analyzed below, a level of significance is determined and reported in the impact analysis for each alternative. Conclusions of significance are defined in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, PH refers to Population and Housing.

Environmental Analysis

Table 3.4-5 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. As shown in the table, none of the alternatives is expected to have a significant impact in inducing substantial growth that would not be in accordance with community plans; however, all BART extension alternatives are expected to have significant impacts due to displacement of existing businesses and housing. Through identified mitigation measures, all potentially significant displacement impacts would be ameliorated to less-than-significant

levels for all alternatives. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.4-5
Summary Comparison for Population and Housing Impacts in the BART to Livermore Study Area

	Unplanned Growth		Displacement	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA
1 – Greenville East	LTS	NA	S	Yes
1a – Downtown-Greenville East via UPRR	LTS	NA	S	Yes
1b – Downtown-Greenville East via SPRR	LTS	NA	S	Yes
2 – Las Positas	LTS	NA	S	Yes
2a – Downtown-Vasco	LTS	NA	S	Yes
3 – Portola	LTS	NA	S	Yes
3a – Railroad	LTS	NA	S	Yes
4 – Isabel/I-580	LTS	NA	S	Yes
5 – Quarry	LTS	NA	S	Yes

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact
NA = Not applicable

Table 3.4-6 summarizes the potential property acquisition impacts resulting from each alternative. As shown, alternatives vary considerably with regard to the number of parcels, acreage of land, and number of residential units that they would potentially affect. Alternative 4, Isabel/I-580,which includes only one station and which is situated primarily within the I-580 right-of-way would have the least impact in terms of property acquisition and potential displacement, while other alternatives would impact upwards of 180 parcels and more than 80 residential units. A more complete description of these impacts is provided in the following section and details on the affected parcels are presented in Appendix C.

Table 3.4-6
Summary of Possible Property Acquisition Impacts in the BART to Livermore Study Area

Alternative	Number of Parcels	Acres	Number of Residential Units
No Build	NA	NA	NA
1 – Greenville East	128	126.7	29
1a – Downtown-Greenville East via UPRR	185	161.6	79
1b – Downtown-Greenville East via SPRR	179	157.5	81
2 – Las Positas	143	185.4	10
2a – Downtown-Vasco	206	210.2	81
3 – Portola	189	120.8	84
3a – Railroad	179	177.4	83
4 – Isabel/I-580	64	28.2	7
5 – Quarry	63	82.2	8

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

PH-1 Growth Inducement Not in Accordance with Plans and Policies

The Livermore General Plan identifies buildout estimates for housing and employment which anticipate substantial new development in the City through 2025. The BART extension alternatives propose five different stations in Livermore, and there is a potential for these stations to become magnets or catalysts for development. Thus, it is anticipated that there would be an indirect effect of redirecting a higher portion of Livermore's planned growth to locations around the stations.

No Build Alternative. As the No Build Alternative would only include completion of programmed and funded transit and roadway improvements within the study area, there would be no new growth inducement impacts.

All BART Extension Alternatives. Once a preferred alignment is selected, BART's System Expansion Policy calls for communities proposed to be served by a BART extension to prepare Ridership Development Plans if their existing General Plan land use designations in the station areas do not yield sufficient ridership for the corridor. These plans seek to promote BART ridership by encouraging more intensive development and/or enhancing access to proposed BART stations. The Ridership Development Plans can be implemented as general plan amendments, specific plans, and/or rezonings. By allowing additional housing development within station areas, growth projected to occur within the City would be redirected and targeted for the station areas.

Citywide Growth Inducement. The City of Livermore General Plan has long anticipated the extension of BART service. As a result, citywide buildout estimates and land use patterns already anticipate future BART service in Livermore. The BART extension alternatives are expected to have a beneficial effect by redistributing anticipated population growth in a transit-oriented pattern in the station areas as described below.

Station Area Growth Inducement. New residential and retail development is generally anticipated by the Livermore General Plan near three of the station areas: I-580/Isabel, Downtown Livermore, and Vasco Road. There are two stations, however, where the Livermore General Plan does not anticipate transit-supported land uses and could experience pressures to allow more development if possible, Isabel/Stanley (proposed predominantly for water/resource management and agriculture) and Greenville East (proposed predominantly for agriculture). The BART extension alternatives could induce additional development around all of these station areas.

Additional details concerning the redistribution of projected growth and the implications for station area development are presented later in the "Cumulative Analysis" section, and Section 4, Other CEQA Considerations. As noted in these other sections of this Program EIR, to the extent that improved transit systems encourage development by removing obstacles to mobility or improving access in the region, the BART to Livermore Extension could have an indirect growth-inducing effect by accelerating planned growth in a more compact, transit-oriented form, along the chosen corridor and particularly in and around the proposed station areas. The indirect growth caused by the BART to Livermore Extension could cause indirect adverse growth-related impacts associated with construction and implementation of new development projects in the local project area (i.e., air and noise impacts from construction of new housing or other development, etc.). As noted above, BART will work with the City in the formulation of Ridership Development Plans, if necessary, for the stations at I-580/Isabel, Downtown Livermore, and Vasco Road. For stations at Isabel/Stanley and Greenville East, which are in both the City and unincorporated Alameda County, both Livermore and Alameda County may be involved in this planning effort. These plans, which could take the form of a specific plan, must undergo environmental review, and will have to document the physical changes to the environment. For those stations entirely in the City, changes in land use intensity, traffic generation, development massing and heights, demand for services and utilities, and air and noise emissions are expected to be important in the planning and environmental review efforts. For those stations that are in both the City and County, additional issues related to modifications to the Urban Growth Boundary, loss of mineral or agricultural resources, and biological impacts will need to be evaluated. Section 3.3, Land Use, and Section 5, Program Merits, explore these issues further.

Employment-Related Growth Inducement. As of 2010, the cities of Dublin, Pleasanton, and Livermore are projected to have an employment base of 140,820 jobs and a combined 74,460 households. According to ABAG, these cities will add approximately 73,250 jobs and 31,480 households between 2010 and 2035. BART estimates that the alternatives would generate

between approximately 150 and 400 full-time equivalent (FTE) positions, including train operators, maintenance personnel, and other employees.[5] If each new employee conservatively required a separate housing unit, consistent with a ratio of 1.46 employed residents per household in the study area, the BART extension alternatives could also indirectly generate demand for up to approximately 275 additional housing units in the study area resulting from increased BART employment. This represents about 0.9 percent of projected household growth in the cities of Dublin, Pleasanton, and Livermore by 2035 and, like employment, would be minimal in the context of total households. Hence, the increased levels of employment and housing demand in the study area resulting from the BART extension alternatives would be less than one percent of projected growth over the next 25 years and is considered less than significant.

PH-2 Displacement of Businesses and Housing

Under the BART to Livermore Extension Program, land acquisition would be required to accommodate the stations, associated parking, rights-of-way, and a maintenance facility, resulting in a significant impact to affected residents, business owners, and property owners. Such displacement would require mitigation in accordance with applicable state laws as described below. A more extensive discussion of impacts for each alternative is presented below and details on the affected parcels are presented in Appendix C.

For purposes of estimating acreage of land acquisition, it has been assumed BART would purchase entire parcels if a particular alternative requires more than 50 percent of a given parcel for right-of-way, stations, and/or a maintenance yard. If BART requires less than 50 percent of a parcel, it has been assumed that BART would purchase only the percent it requires. Notwithstanding this assumption, where BART needs to acquire a portion of a single family residential parcel, it has been assumed that BART would acquire the entire parcel.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No-Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no additional displacement or parcel acquisitions under the No Build Alternative.

Alternative 1 – Greenville East. Alternative 1 would require the full or partial acquisition of 114 parcels, totaling 136.9 acres (see Table 3.4-7). Although the BART right-of-way for this alternative would mainly occur within the right-of-way of I-580, the alternative would require widening portions of the Caltrans I-580 right-of-way beyond that currently planned by Caltrans

[5] Tumola, Thomas, Senior Planner, BART, email communication with BAE, May 29, 2009.

Table 3.4-7
Potential Land Acquisition for Alternative 1 – Greenville East

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	20	28.8	-
Utilities	3	7.5	-
Industrial/Warehouse/Storage	8	5.7	-
Commercial/Retail/Office	12	1.2	-
Residential	21	13.2	29
Vacant	52	31.6	-
Mining/Quarries	0	0.0	-
Agricultural	12	38.8	-
Total	**128**	**126.7**	**29**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.
Notes:
a. Classification by existing use is as recorded by the Alameda County Assessor.
b. Includes full and partial acquisitions.
c. This table does not include property currently owned by BART.

as part of the I-580 HOV lane projects. This analysis only takes into account the additional land acquisitions needed for implementation of the BART extension alternative in the median. Parcel acquisition would also be necessary for the proposed Isabel/I-580 Station, Greenville East Station, and Greenville Yard.

Most parcels affected by this alternative are currently vacant; however, there are existing residential, government and institutional, and commercial uses on some parcels. Approximately 29 residential units would be affected by right-of-way acquisition. This includes approximately 19 residential units that are part of a mobile home park north of I-580. Although the mobile home park contains over 100 homes, only those units that border I-580 would be affected by required freeway widening. Other affected residential uses include single family homes located south of I-580 between Santa Rita Road and El Charro Road.

Alternative 1a – Downtown-Greenville East via UPRR. Alternative 1a would require the full or partial acquisition 185 parcels, totaling 161.6 acres (see Table 3.4-8). The BART right-of-way for this alternative would mainly occur within the right-of-way of I-580 as BART approaches Livermore. As discussed under Alternative 1, some parcel acquisition along I-580 would be required for widening the Caltrans I-580 right-of-way beyond that already planned as part of the ongoing Caltrans project. The alternative departs I-580 along El Charro Road, and proceeds along Railroad Avenue and the Union Pacific Railroad (UPRR) right-of-way. Portions of parcels along these roads and UPRR would need to be acquired for Alternative 1a. The proposed Downtown Livermore Station would require the acquisition of parcels with existing residential, industrial, warehouse, retail, and transit uses.

Table 3.4-8
Potential Land Acquisition for Alternative 1a – Downtown-Greenville East via UPRR

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	35	32.2	-
Utilities	40	39.7	-
Industrial/Warehouse/Storage	5	5.8	-
Commercial/Retail/Office	28	6.9	-
Residential	39	15.0	79
Vacant	21	18.0	-
Mining/Quarries	9	9.3	-
Agricultural	8	34.6	-
Total	**185**	**161.6**	**79**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.
Notes:
a. Classification by existing use is as recorded by the Alameda County Assessor.
b. Includes full and partial acquisitions.
c. This table does not include property currently owned by BART.

Among the 185 parcels affected by this alternative are a mix government, utilities, residential, commercial, and other uses. Approximately 79 single family and multifamily residential units occupy parcels that would be affected by the necessary acquisition. A number of the affected single family homes are located south of I-580 between Santa Rita Road and El Charro Road. Other residential uses affected by this alternative are concentrated on Chestnut Street and Junction Avenue where the proposed Downtown Livermore Station would be sited. In addition, a 1.3-acre site on Railroad Avenue that contains a multilevel parking garage for the Livermore Valley Center would need to be acquired for the Downtown Livermore Station. The two-acre Livermore Transit Center on Old First Street, which serves as a major transfer point for the ACE train and LAVTA, Greyhound, and Amtrak bus lines, would also be affected.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would require the full or partial acquisition of 179 parcels, totaling 158 acres (see Table 3.4-9). The BART right-of-way for this alternative shares elements described in Alternative 1a, except the segment between the Downtown Livermore Station and the Greenville East Station would follow the SPRR right-of-way rather than the UPRR right-of-way. Portions of parcels along I-580, El Charro Road, Railroad Avenue, and the SPRR right-of-way would need to be acquired for Alternative 1b.

Table 3.4-9
Potential Land Acquisition for Alternative 1b – Downtown-Greenville East via SPRR

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	35	34.2	-
Utilities	33	35.9	-
Industrial/Warehouse/Storage	5	5.8	-
Commercial/Retail/Office	28	6.9	-
Residential	38	14.7	81
Vacant	22	17.7	-
Mining/Quarries	9	9.3	-
Agricultural	9	32.9	-
Total	**179**	**157.5**	**81**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

As discussed under Alternative 1a, existing residential, industrial, warehouse, retail, and transit uses would be affected by the proposed Downtown Livermore Station. The Greenville East Station and Greenville Yard contain a mix of vacant land, agricultural, industrial, warehouse, and government uses.

Alternative 2 – Las Positas. Alternative 2 would require the full or partial acquisition of 143 parcels, totaling 185.4 acres (see Table 3.4-10). The BART right-of-way for this alternative would mainly occur within the right-of-way of I-580 until Las Positas Road. As discussed in Alternative 1, some parcel acquisition along I-580 would be required for the added widening of the Caltrans I-580 right-of-way as a result of placing the alignment in the median of I-580. In addition, parcels along Las Positas Road and the UPRR right-of-way between I-580 and the proposed Vasco Road Station would need to be acquired.

The majority of land affected by this alternative contains existing industrial, warehouse, or storage uses. This includes large flex and industrial space along Patterson Pass Road that would need to be acquired for the proposed Vasco Road Station and Vasco Yard. In addition, 10 residential units would be affected by Alternative 2.

Table 3.4-10
Potential Land Acquisition for Alternative 2 – Las Positas

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	28	16.4	-
Utilities	15	25.3	-
Industrial/Warehouse/Storage	22	92.9	-
Commercial/Retail/Office	14	1.6	-
Residential	15	12.4	10
Vacant	42	29.7	-
Mining/Quarries	0	0.0	-
Agricultural	7	7.2	-
Total	**143**	**185.4**	**10**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

Alternative 2a – Downtown-Vasco. Alternative 2a would require the full or partial acquisition of 206 parcels, totaling 210.2 acres (see Table 3.4-11). The BART right-of-way for this alternative follows I-580, El Charro Road, Railroad Avenue, and the UPRR right-of-way. Parcels along these roads and rights-of-way would need to be acquired for this alternative.

Existing uses on the 210 acres that would need to be acquired for Alternative 2a include industrial, warehouse, and storage, utilities, government, commercial, and residential uses. As discussed under Alternative 1a, many of the affected residential parcels are concentrated along Chestnut Avenue and Junction Avenue where the proposed Downtown Livermore Station is located. Industrial, warehouse, and storage uses currently occupy land proposed for the Vasco Road Station and Vasco Yard.

Alternative 3 – Portola. Alternative 3 would require the full or partial acquisition of 189 parcels, totaling 120.8 acres (see Table 3.4-12). The BART right-of-way for this alternative follows I-580, Portola Avenue, and the UPRR right-of-way. Parcels along these roads and the rights-of-way would need to be acquired for this alternative.

Table 3.4-11
Potential Land Acquisition for Alternative 2a – Downtown-Vasco

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	42	23.0	-
Utilities	42	46.5	-
Industrial/Warehouse/Storage	22	93.3	-
Commercial/Retail/Office	28	6.9	-
Residential	37	12.0	81
Vacant	23	16.9	-
Mining/Quarries	9	9.3	-
Agricultural	3	2.3	-
Total	**206**	**210.2**	**81**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

Table 3.4-12
Potential Land Acquisition for Alternative 3 – Portola

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	37	15.7	-
Utilities	0	0	-
Industrial/Warehouse/Storage	12	15.5	-
Commercial/Retail/Office	37	23.6	-
Residential	67	47.2	84
Vacant	34	17.0	-
Mining/Quarries	0	0.0	-
Agricultural	2	1.8	-
Total	**189**	**120.8**	**84**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

Residential properties affected by Alternative 3 are concentrated in areas proposed for the Downtown Livermore Station. Existing warehouse and storage uses also occupy land proposed for the maintenance yard. Other uses affected by this alternative include government and commercial uses. Thirty-four of the 189 affected parcels are vacant.

Alternative 3a – Railroad. Alternative 3a would require the full or partial acquisition of 179 parcels, totaling 177.4 acres (see Table 3.4-13). Similar to Alternative 2a, the BART right-of-way for this alternative follows I-580, El Charro Road, Railroad Avenue, and the UPRR right-of-way. Parcels along these roads and rights-of-way would need to be acquired for this alternative.

The Isabel/Stanley Station would require the acquisition of vacant parcels and industrial uses. In addition, BART would need to acquire a portion of two parcels owned by Pleasanton Gravel Company. Although active quarry activity is not currently taking place, Pleasanton Gravel Company has filed mining permits for the sites.[6]

A total of 83 residential units would be affected by Alternative 3a. As discussed previously, many of these residential units are located along Chestnut Street and Junction Avenue where the proposed Downtown Livermore Station would be located.

Table 3.4-13
Potential Land Acquisition for Alternative 3a – Railroad

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	36	16.1	-
Utilities	35	51.9	-
Industrial/Warehouse/Storage	11	15.4	-
Commercial/Retail/Office	30	22.5	-
Residential	36	13.8	83
Vacant	18	5.7	-
Mining/Quarries	10	30.5	-
Agricultural	3	21.6	-
Total	**179**	**177.4**	**83**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

[6] Bell, Debbie, Assistant Planner, City of Livermore Planning Division, telephone communication with BAE, April 22, 2009.

Alternative 4 – Isabel/I-580. Alternative 4 would require the full or partial acquisition of 64 parcels, totaling 28.2 acres (see Table 3.4-14). The right-of-way for this alternative is located in the median of I-580. As discussed under Alternative 1, some parcel acquisition along I-580 would be required for the widening of the Caltrans I-580 right-of-way to accommodate BART in the median.

Table 3.4-14
Potential Land Acquisition for Alternative 4 – Isabel/I-580

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	11	6.7	-
Utilities	0	0.0	-
Industrial/Warehouse/Storage	1	0.1	-
Commercial/Retail/Office	11	1.2	-
Residential	10	3.8	7
Vacant	29	14.7	-
Mining/Quarries	0	0.0	-
Agricultural	2	1.8	-
Total	**64**	**28.2**	**7**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

The majority of land and parcels affected by Alternative 4 are vacant. However, seven residential units would need to be acquired. These include single family homes south of I-580 between Santa Rita Road and El Charro Road.

Alternative 5 – Quarry. Alternative 5 would require the full or partial acquisition of 63 parcels, totaling of 82.2 acres (see Table 3.4-15). Similar to Alternative 2a, the BART right-of-way for this alternative follows I-580 and El Charro Road, but this alternative would terminate at the Isabel/Stanley Station. Parcel acquisition would be necessary along I-580 and El Charro Road for this alternative.

Much of the land affected by this alternative contains mining and quarry uses as discussed in Alternative 3a. There are eight single family residences located on affected parcels. These include single family homes south of I-580 between Santa Rita Road and El Charro Road.

Table 3.4-15
Potential Land Acquisition for Alternative 5 – Quarry

Existing Use[a]	Number of Parcels Impacted[b]	Area Acquired (Acres)[c]	Number of Residential Units Impacted
Government/Institutional	16	7.5	-
Utilities	7	14.3	-
Industrial/Warehouse/Storage	0	0.0	-
Commercial/Retail/Office	6	0.6	-
Residential	8	4.2	8
Vacant	13	3.4	-
Mining/Quarries	10	30.5	-
Agricultural	3	21.6	-
Total	**63**	**82.2**	**8**

Sources: DataQuick Information Systems, 2009; PBS&J, 2009; BAE, 2009.

Notes:

a. Classification by existing use is as recorded by the Alameda County Assessor.

b. Includes full and partial acquisitions.

c. This table does not include property currently owned by BART.

MITIGATION MEASURE. Mitigation for displacement impacts is guided by the California Relocation Assistance and Real Property Acquisition Guidelines. These guidelines set forth mandatory minimum requirements for acquisition, appraisal, and relocation payments and services to compensate for displacements resulting from public agency projects. Implementation of the following mitigation measure would ensure that impacts related to displacement of the affected parcels are addressed as stipulated by applicable state laws, and would reduce them to a less-than-significant level. This mitigation would be applicable to all the BART extension alternatives because each would require acquisition of property. (LTS)

PH-2.1 *Acquire Property and Relocate Affected Residents and Businesses*. BART's Real Estate Department shall implement an acquisition and relocation program that meets the requirements of applicable state relocation law. Acquisition will involve compensation at fair market value for properties, and relocation assistance would include, but is not limited to, down payments or rental supplements, moving costs, business reestablishment reimbursement, and goodwill offers as appropriate. All benefits will be provided in accordance with the California Relocation Assistance and Real Property Acquisition Guidelines.

Effect of UP Commuter Access Principles

As described in Section 2, Alternatives, UPRR has developed its own set of principles that offer an added measure of protection for access to its right-of-way where freight operates. The principles essentially define a "safety envelope" around the freight tracks and within this envelope, only freight rail should operate. These principles would apply to Alternatives 1a, 1b, 2, 2a, and 3a and increase

the distance between BART trains and trains on the UP right-of-way (i.e., ACE and freight trains) by separating freight and passenger tracks by 50 feet or more.

Growth Inducement. The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in changes to the projected growth inducement. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the growth inducement analysis or conclusions presented earlier in this section.

Displacement of Housing and Businesses. Additional property acquisitions may be required as part of negotiations with UPRR and its Commuter Access Principles. Adherence to these principles would require land acquisition north of the existing UPRR ROW for about 1.7 miles between Murrieta Boulevard and First Street and for about 3,500 feet east of Mines Road. A summary of affected parcels is presented in Table 3.4-16 below.

Table 3.4-16
Additional Property Acquisition with UP Commuter Access Principles Compliance

	Number of Commercial Parcel	Number of Industrial Parcels	Number of Residential Parcels	Number of Mixed-Use Parcels	Number of Undeveloped Parcels
1 – Greenville East	0	0	0	0	0
1a – Downtown-Greenville East via UPRR	10	19	39	10	5
1b – Downtown-Greenville East via SPRR	10	6	38	10	6
2 – Las Positas	0	6	0	0	4
2a – Downtown-Vasco	10	9	38	10	6
3 – Portola	10	3	24	3	0
3a – Railroad	9	3	24	0	0
4 – Isabel/I-580	0	0	0	0	0
5 – Quarry	0	0	0	0	0

Source: AECOM, 2009.

Note:

The figures in this table represent the additional parcels/units assuming full compliance with the UP Commuter Access Principles. It is recognized that these principles are not regulations or standards adopted by a state or federal agency, and discussions during the project level planning, engineering, and environmental review will affect the actual number of properties that may be acquired

Cumulative Analysis

The geographic context for this cumulative population and housing analysis includes the areas that would be immediately served by the BART extension alternatives. The immediate service area for the alternatives includes the cities of Dublin, Pleasanton, and Livermore, and nearby areas in Alameda County. Other foreseeable future development within the geographic context includes growth under the planning documents identified in Section 3.1, Introduction to Environmental Analysis.

The cumulative impacts addressed here include inducement of substantial housing and employment growth, and displacement due to land acquisition.

PH-CU-3 Cumulative Inducement of Substantial Housing and Employment Growth

The BART extension alternatives, in combination with improvements to the I-580 freeway, would add considerable additional commuting capacity along the I-580 corridor that could support substantial population and employment growth as projected by ABAG and planned for in the City of Livermore General Plan, as well as other jurisdictional plans identified in Section 3.1.

As described above, the BART extension alternatives would be growth-accommodating, responding to the existing need for transit services and substantial levels of future growth anticipated by ABAG and the City. While the amount of new growth in the study area will be substantial in coming years, the local general plans and the preparation of future Ridership Development Plans, as appropriate, would help to accommodate growth in a more compact, transit-oriented configuration than would otherwise occur without the BART extension alternatives. As a result, while substantial growth is forecast for the study area, it is anticipated that this development would occur in accordance with local and county plans. The future growth would be targeted towards areas proposed by the local jurisdictions through their general plans, specific plans, and neighborhood plans.

While the amount of new growth surrounding the proposed stations could be substantial, it is being addressed through specific planning processes by the cities of Dublin and Pleasanton for the existing Dublin/Pleasanton BART Station, and by Livermore for the new stations. The growth that could occur around the stations may be more than what is currently envisioned by the City for those areas; however, the overall growth in the City is not expected to be greater than projected by the City's General Plan. The station locations along the BART extension alternative alignments would have the effect of redistributing growth that is already forecast for the City, a redistribution that would result in a more compact and transit-oriented configuration, which is considered smart growth and consistent with the City's development policies. Limited growth is envisioned by Livermore at the Isabel/Stanley and Greenville East Stations, in large part because they are outside the Urban Growth Boundary. It is noted that the City in anticipation of a BART to Livermore Extension did designate a different area in its General Plan for TOD around

Greenville Road. That area is on the north side of I-580 and is approximately where the Greenville Yard is proposed. As a result, a substantial amount of General Plan development potential is assigned to that site which would not be used for TOD. The development potential could be redistributed to station locations proposed in this Program EIR, provided that such development would be consistent with City development policies.

In conclusion, the BART to Livermore Extension would not directly induce substantial population, housing, or economic growth beyond that currently defined in the General Plans for the cities of Dublin, Pleasanton, and Livermore, and Alameda County. The growth that is projected to occur may be redistributed to take advantage of the regional accessibility afforded by the BART station, and that intensification at the infill stations of I-580/Isabel, Downtown Livermore, and Vasco Road would be consistent with City land use policies that have anticipated a BART to Livermore Extension. Intensification could also occur at Isabel/Stanley and at Greenville East, but would not be consistent with current policies for those station areas.

PH-CU-4 Cumulative Displacement of Businesses and Housing

Future projects within the study area could result in the need to acquire land already occupied by other uses, which could result in the conversion of those and possibly surrounding land uses. The I-580 HOV project would occur primarily within the existing Caltrans right-of-way; however, there are sections where property acquisition and displacement would occur. The proposed Livermore Iron Horse Trail Project Initial Study reported no displacement of housing. Other foreseeable projects, including future projects involving major redevelopment activities surrounding the proposed stations could result in major changes to land use, would likely require land acquisition, and could potentially displace existing uses. The combination of the BART extension alternatives, the I-580 project, and future development/redevelopment associated with the long-term plans of the local jurisdictions would result in a potentially significant cumulative displacement impact.

The contribution of the BART extension alternatives towards the cumulative displacement would be cumulatively considerable because all alternatives would require acquisition of a considerable acreage and displacement of between seven to 109 residences, as shown in Tables 3.4-7 through 3.4-15. As such, the alternatives would have a significant cumulative impact related to displacement.

MITIGATION MEASURE. Mitigation Measure PH-2.1, which calls for compliance with the State relocation laws, would reduce the contribution of the alternatives to cumulative displacement to a less than cumulatively considerable level. Other public improvements, such as the I-580 HOV projects, would also comply with these laws. As such, cumulative displacement impacts would be reduced to less than significant. (LTS)

3.5 VISUAL QUALITY

Introduction

This visual quality assessment discusses the aesthetics of the area surrounding the BART extension alternatives, and how the existing landscape would change with implementation of the alternatives. A landscape has two primary components: natural features such as topography and vegetation; and built features such as roads, buildings and fences. In combination, natural and built features create the form, line, height, colors, and textures of an area which is the visual quality of the landscape. This section is intended to assess if the alignments would fit into the existing visual setting of the study area, detracting, maintaining or enhancing the visual quality of the landscape.

Visual quality can be subjective and often depends on the viewer. This section discusses visual quality as it is experienced by "viewer groups," which are defined as groups of people who would have a view of the alignments from a particular vantage point. An example of a viewer group is drivers along I-580, who would see the BART extension alternatives while driving on the freeway. Visual quality is discussed in this section with an awareness of the unique perspective of each viewer group.

This visual quality assessment begins with a regional overview of the visual setting and then provides more detailed descriptions of the local setting by alignment.

The key issues examined in this analysis are:

- Natural and Built Environments – refers to the type and intensity of development and noteworthy constructed features within the alignment area. The relationship between the height, bulk, and mass of constructed features, as well as the location and shape of undeveloped spaces, help define scale.
- Significant Views and Scenic Resources – refers to view corridors and natural features that are visible from a distance and help orient the viewer and visually distinctive constructed elements or natural features, public spaces or locations where significant numbers of people would congregate or pass on any given day. Public spaces include roads, parks, and designated scenic viewpoints.
- Sensitive Receptors – refers to land uses that have the potential of being affected by changes in the visual setting. These land uses include public spaces that are frequented by people on a daily basis, such as parks and pedestrian trails. Urban drivers can be considered sensitive receptors if the roadway traveled is a designated scenic highway or is a highway with a public, designated scenic viewpoint. Otherwise, views from moving vehicles on urban highways are often fleeting as drivers generally concentrate on traffic and the roadway rather than views. Industrial areas are not typically considered sensitive receptors.

Since this EIR is a programmatic evaluation of the BART extension alternatives, this visual analysis is broadly scaled to permit a comparison of relative differences among the alignments.

It should be noted that even though this section describes the consistency of the alternatives with local policies, California Government Code Section 53090 exempts rapid transit districts such as BART from the requirement to comply with local plans, policies, and zoning ordinances. However, because the BART Strategic Plan adopted in 1999 recognizes the connection between transit investments and local planning and development, the impact analysis in this section includes a discussion of such local policies, plans, and regulations to affirm any support or conflict of the alternatives with local visual quality issues.

Stakeholders of the planned auto mall at El Charro Road and I-580 raised visual quality concerns during the scoping period. These concerns are addressed in this section.

Existing Conditions

Regional Overview

The study area is located in the Livermore Tri-Valley region, which is the easternmost section of the San Francisco Bay Area. The Livermore Tri-Valley includes the cities of Dublin, Pleasanton, and Livermore, which consist primarily of urbanized flat lands surrounded by small mountain ranges with long-range views of two landmark mountain peaks generally to the north – Mount Diablo and Brushy Peak. Dublin and Pleasanton lie in a flat valley east of the East Bay hills and west of the City of Livermore. These cities are surrounded by suburban housing developments, ranchettes, and vineyards.

Development in the Livermore Tri-Valley region is less dense and of a more rural character than Bay Area cities to the west, including Berkeley, Oakland, and San Francisco. Large tracts of suburban homes are arranged primarily in cul-de-sacs and along curvilinear streets. Larger commercial and industrial development, including business parks, are spread out and oriented near I-580 and along the Union Pacific Railroad (UPRR) and Southern Pacific Railroad (SPRR) rights-of-way. Most of the study area is located in Livermore, which is the largest city of the Tri-Valley. The landscape throughout Livermore is dominated by open grassy hillsides, scattered trees, and grazing cattle. Low-lying, one- and two-story commercial buildings can be seen in the Downtown. Industrial buildings are located primarily in the eastern half of the City. Views of the hillsides and the surrounding ridge line can be seen from most locations in and around Livermore, except for the most part in the Downtown area.

Local Setting

The alignments in the study area run along six corridors, which are I-580, the UPRR right-of-way, the SPRR right-of-way, Las Positas Road, Portola Avenue, and El Charro Road. Along these corridors are five proposed stations: Isabel/I-580, Isabel/Stanley, Downtown Livermore, Vasco Road, and

Greenville East Stations. Figure 3.5-1 identifies the locations from which photographs were taken to portray the visual characteristics in the study area. Figures 3.5-2 through 3.5-6 provide representative photos of the existing conditions along the alignments. Each numbered location corresponds with the numbered figures in this section.

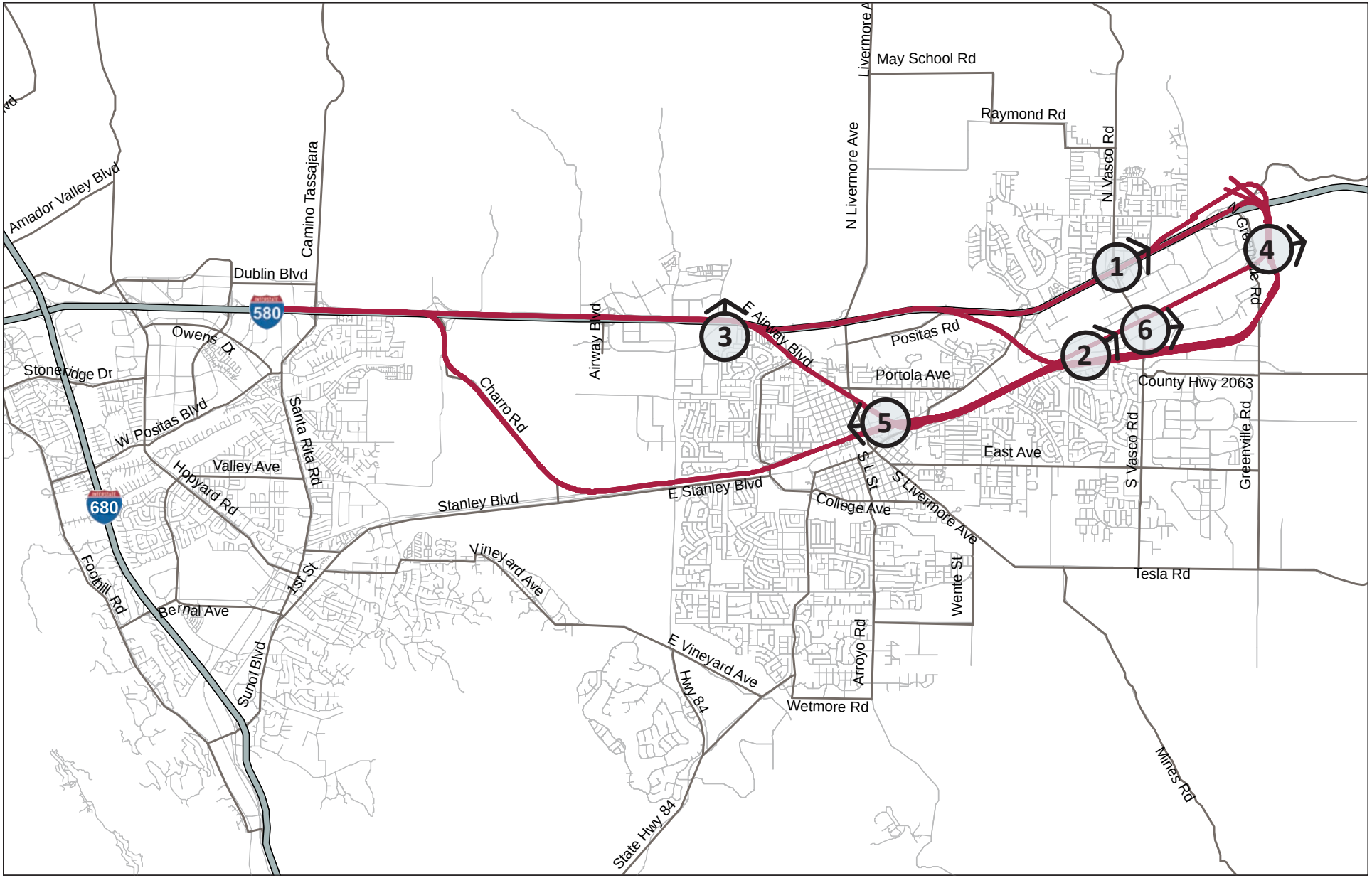
I-580 Corridor. The I-580 corridor is a predominantly highway environment, as shown in Figure 3.5-2. East of the existing Dublin/Pleasanton BART Station to Santa Rita Road/Tassajara Road, highway-oriented, mostly large, commercial structures proximate to I-580, including business parks and substantial surface parking lots, are located north and south of I-580 on flat lands with views of Mount Diablo to the northwest, Brushy Peak to the northeast as well as mid-range views of rolling hills.

Between Santa Rita/Tassajara Road and El Charro Road/Fallon Road, I-580 to the north is marked by undeveloped lands slated for planned commercial uses. Further north are multistory, multifamily residential units with the foothills as a visual backdrop. South of I-580 in this segment are walled residential subdivisions in Pleasanton and undeveloped land that is the Staples Ranch site in the southwest quadrant of the El Charro Road interchange.

Improvements to the El Charro Road/I-580 interchange are already under construction; on- and off-ramps are being added and the number of lanes expanded to accommodate a partial cloverleaf style interchange that will provide access directly to El Charro Road from I-580. The Stoneridge Drive/Staples Ranch Specific Plan proposes an auto mall, a retail center, a community park, and a continuing care community facility. The planned auto mall will include a prominently visible freeway sign near the beginning of the new El Charro eastbound off-ramp. The southeast corner of the El Charro Road and I-580 intersection includes plans for an outlet mall and other regional commercial land uses as part of the El Charro Specific Plan in Livermore.

Between the El Charro Road interchange and just east of Airway Boulevard, the north side of I-580 is undeveloped. On the south side is the vacant El Charro Specific Plan area, and the municipally-owned Las Positas Golf Course. East of the golf course and Airway Boulevard, business parks line the I-580 frontage similar to the development and visual character on the north side of I-580.

East of Isabel Avenue along the I-580 corridor, the alignment continues through primarily undeveloped grassland with mid-range views of rolling hills to the north with only the single family residential portion of North Livermore, between Springtown Boulevard and Vasco Road interrupting this visual landscape. The south side of I-580 in this eastern portion of the I-580 corridor includes substantially more urban development comprised of shopping centers (primarily between Livermore Avenue and First Street) and a mix of commercial and industrial uses east to Greenville Road.



Source: DC&E, 2009.

EXISTING VIEW PHOTO LOCATIONS
FIGURE 3.5-1

Source: DC&E 2009

EXISTING VIEW OF I-580 AT VASCO ROAD LOOKING EAST
FIGURE 3.5-2

Source: DC&E 2009

EXISTING VIEW OF UPRR RIGHT-OF-WAY LOOKING NORTHEAST
FIGURE 3.5-3

UPRR Right-of-Way Corridor. The UPRR right-of-way corridor follows the Union Pacific Railroad line from just west of the intersection of Stanley Boulevard and Isabel Avenue East, through Downtown Livermore to I-580. This corridor is surrounded by a mix of residential and commercial structures that are partially separated from the right-of-way by a non-contiguous buffer of vegetation and trees, shown in Figure 3.5-3. East of Isabel Avenue, neighborhoods of single family detached homes flank both sides of the corridor. Residences north of this alignment segment are separated from the alignment by a culvert channel and fencing. Residences south of this alignment are separated from the alignment by East Stanley Boulevard, a four-lane thoroughfare with a narrow median that is intermittently landscaped. Continuing on the UPRR right-of-way past Murrieta Boulevard, the corridor is visually defined by mostly one-story, light industrial and commercial strip-mall structures immediately adjacent to the alignment. Through the Downtown, the visual quality of this corridor is marked by a variety of building types, storage and parking areas, the backs of buildings – in general, of low visual quality. The larger Downtown Station area contains pedestrian-oriented streets, attractive streetscapes, and visually distinctive historic buildings. (Historic resources and buildings are described in detail in Section 3.6, Cultural Resources.)

East of Downtown, industrial and commercial structures are seen to the north of the alignment. The alignment is separated from adjacent structures by Contractors County Road, which runs parallel to the alignment on the north side, and parkway strips with trees and shrubs. William J. Payne Sports Park, which has two baseball fields, a soccer field and a BMX course, is located just west of the intersection of Vasco Road and the UPRR right-of-way. West of Vasco Road, the alignment runs through primarily flat areas with warehouse and storage facilities. Mostly undeveloped grassland and sparse trees are located along the alignment east of Vasco Road. Views of rolling hills to the east can be seen along the alignment near Greenville Road.

SPRR Right-of-Way Corridor. The SPRR right-of-way that could be shared by one of the BART extension alternatives starts near First Street, just east of the existing Downtown Livermore Station, and ends near Greenville Road. Sparse, mostly commercial and light industrial structures are seen along this corridor. Rolling hills can be seen to the north and east of the alignment.

Las Positas Road Corridor. The Las Positas Corridor follows Las Positas Road just east of Las Colinas Road to approximately First Street. Mount Diablo can be seen to the northwest of this corridor. Industrial structures and large office parks as well as substantial surface parking lots are seen and accessed from Las Positas Road. At the intersection of Las Positas Road and First Street, the northwest, northeast, and southeast corners are visually dominated by large commercial centers and extensive surface parking lots. The southwest corner contains a single family residential area that is set back from Los Positas Road and screened by street trees and intervening topography.

Portola Avenue Corridor. The Portola Avenue Corridor includes Portola Avenue south of I-580 to North Livermore Avenue and Junction Avenue to approximately First Street. Just off I-580, this corridor includes some undeveloped, flat grassland and a mix of low-lying, light industrial structures. Farther along Portola Avenue, the corridor is visually defined by trees lining both sides of the street

and mostly, suburban one-story homes. Portola Avenue is a wide, four-lane street with a landscaped median. Portola Park, a grassy park with shaded trees and pedestrian paths, is located where Portola Avenue and Junction Avenue intersect. Along Junction Avenue heading toward Downtown Livermore, one- and two-story homes are set closer together along the street than along Portola Avenue with sparse, intermittent trees along both sides of the street.

El Charro Road Corridor. The El Charro Road Corridor follows El Charro Road south of I-580 to Stanley Boulevard. Along El Charro Road, which is a sparsely tree- and shrub-lined roadway, the alignment runs through primarily flat, undeveloped quarry land. Few structures exist or can be seen from the corridor in the quarry area, with the exception of a ranch house located approximately one mile south of I-580 along El Charro Road and some industrial structures near where El Charro Road intersects with East Stanley Boulevard.

Isabel/I-580 Station Area. The Isabel/I-580 Station Area is characterized by a semi-rural setting with mid-range views of low, rolling hills to the north, as seen in Figure 3.5-4. Land immediately adjacent to the proposed station area is flat, undeveloped grassland. A residential neighborhood of single family detached homes can be seen less than a half-mile east of the station area.

Greenville East Station Area. The Greenville East Station area is located in a predominantly industrial commercial environment with mid-range views of gently rolling hills located to the north and east of the station, as seen in Figure 3.5-5. Just north of the station, I-580 becomes an overpass and crosses over Greenville Road. Large business park structures and parking lots, highway-oriented commercial structures and industrial buildings, which front onto Greenville Road, can be seen west of the proposed station site.

Downtown Livermore Station Area. The Downtown Livermore Station area is located in Downtown Livermore, along the UPRR right-of-way. A mix of light industrial structures and homes can be seen from the existing ACE station. No scenic vistas exist from the station area, shown in Figure 3.5-6. Buildings in the area are setback from the UPRR right-of-way and separated by fencing from the station.

Vasco Road Station Area. The Vasco Road Station area is located adjacent to primarily light industrial and warehouse facilities, as seen in Figure 3.5-7. The William J. Payne Sports Park, which consists of two baseball fields, a soccer field and a BMX course, can be seen immediately southwest of the proposed station area. Long-range views of Brushy Peak and mid-range views of rolling hills can be seen to the north of the station area.

Isabel/Stanley Station Area. The Isabel/Stanley Station would be located just west of the intersection of Isabel Avenue and Stanley Boulevard. In the station area, Stanley Boulevard, a four-lane road with a median, crosses over Isabel Avenue, a two-lane highway (also designated as SR 84) flanked by earthen embankments. A pedestrian pathway runs along the east side of Isabel Avenue, underneath the

Source: DC&E 2009

EXISTING VIEW FROM I-580 AT ISABEL AVENUE LOOKING NORTH
FIGURE 3.5-4

Source: DC&E 2009

EXISTING VIEW FROM GREENVILLE ROAD LOOKING EAST
FIGURE 3.5-5

Source: DC&E 2009

EXISTING VIEW OF DOWNTOWN LIVERMORE ACE STATION LOOKING WEST
FIGURE 3.5-6

Source: DC&E 2009

EXISTING VIEW OF VASCO ROAD LOOKING EAST
FIGURE 3.5-7

Stanley Boulevard crossing. Isabel Avenue is a locally designated scenic route in the Livermore General Plan. Primarily, flat undeveloped industrial and quarry land can be seen in the immediate vicinity west and north of the proposed station site. Detached, single family residences are seen east of the proposed station area and are separated from the station site by the intersection of Stanley Boulevard and Isabel Avenue, the pedestrian pathway, earthen embankments, fencing, and trees.

Sensitive Receptors. Sensitive receptors include parks and public spaces where the visual setting could be potentially affected by the alignments. The proposed alignments run primarily along I-580 or along former rail lines and through mostly developed and previously disturbed areas. Sensitive receptors may include municipal golf courses, pedestrian trails or pathways, public spaces such as parks. Sensitive receptors in the study area that may be affected by the alignments include:

- Portola Park at the intersection of Portola Avenue and Junction Avenue;
- William J. Payne Park at the intersection of Vasco Road and the UPRR right-of-way;
- Las Positas Golf Course, a public golf course located just south of I-580 and west of Airway Boulevard; and
- Pedestrian paths near the intersection of Isabel Avenue and Stanley Boulevard along both Isabel Avenue and Stanley Boulevard.

Applicable Policies and Regulations

Alameda County. Alameda County's East County General Plan sets out a goal to preserve and enhance views within scenic corridors by managing development and conservation of the land within East County scenic highway corridors.

City of Livermore. Livermore's local policies related to visual quality are found in the Community Character Element of the City of Livermore General Plan. The Community Character Element sets goals, policies and actions for the preservation of the City's scenic corridors and open space. The policies intend to protect views of the hills and ridgelines that surround the City, creeks and arroyos and, in general, the rural character and natural setting that exists in many parts of Livermore.

There are two types of views and vistas that could be affected by the BART extension alternatives: natural views, which include scenic vistas and views from scenic routes; and views to and from businesses and residential areas. All scenic resources and views within the study area are identified primarily under Livermore's jurisdiction under the Livermore General Plan, described in this section. The Community Character Element of Livermore's General Plan identifies several scenic routes and designated scenic vistas. This Element also identifies exemptions to the policies and regulations stated in the General Plan, noting that works "of public necessity" may be exempt from regulations contained in the Scenic Route Goals, Objectives, Policies, and Actions of the General Plan.

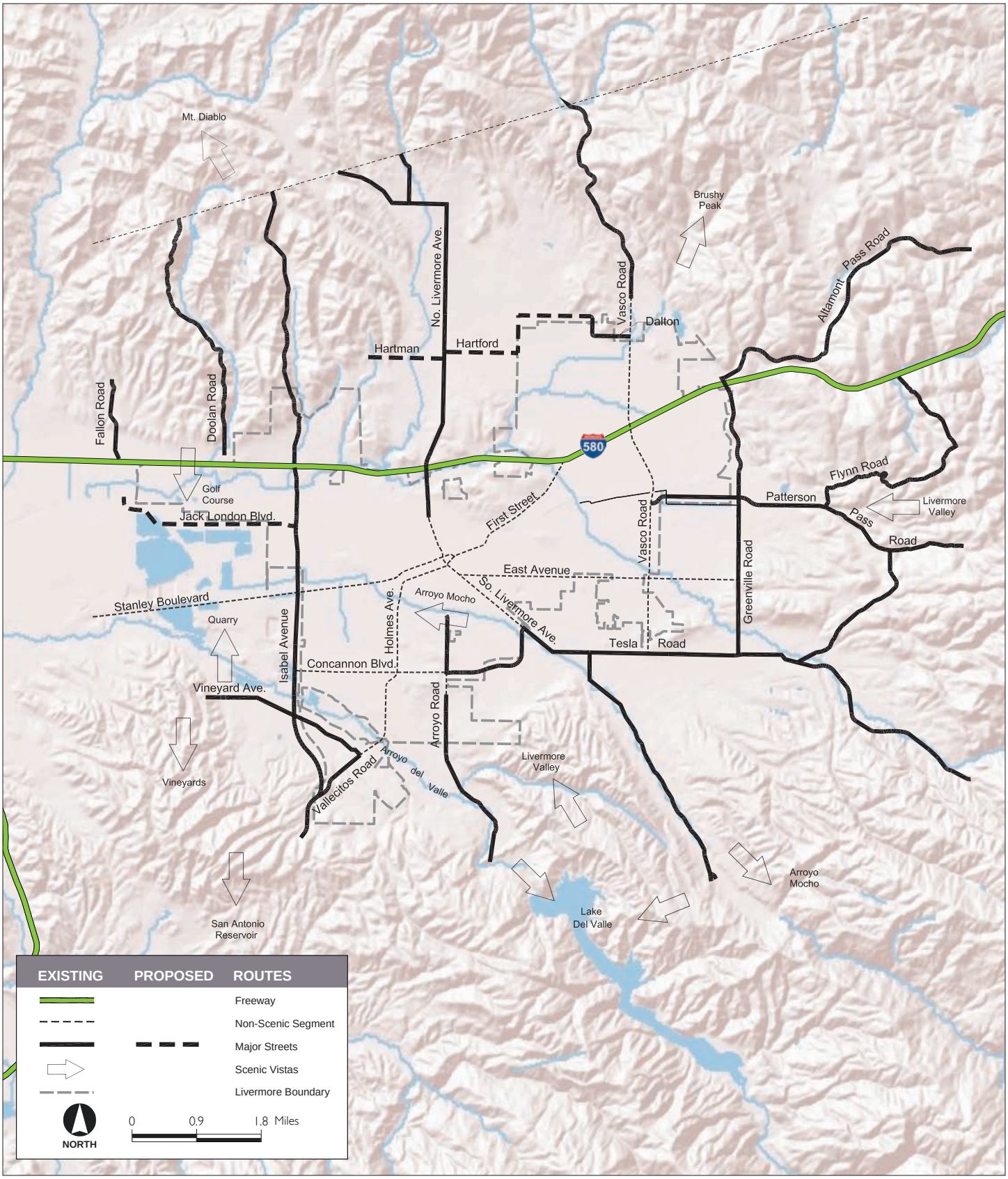
Scenic routes are important elements that contribute to the overall visual quality in Livermore. Much of Livermore's visual diversity is experienced by passing through or from a roadway that is considered a scenic route. Livermore's General Plan identifies a number of roadways that are considered planned scenic routes, designated as such because they either pass through or provide access to important scenic, recreational, cultural, or historic points. The BART extension alternatives traverse much of the same terrain as that of I-580, making the protection of visual quality along this corridor particularly relevant. Although I-580 within the study area is not officially designated a State or County Scenic Highway, it is identified as a Scenic Corridor in the Livermore General Plan. Local policies and actions specifically seek to preserve and protect scenic views within this corridor through control of grading, landscaping and building height.

Several existing scenic routes as identified by the Livermore General Plan are within, across, or in the vicinity of the alternative alignments and are also shown in Figure 3.5-8. Fallon Road, Doolan Road, Isabel Avenue, North Livermore Avenue, and Greenville Road are existing scenic routes that run perpendicular to the potential rail alignment along I-580. Patterson Pass Road, also identified as a scenic route, runs east-west beginning from the projected terminus of the Alternative 2 alignment. Greenville Road and Altamont Pass Road are existing scenic routes located near the Alternatives 1, 1a, and 1b alignments. Greenville Road runs north-south at the eastern end of the alignments between Tesla Road and Altamont Pass Road, which is a winding road with sweeping views of the hills.

The Livermore General Plan also identifies scenic waterways in the area, primarily arroyos, which are gulches or empty creek beds that seasonally fill with water. As shown in Figure 3.5-8, an arroyo is located along the south side of I-580, sometimes crossing into the north side of the corridor, between Fallon Road to a point just past Vasco Road.

Several scenic vistas designated by the Livermore General Plan are also shown in Figure 3.5-8. Four of these scenic vistas may be affected by the alignments. Scenic vistas potentially impacted by alignments include:

- The view of Mount Diablo, a regional landmark and visual frame of reference for drivers along the highways in Alameda County, to the northwest of the alignments.
- The view of Brushy Peak, a smaller mountain that can be seen to the northeast of the alignments.
- The view across I-580 facing south across and into Las Positas Golf Course, just west of Doolan Road. This view is located along the proposed alignment segment from the existing Dublin/Pleasanton Station to the proposed Isabel/I-580 Station after El Charro Road and is particularly prominent for Alternatives 1, 2, 3, and 4.
- The view facing north at the quarry on El Charro Road from Vineyard Avenue, just west of Isabel Avenue. This vista would be affected by Alternatives 1a, 1b, 2a, 3a, and 5.



Source: DC&E 2009

DESIGNATED SCENIC VISTAS AND ROUTES
FIGURE 3.5-8

The Community Character Element also sets goals, objectives, policies and actions to protect the I-580 scenic corridor, which features the low, rounded knolls separating the City from the rest of the Valley. The I-580 Scenic Corridor is defined as the area within 3,500 feet of the freeway centerline and visible from the roadway. These knolls are illustrated in Figure 3.5-4. Protection of scenic views from I-580 is of particular importance. This heavily-traveled roadway provides views of Livermore's surrounding hillsides and ridgelines. Policies and actions in Community Character Element specifically seek to preserve and protect scenic views within the I-580 corridor through control of grading, landscaping and building height.

The following goals, objectives, and policies in the Community Character Element of the Livermore General Plan address visual quality. Some of these policies reference policies in the North Livermore Urban Growth Boundary Initiative (NLUGBI).

Goal CC-4*:* Protect and enhance public views within and from established scenic routes, including views of arroyos.

Objective CC-4.1: Protect public views from scenic routes and corridors.

Policies

P1 Development shall not be allowed to obscure, detract from, or negatively affect the quality of the views from designated scenic routes.

P2 The City shall maintain in open space that portion of the hills which is seen from the freeway and which is within the I-580 Scenic Corridor… Any development within the I-580 Scenic Corridor is subject to the policies set forth under Goal CC-4 and the conditions set forth in *Section C, I-580 Scenic Corridor Implementation*.

P3 The City shall permit no development to wholly obstruct or significantly detract from views of any scenic area as viewed from a scenic route.

The City of Livermore's General Plan Land Use Element also contains goals that seek to protect aesthetically sensitive areas, including the historic Downtown and its residential neighborhoods, vineyards, ranches, natural habitats and open space. The Land Use Element also ensures that development in North Livermore will minimize potential visual impacts, as well as preserve South Livermore's rural and scenic qualities.

City of Pleasanton. Although the Pleasanton General Plan 2005-2025 does not identify any scenic views or routes in the study area, the Open Space and Conservation Element includes a policy intended to preserve all areas of outstanding scenic qualities or areas that provide extraordinary views of natural and human-made objects. The Open Space and Conservation Element also calls for a ridgeline preservation ordinance, as well as implementation of the Scenic Highway Plan for I-680, among other policies intended to preserve areas of outstanding scenic qualities.

The General Plan's Community Character Element also sets the goal of preserving open space character and natural features. Finally, the Land Use Element contains a policy intended to preserve scenic hillside at the edges of the City, as well as preserving scenic hillside and ridge views including the Pleasanton ridgeline and Southeast Hills.

City of Dublin. In the City of Dublin's General Plan Land Use and Circulation: Parks and Open Space Element, there are policies intended to minimize potential impacts to visual resources, including policies to restrict structures on the hillsides, which are a defining characteristic of Dublin's appearance. The Land Use and Circulation: Circulation and Scenic Highways Element also includes policies for protecting I-580. The Dublin General Plan does not identify any other scenic resources other than those scenic routes designated by the County, which is the I-580 corridor discussed in the Livermore General Plan.

Impact Assessment and Mitigation Measures

Standards of Significance

Natural features and physical conditions, both natural and man-made, contribute to the visual quality of an area. In order to analyze the existing visual character and visual quality, the relationship between community and the surrounding physical landscape area considered. This relationship is often subjective in nature.

The following standards of significance for determining visual impacts are based on CEQA Guidelines and professional judgment. Standards for determining the significance of visual impacts include the following:

- Visual Compatibility – Visual compatibility is measured by the amount of visual change either positively or adversely affecting the perceived aesthetic value or conditions of the setting. A highly visible change resulting from constructing a project that is incompatible with the setting or is not pleasing to look at would constitute a significant adverse visual impact. Factors to be considered include the physical layout of constructed elements with respect to each other and existing structures, the density or intensity of development, scale relationships between existing and proposed structures, the degree that new structures visually encroach on existing structures and spaces, site landscaping, and other features of development. Significant differences in adjacent building mass or form would be expected to generate adverse visual impressions under normal circumstances. Overall, a visual change would be considered adverse if it introduced obtrusive elements substantially out of character with existing setting conditions.
- View Obstruction – View obstruction is the amount of view blockage of a natural, scenic vista or an important view from a business or residential area. An impact would be potentially significant if it were to have a substantial adverse effect on an important view or scenic vista that is normally experienced by large numbers of people.
- Disturbance to Scenic Resources – Adverse alterations to visual character or quality would result from changes to the setting, such as the removal of vegetation that occurs naturally in the

landscape, rock outcroppings, visual landmarks, or historic resources. The loss or removal of these features as a result of a BART extension alternative would detract from the visual amenities or quality of the study area.

- Light and Glare – Light and glare refers to the introduction of new point sources of light or glare as a result of constructing the project. An impact would be potentially significant if it were to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

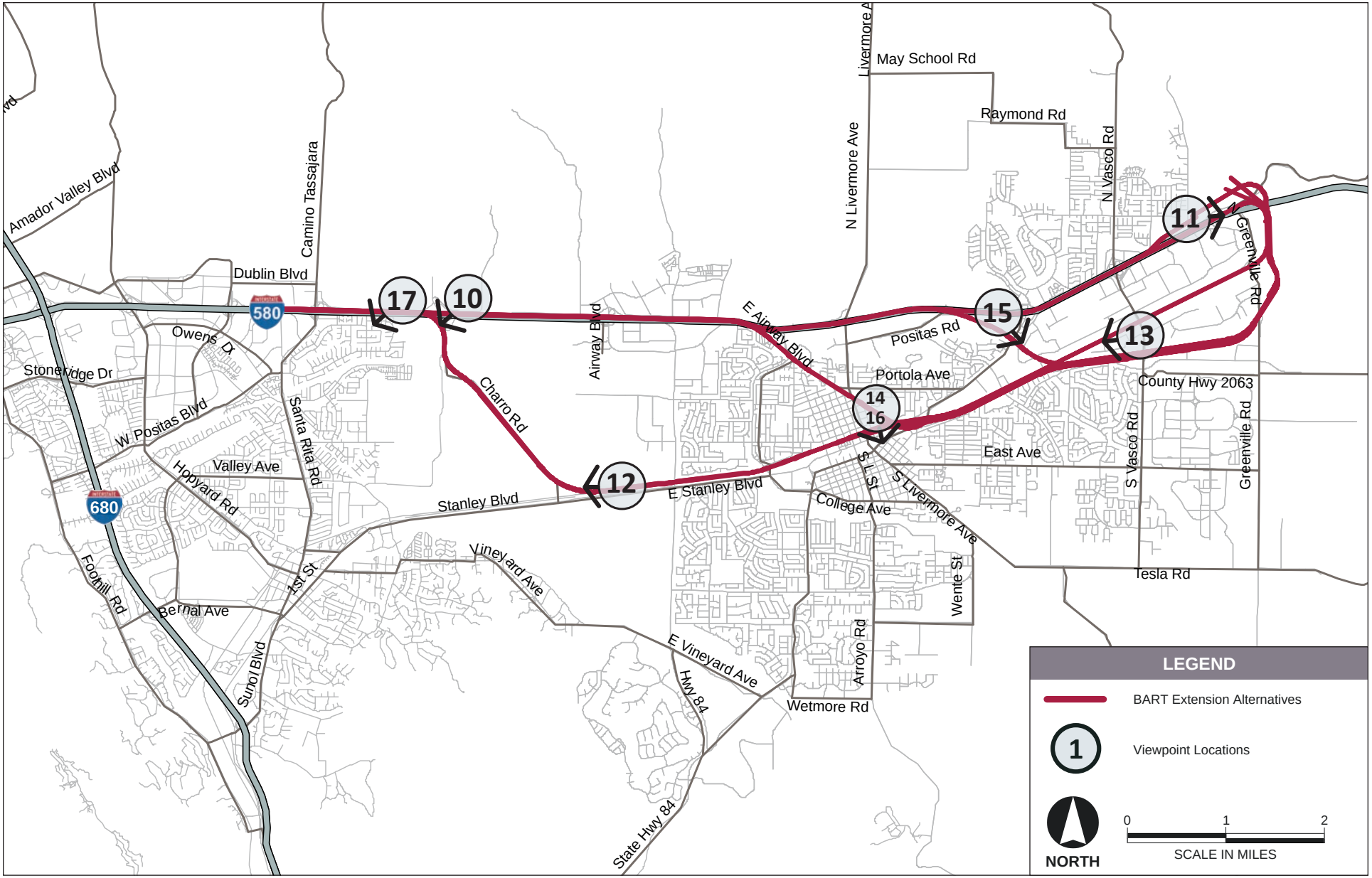
For each impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), and no impact (NI) If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, VQ refers to Visual Quality.

Methodology

A field investigation was conducted to inventory the existing setting along each of the nine BART alignment alternatives. Specific attention was given to key visual resources, including hillcrests, valleys, landmarks, and designated scenic travel routes. The assessment of the existing visual setting for each alignment alternative is divided into logical segments based on the proposed location of station areas and consistency of visual elements along each alignment. Key visual resources for each segment have been identified and are described in the existing conditions sections above.

Representative photos, referenced in the "Existing Conditions" section above, were selected to demonstrate key visual resources from the study area. The photographs document a particular vantage point, a perspective looking directly at what would be a segment of the alignments from a principal viewer group. The viewer groups consist of drivers along I-580 and/or pedestrians along adjacent public spaces or pathways.

Photosimulations of representative viewpoints of the BART extension alternatives further demonstrate the potential visual impacts of construction and operation of the alternatives. These simulations are referenced and analyzed in the impact analysis below. The locations from which photosimulations were generated are shown in Figure 3.5-9. Photosimulations are computer-generated images of a BART extension alternative alignment super-imposed on a photo of the existing setting. The photosimulations provide a direct comparison of the No Build Alternative (the "existing" image) and the alternative alignments in a photo-realistic fashion (the "proposed" image). Photosimulations illustrate alignment elements such as fences, the guideway track, overpasses, related electrical wiring, and any shadows that may result from the alignments.



Source: DC&E, 2009.

PHOTOSIMULATION LOCATIONS OF BART TO LIVERMORE ALTERNATIVES

FIGURE 3.5-9

The photosimulations are used as a means to compare and contrast the visual quality of the No Build Alternative and the proposed alignments. The BART standards of significance are then applied to assess the alternative alignments' potential impacts to visual quality.

To analyze visual impacts, the impacts of each alternative were ranked high, moderate, or low according to the alternative's potential to affect existing visual quality. The impact rankings are as follows:

1. A high visual impact occurs if features of the alignment or station are prominent and potentially detract from existing visual quality or scenic resources. Generally, a high impact is equivalent to a *significant* impact.
2. A moderate visual impact occurs if features of the alignment or station are noticeable, but do not dominate the landscape or detract from existing visual quality. Generally, a moderate impact is equivalent to a *potentially significant* impact.
3. A low visual impact occurs if features of the alignment or station are consistent with the existing line, form, texture, and color of other elements in the landscape and do not stand out. Generally, a low impact is equivalent to a *less-than-significant* impact.
4. No impact occurs if features of the alignment or station are not visible from any public viewpoint and therefore would have no effect on the existing visual quality.

Environmental Analysis

Table 3.5-1 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, all build alternatives would have potentially significant impacts associated with aerial guideways, station area configurations, and/or sources of light and glare. Identified mitigation measures described below could lessen visual impacts. In some cases, sufficient information is not available at the program level to conclude with certainty that mitigation would reduce the impact to a less-than-significant level in all circumstances. Such impacts are considered as significant and unavoidable or potentially significant and unavoidable. A more detailed description of the impacts on visual resources for each alternative is provided below.

Also, Table 3.5-2 includes a summary of Impacts VQ-1 to VQ-4. A more detailed description of impacts for each alternative follows.

VQ-1 Visual Compatibility

All BART extension alternatives could introduce elements that are visually incompatible with the existing setting. Where the alignments introduce heavy rail components within an existing railroad right-of-way or highway-oriented setting, no significant impact would be likely to

Table 3.5-1
Summary Comparison of Visual Quality Impacts
in the BART to Livermore Extension Study Area

	Visual Compatibility		Obstruction of Important Views or Scenic Vistas		Disturbance to Scenic Resources		New Sources of Light or Glare Affecting Day or Nighttime Views	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA	NI	NA	NI	NA
1 – Greenville East	PS	No	LTS	NA	LTS	NA	PS	Yes
1a – Downtown Greenville East via UPRR	PS	No	LTS	NA	LTS	NA	PS	Yes
1b – Downtown Greenville East via SPRR	PS	No	LTS	NA	LTS	NA	PS	Yes
2 – Las Positas	PS	No	LTS	NA	LTS	NA	PS	Yes
2a – Downtown Vasco	PS	No	LTS	NA	LTS	NA	PS	Yes
3 – Portola	LTS	NA	LTS	NA	LTS	NA	PS	Yes
3a – Railroad	PS	No	LTS	NA	LTS	NA	PS	Yes
4 – Isabel/I-580	LTS	NA	LTS	NA	LTS	NA	LTS	NA
5 – Quarry	LTS	NA	LTS	NA	LTS	NA	PS	Yes

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact NA = Not Applicable

Table 3.5-2
Comparative Visual Quality Impacts of BART Extension Alternatives

Alternative	Visual Compatibility	Obstruction of Important Views or Scenic Vistas	Disturbance to Scenic Resources	New Sources of Light or Glare Affecting Day or Nighttime Views
1 – Greenville East	Moderate-to-high impact. This alignment would be at grade within the median of I-580, but would introduce a potentially obtrusive aerial structure at the foot of the Altamont Pass, a designated scenic corridor.	Low impact. This alignment would be at grade along I-580 and view blockage would be minimal and/or intermittent at the Isabel/I-580 Station and the Greenville East Station.	Low impact. This alignment would not disturb scenic resources along I-580 environment or in the station areas.	Moderate impact. Light from the Greenville East Station and Greenville yard would be in proximity to commercial, industrial and some residential structures.
1a – Downtown Greenville East via UPRR	Moderate impact. This alignment would include a noticeable aerial structure along El Charro Road. However, this area consists of industrial quarry land of low visual quality. This alternative may require sound walls that would alter the visual setting near visually sensitive uses.	Low impact. This alignment would have intermittent view blockage from the aerial structure along El Charro Road.	Low impact. This alignment introduces an aerial structure along El Charro Road that would not require alteration of existing structures on industrial quarry land in an area of low visual quality. The alignment would pass through Downtown Livermore where many historic resources are found and contribute to the visual setting of the Downtown, but the alternative would not result in the removal of these resources.	Moderate impact. Light from the Downtown Livermore and Greenville East Stations and Greenville yard would be in proximity to commercial, industrial and some residential structures.
1b – Downtown Greenville East via SPRR	Moderate impact. The visual compatibility issues discussed for Alternative 1a apply to this alternative.	Low impact. Issues discussed regarding effects on important views and scenic vistas for Alternative 1a apply to this alternative.	Low impact. Issues discussed regarding disturbance to scenic resources for Alternative 1a apply to this alternative.	Moderate impact. Issues discussed regarding new sources of light or glare affecting day or nighttime views for Alternative 1a apply to this alternative.
2 – Las Positas	Moderate impact. The aerial guideway in Las Positas Road would be located along a busy arterial and would be highly visible to a residential area just south of the alignment. This alternative may also require sound walls that could alter the visual setting near visually sensitive land uses.	Low impact. This alignment would have intermittent view blockage from the aerial structure along Las Positas Road.	Low impact. This alignment introduces an aerial structure within the median above Las Positas Road, which would remove some landscaping but the built environment is generally considered to be of low visual quality.	Low impact. Light from the Vasco Road Station and Vasco yard would be in proximity to a park.

Table 3.5-2
Comparative Visual Quality Impacts of BART Extension Alternatives

Alternative	Visual Compatibility	Obstruction of Important Views or Scenic Vistas	Disturbance to Scenic Resources	New Sources of Light or Glare Affecting Day or Nighttime Views
2a – Downtown Vasco	Moderate impact. This alignment would include a noticeable aerial structure along El Charro Road. However, this area consists of industrial quarry land of low visual quality. The remainder of this alignment would be compatible with the existing setting consisting of industrial structures and the William J. Payne sports park. There could, however, be alterations to the visual setting because of sound walls near visually sensitive land uses.	Low impact. This alignment would have intermittent view blockage resulting from the aerial structure along El Charro Road.	Low impact. This alignment includes expansion of an existing ACE station. This alignment also would not alter the visual character of the existing railroad right-of-way and surrounding structures. Historic buildings in the Downtown would not be removed.	Moderate impact. Light from the Vasco Road Station and Vasco yard would be in proximity to a park.
3 – Portola	Low impact. This alignment would be at-grade along I-580 and visually compatible with the predominantly highway environment. This alignment would be below ground along Portola Avenue entering a subway platform at the Livermore Downtown Station and thus would not contrast with the visual setting.	Low impact. This alignment would be at grade along I-580 and be in a subway under Portola Avenue.	Low impact. The subway section would not visually impact the residential setting along Portola Avenue. Historic buildings in the Downtown that contribute to the visual setting would not be removed.	Moderate impact. Light from the Livermore Downtown Station and Portola/Railroad yard would be in proximity to a mix of commercial and residential structures.
3a - Railroad	Moderate impact. This alignment would include an aerial structure above an existing overpass as it approaches the Downtown Livermore Station. Additionally, there may be alteration to the visual setting because of possible sound walls near visually sensitive land uses.	Low impact. The aerial guideway along El Charro Road intermittently affects views from El Charro Road. Views from Isabel Avenue are unaffected by the Isabel/Stanley Station because of grade separation.	Low impact. This alignment would be built along I-580. The Isabel/Stanley Station and the overpass at Livermore Avenue would not result in changes to scenic resources.	Moderate impact. Light from the Isabel/Stanley and Livermore Downtown Stations and Portola/Railroad yard would be in proximity to residential and commercial structures.
4 – Isabel/I-580	Low impact. This alignment would be at-grade within the median of I-580 and visually compatible with the predominantly highway environment.	Low impact. This alignment would be at grade along I-580 and view blockage would be intermittent and/or minimal at Isabel/I-580 Station.	Low impact. This alignment would not alter the visual character of the I-580 setting; there are no scenic resources along this alignment.	Low impact. Light from the Isabel/I-580 Station would be located within the I-580 median.

Table 3.5-2
Comparative Visual Quality Impacts of BART Extension Alternatives

Alternative	Visual Compatibility	Obstruction of Important Views or Scenic Vistas	Disturbance to Scenic Resources	New Sources of Light or Glare Affecting Day or Nighttime Views
5 - Quarry	Low impact. This alignment would include a noticeable aerial structure along El Charro Road; however, this area consists of industrial quarry land of low visual quality. No obtrusive elements are introduced at the Isabel/Stanley Station.	Low impact. The aerial guideway along El Charro Road intermittently affects views from El Charro Road. Views from Isabel Avenue are unaffected by the Isabel/Stanley Station because of grade separation.	Low impact. This alignment introduces an aerial structure along El Charro Road that requires no alteration to scenic resources on industrial quarry land.	Moderate impact. Light from the Isabel/Stanley Station would be in proximity to residential structures.

occur since the existing setting is already largely defined by transportation-related uses and features. On the other hand, particularly in the station areas, BART facilities including multistory garages may contrast with the existing built environment. Several of the BART extension alternatives involve aerial guideways that could obstruct views or detract from scenic corridors identified by the Livermore General Plan. Even though Alternative 3 would be underground as it approaches Downtown Livermore, it would require ventilation shafts that would introduce a new aboveground structure along the Portola Avenue that would be viewed against the development along this thoroughfare.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Any changes to the visual setting within the study area under the No Build Alternative would be in accordance with the existing plans and policies within the study area. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no visual compatibility impacts.

Alternative 1 – Greenville East. The Greenville East alignment would run within the median at grade along the I-580 corridor where the highway is the prominent visual feature. BART tracks would be an extension of the tracks from the Dublin/Pleasanton Station and would include construction of a three-foot-high concrete safety barrier and fencing along the edges of the median similar to the existing barrier west of the Dublin/Pleasanton Station. The concrete barrier would be visually compatible with the existing setting because it would be similar to existing concrete barriers found along I-580 between Castro Valley and the Dublin/Pleasanton Station. The El Charro Road/I-580 interchange is currently undergoing construction so that

on- and off-ramps can be added into a partial cloverleaf design. As shown in Figures 3.5-10, the concrete barrier constructed along the edges of the median would obstruct views to the at-grade guideway from motorists except for those traveling in the tallest vehicles, such as trucks. Therefore, the at-grade rail guideways would not be seen by most motorists on I-580. As shown in Figure 3.5-10, the alignment would be visually compatible with the existing highway-oriented setting. It would not introduce structures that would substantially degrade the visual quality of the I-580 corridor.

At the Isabel/I-580 Station, the BART station platform would be at grade within the I-580 median and would also be blocked from views by a three-foot-high concrete safety barrier. Parking structures included in the station area would be up to 45 feet in height and would be noticeable within the existing rural highway environment, but would be similar in visual context to other highway-oriented commercial structures along I-580. Therefore, there would be neither a positive nor negative impact on the visual setting.

The BART alignment would be built on an elevated structure as it approaches the proposed Greenville East Station, crossing over the westbound I-580 lanes before turning south and crossing back under both the westbound and eastbound lanes to the station. Figure 3.5-11 shows that even though the elevated structure would introduce an overpass over westbound I-580, the structure would be compatible with the existing highway-oriented environment and would be viewed similarly to existing freeway overpasses along I-580. However, the aerial structure would also be located at the foot of the Altamont Pass and would be visually incompatible with the scenic corridor open space. Therefore, the alignment would have an adverse effect and potentially high impact on the existing setting in this portion of the alignment.

The Greenville East Station would be an aerial structure with an elevated station platform. A parking structure up to 45 feet in height would be located east of Greenville Road and would be compatible with the existing light industrial structures in the immediate area. The new BART yard would be located northwest of the station adjacent to the alignment and would be compatible with the existing highway commercial environment because it would be similar to nearby light industrial structures and would neither introduce physical elements that are vastly different nor detract from the existing environment. A possible 100-foot-high communication tower would project above the existing environment but the narrow structure would not obstruct views or contrast substantially with the nearby visual setting. Therefore, the proposed Greenville East Station and Greenville Yard would neither positively nor adversely affect the existing visual setting.

The majority of this alignment would be visually compatible with the I-580 corridor setting, but because this alignment would introduce an aerial structure at the foot of Altamont Pass that would be visually incompatible with this designated scenic corridor, the Greenville East Alternative would have a moderate-to-high impact on the existing visual setting and would therefore result in a potentially significant impact.

Source: DC&E 2009

TOP- EL CHARRO ROAD OVERPASS EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVES 1, 2, 3, 4)
FIGURE 3.5-10

Source: DC&E 2009

TOP - GREENVILLE ROAD EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVE 1)
FIGURE 3.5-11

Alternative 1a – Downtown-Greenville East via UPRR. At I-580 and El Charro Road, the BART alignment would be in an aerial structure that would be a compatible feature with the existing highway-oriented setting (see Figure 3.5-12). As shown in Figure 3.5-12, the proposed aerial structure along El Charro Road at I-580 would be noticeable, but would be a compatible feature with the existing overpasses and ramps associated with the highway. Farther south along El Charro Road, the aerial structure would be noticeable alongside El Charro Road which is sparsely vegetated and surrounded by flat quarry land of low visual quality where there are virtually no existing structures. The aerial structure is shown near where El Charro Road meets East Stanley Boulevard in Figure 3.5-13. The aerial structure would be obtrusive in an environment where no such existing structures exist. However, because the aerial structure would be located in an area where the overall existing visual quality is low, the aerial structure along El Charro Road would not result in a significant impact for this alternative.

This alternative alignment runs at grade within the existing UPRR right-of-way beginning along East Stanley Boulevard to approximately Greenville Road. Based on the existing railroad right-of-way conditions, the at-grade guideway would neither positively nor adversely impact the existing visual setting. As shown in Figure 3.5-14, the alignment would have a low impact on the existing visual setting of the UPRR right-of-way.

Nearing the proposed Downtown Livermore Station, this alignment crosses over Livermore Avenue along an existing overpass as shown in Figure 3.5-15 that would be used by the BART trains. The guideway does not introduce obtrusive elements that would be incompatible with the existing roadway overpass.

The majority of the proposed Downtown Livermore Station would be developed on the existing Livermore ACE Station/Livermore Amador Valley Transit Authority (LAVTA) Livermore Transit Center, including an at-grade station platform adjacent to the existing ACE platform. The proposed station area is surrounded by residential and commercial structures and Doolan Park on Junction Avenue. The proposed station would be an expansion of the existing ACE facility which would not be visually incompatible with the existing urban center of Livermore. Therefore, there would be a less-than-significant impact associated with the Downtown Livermore Station.

As discussed in Section 3.10, Noise and Vibration, of this Program EIR, secondary visual impacts could occur as a result of noise mitigation efforts for residents in proximity to the BART extension alternatives. If sounds walls are constructed to mitigate noise impacts, these walls, depending on their height and placement and their proximity to uses to the north and south of the UPRR tracks, could alter the visual setting for sensitive receptors along the alignment. Noise impacts where walls could be installed for Alternative 1a extend along the UPRR tracks generally from Kitty Hawk Road to Vasco Road. There are residential uses and recreational uses along the UPRR corridor where such walls could adversely affect the visual setting. As a result, this impact is considered potentially significant for Alternative 1a.

Source: DC&E 2009

TOP- EL CHARRO ROAD OVERPASS EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVES 1A, 1B, 2A, 3A, 5)
FIGURE 3.5-12

Source: DC&E 2009

TOP - EAST STANLEY BOULEVARD AND QUARRY EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVES 1A, 1B, 2A, 3A, 5)
FIGURE 3.5-13

Source: DC&E 2009

TOP - UPRR TRACKS NEAR WILLIAM J. PAYNE PARK EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVE 2A)
FIGURE 3.5-14

Source: DC&E 2009

TOP - LIVERMORE AVENUE EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVES 1A, 1B, 2A)
FIGURE 3.5-15

This alignment approaches the Greenville East Station at grade from south of the station along Greenville Road in an area of commercial and industrial parks. Alternative 1a would have a similar configuration for the Greenville East Station and Greenville Yard as Alternative 1. Alternative 1a would introduce an at-grade structure that would not be considered obtrusive nor visually incompatible with the existing commercial and industrial environment. Therefore, there would be a low visual compatibility impact associated with the Greenville East Station.

Overall, there would be a moderate, potentially significant impact on the existing visual setting because of the possibility of sound walls.

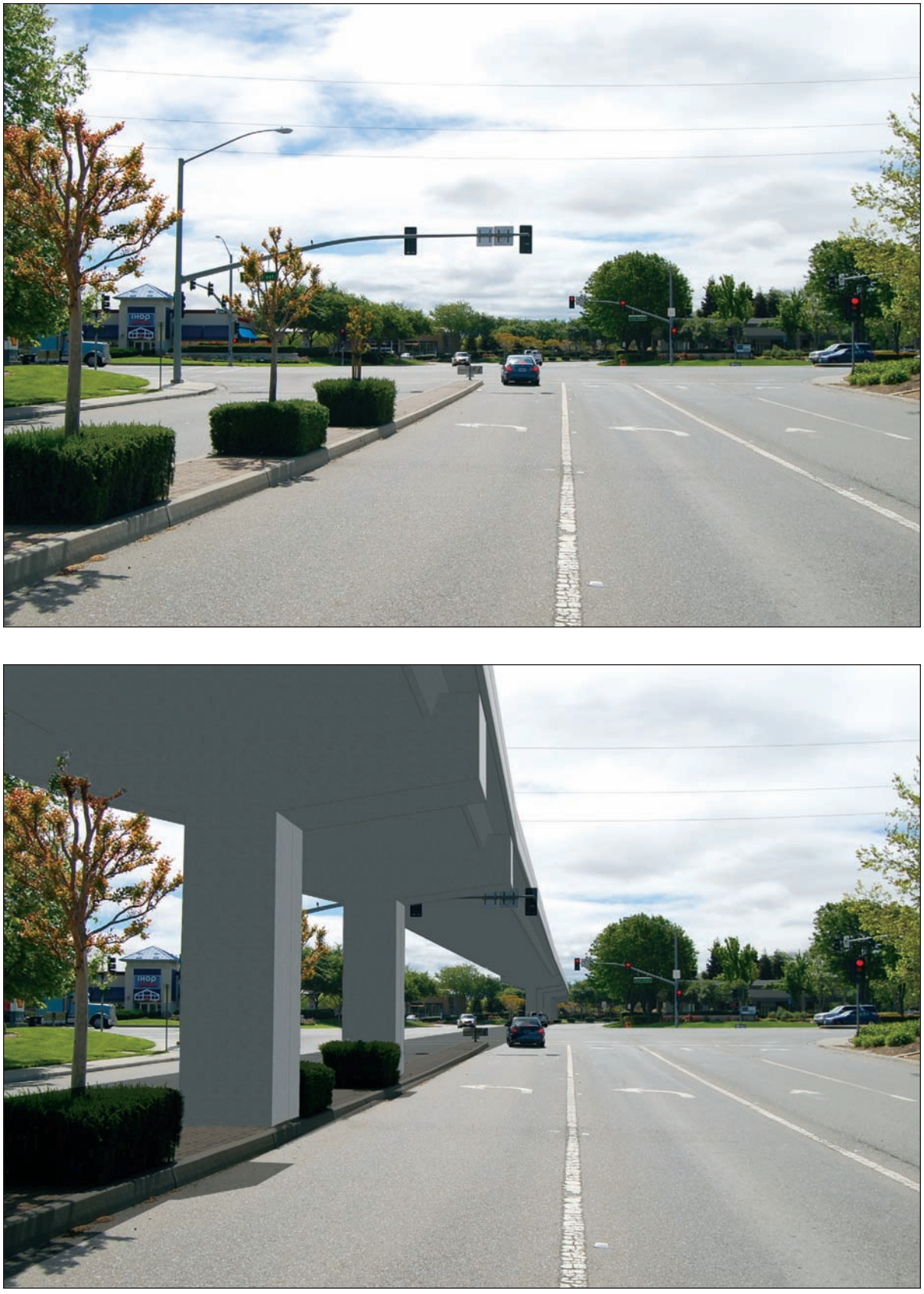
Alternative 1b – Downtown-Greenville East via SPRR. At I-580 and El Charro Road, the BART alignment would be in an aerial structure that would be a compatible feature with the existing highway-oriented setting, as explained above under Alternative 1a (see Figure 3.5-12). This alternative follows the same alignment configuration as in Alternative 1a until it reaches the SPRR right-of-way, after which it approaches the same Greenville East Station as described under Alternative 1a. For the same reasons as stated under Alternative 1a, this alignment would have a low-to-moderate impact on the existing visual setting because the aerial alignment along El Charro Road would be in an area of low visual quality. However, as described for Alternative 1a, Alternative 1b may require sound walls along the UPRR, the installation of which could alter the visual setting for nearby sensitive receptors. Depending on the height, location, and proximity of these sound walls, there could be a potentially significant visual impact.

Although the easternmost section of this alignment veers north onto the SPRR right-of-way, the structures surrounding this section of the alignment and the configuration of the alignment are similar to Alternative 1a along the UPRR right-of-way and would be visually compatible with the existing SPRR right-of-way setting.

Overall, the impact of this alternative would have a moderate, potentially significant impact because of the possibility of sound walls.

Alternative 2 – Las Positas. This alternative follows the same configuration as Alternative 1 along I-580 until it reaches Las Positas Road. As stated under Alternative 1, this portion of the alignment in the I-580 median would have a low impact on the highway-oriented commercial environment along I-580 because the alignment would be visually compatible with the existing highway setting (see Figure 5.3-10). This alignment also passes through the proposed Isabel/I-580 Station, which for the reasons stated under Alternative 1, would have neither a positive nor negative impact on the existing visual setting.

Along Las Positas Road, the BART guideway would be in an aerial structure, above the Las Positas Road median. As shown in Figure 3.5-16, the aerial structure would be highly visible to drivers along Las Positas Road, a major arterial in Livermore. The setting of Las Positas



Source: DC&E 2009

TOP - LAS POSITAS ROAD EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVE 2)
FIGURE 3.5-16

Road is defined primarily by "big box" commercial structures, chain restaurants, and large surface parking lots, which are not considered visually sensitive receptors. Where Las Positas Road intersects with First Street, the alignment would approach a residential area just south of the alignment. Because the alignment would be on an aerial structure along a busy arterial proximate to a residential area, the proposed aerial structure would have a moderate, potentially significant impact on the existing setting.

The proposed Vasco Road Station and Vasco Yard would be an expansion of an existing ACE station along the UPRR right-of-way. The BART/ACE intermodal station would include a parking structure east of Vasco Road up to 45 feet in height. The station would be within an area of primarily industrial structures and would remain compatible with the existing visual setting and would therefore constitute a low impact. The Vasco Yard would be immediately east of the Vasco Road Station and would also be sited in an industrial setting. The maintenance-related buildings and structures, such as the communication tower, would not contrast nor detract from the visual setting.

As described in Section 3.9, Noise and Vibration, there are stretches of Alternative 2 that may require sound walls to reduce potential noise impacts, Alternative 2 may require sound walls along Las Positas Road between I-580 and First Street and along the UPRR between the former SPRR and Vasco Road. While most of this stretch is occupied by non-residential uses, there are some segments of visually sensitive residential land uses. Depending on the height, location, and proximity of these sound walls, there could be a potentially significant visual impact for the nearby residents.

Overall, this alignment alternative would have a moderate impact on the existing visual setting because of the highly visible aerial structure in the visual setting of Las Positas Road and the possibility of sound walls. The structure would dominate the existing setting of a busy arterial that is in proximity to a residential area and therefore constitutes a potentially significant impact.

Alternative 2a – Downtown-Vasco. At I-580 and El Charro Road, the BART alignment would be in an aerial structure that would be a compatible feature with the existing highway-oriented setting (see Figure 3.5-10). Along El Charro Road, the alignment would constitute a low-to-moderate impact because it would introduce an aerial structure that would be out of character with the flat quarry land, but there are virtually no structures in this segment that would visually conflict with the elevated BART guideway (see Figure 3.5-12). As stated under Alternative 1a and Alternative 2, the majority of this alignment and the proposed Vasco Road Station and Vasco Yard would not be a highly visible change from the existing highway-oriented commercial and quarry land settings and would constitute a low-to-moderate impact.

As shown in Figure 3.5-14, the alignment approaches William J. Payne Sports Park at grade before arriving at Vasco Road Station. The at-grade alignment would appear to be a prominent feature in the existing setting alongside the park; however, the structure would be situated

along the existing UPRR right-of-way and would be located in a primarily industrial area where it would not be considered incompatible with the existing setting.

As described for Alternatives 1a and 1b, Alternative 2a may require sound walls along the UPRR, the installation of which could alter the visual setting for nearby visually sensitive land uses. Depending on the height, location, and proximity of these sound walls, there could be a potentially significant visual impact.

Alternative 3 – Portola. As stated under Alternative 1, the portion of the Portola alignment along I-580 would not result in a highly visible change from the existing setting because it would be visually compatible with the I-580 corridor (see Figure 3.5-10). The Isabel/I-580 Station would remain the same as under Alternative 1 except that the station platform would be below grade to accommodate the transition to subway along Portola Avenue and a below-grade subway platform at Livermore Downtown Station. This alignment would include a Portola/Railroad Yard, adjacent to and east of the Downtown Livermore Station along the UPRR right-of-way. This yard would not represent a highly visible change from the nearby existing ACE facility surrounded by a mix of lower-density residences, and commercial and industrial structures. The yard would be adjacent to the Trevarno Road Historic District, a heavily landscaped historic residential area. The Portola/Railroad Yard would be to the rear (west) of the district and visually screened by the trees along the western perimeter of the district. As a result, the Portola/Railroad Yard would not visually conflict with the nearby visual setting.

For the portion of the Portola Alternative beneath Portola and Junction Avenues, there would be a low impact to the existing visual setting. Although ventilation shafts would be located above ground, they would not visually conflict with the existing road, utility, and commercial visual setting. Where the alignment would be in subway, a total of seven ventilation shafts, approximately 20 feet by 20 feet and at least 8 feet above grade, would be located 1) on both sides of the underground platform, 2) at least 1,000 feet from a portal, and 3) no further than 3,000 feet apart. These ventilation shafts can be freestanding or built into the side of an adjacent structure in order to blend in or be compatible with the existing environment. Ventilation shafts built for existing BART subway lines do not noticeably detract from the existing visual character or quality of a developed setting and would be compatible with existing road, utility, and commercial settings along Portola and Junction Avenues. Therefore, where the Portola alignment would traverse beneath Portola and Junction Avenues, there would be a low impact to the existing visual character or quality of the setting.

Overall, the visual impact of Alternative 3 would be less than significant.

Alternative 3a – Railroad. At I-580 and El Charro Road, the BART alignment would be in an aerial structure that would be a compatible feature with the existing highway-oriented setting (see Figure 3.5-12). This alignment would follow the same route and vertical profile as Alternative 1a to the proposed Downtown Livermore Station. As stated under Alternative 1a, the construction of this portion of the alignment would have a low-to-moderate impact on the

existing setting because it would introduce an aerial structure along El Charro Road that would be visually out of context with the existing quarry land, but is an area of low visual quality (see Figure 3.5-12).

Unlike Alternatives 1a and 2a, this alignment would include a proposed Isabel/Stanley Station. A pedestrian bridge proposed to connect the station area to the nearby pedestrian and bicycle trail would be smaller in scale than the existing East Stanley Boulevard overpass and therefore would not be a prominent or dominating structure in the existing setting. The Isabel/Stanley Station also includes a proposed parking structure of up to 40 feet on the north side of the alignment. Overall, development of the station area would be within an environment defined by wide, heavily traveled arterial streets and would therefore have a low visual impact on the existing setting.

The overall configuration of the Downtown Livermore Station would be similar to Alternatives 1a, 1b, and 2a with one major exception. As the alignment approaches the Downtown Livermore Station, as shown in Figure 3.5-17, the alignment would be in an aerial structure above the existing overpass, and the station itself would be parallel to and above the existing ACE platform. Although similar to and located above an existing overpass, the height and visual prominence of the elevated platform would constitute a potentially significant alteration of the existing visual character at the trackway over Livermore Avenue, as shown in Figure 3.5-17. Therefore, the elevated platform would have a moderate impact on the existing visual setting. The new Portola/Railroad Yard proposed adjacent to and east of the Downtown Livermore Station would not be visually incompatible with the existing setting, as described above under Alternative 3.

As described for Alternatives 1a, 1b, and 2a, Alternative 3a may require sound walls along the UPRR. For Alternative 3a, these walls may be considered for the stretch between Kitty Hawk and Livermore Avenue, the installation of which could alter the visual setting for nearby visually sensitive land uses. Depending on the height, location, and proximity of these sound walls, there could be a potentially significant visual impact.

Because of the prominence of the alignment as it approaches the Downtown Livermore Station and the possibility of sound walls, the overall impact of this alignment would be moderate and therefore potentially significant.

Alternative 4 – Isabel/I-580. This alternative follows the same alignment configuration under Alternative 1 along I-580 to the Isabel/I-580 Station. As with Alternative 1, this alignment alternative would be visually compatible with the existing highway setting and would have a low and therefore less-than-significant impact on the existing visual setting.

Source: DC&E 2009

TOP - LIVERMORE AVENUE EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION (ALTERNATIVE 3A)
FIGURE 3.5-17

Alternative 5 – Quarry. At I-580 and El Charro Road, the BART alignment would be in an aerial structure that would be a compatible feature with the existing highway-oriented setting (see Figure 3.5-12). Similar to Alternative 3a, from the start of the alignment to and including the Isabel/Stanley Station, this alignment would have a low-to-moderate impact on the existing visual setting and would therefore have a less-than-significant impact. A majority of the alignment would not introduce obtrusive physical elements into the existing visual setting, except along El Charro Road where an aerial structure would be built in a flat, quarry land setting with few other existing structures (see Figure 3.5-12); however, the El Charro Road area is of low visual quality. Thus, the overall impact of this alternative is less than significant.

MITIGATION MEASURES. Alternatives 1, 2, and 3a would propose visually prominent aerial structures to support the BART alignment. Alternative 1 would include an overpass over I-580 at the foot of the Altamont Pass, Alternative 2 would include an aerial structure over Las Positas Road, and Alternative 3a would include an elevated configuration entering Downtown Livermore from the west as well as an aerial station. Because these aerial structures are in locations that are highly visible, the visual incompatibility impact would be significant. If one of these alternatives were selected, the alterations to the visual setting could not be feasibly mitigated because of the height and scale of the elevated guideway and support columns, and the impact would remain significant and unavoidable. If Alternative 1a, 1b, 2, 2a, or 3a was to be selected, the possibility of sound walls could result in visual compatibility impacts. The mitigation measure below would reduce the potential visual conflicts; however, sufficient information is not available at the program level to conclude with certainty that the mitigation would reduce this impact to a less-than-significant level in all circumstances. As detailed engineering design is developed on the project level, BART will identify more precisely the locations and heights of proposed soundwalls and will confer with the City on the tradeoffs between noise impacts and secondary visual impacts of soundwalls used to reduce noise impacts. Because the outcomes of Mitigation Measures VQ-1.1 and VQ-1.2 are uncertain at the programmatic stage, this impact is considered potentially significant and unavoidable. (PSU)

VQ-1.1 *Design Sound Walls with Sensitivity to Surroundings (Alternatives 1a, 1b, 2, 2a, 3a).* During the project design phase, sound walls may be required to reduce noise impacts in visually sensitive areas. In order to reduce the visual impacts of sound barriers, BART shall use materials, colors, and design details as well as landscaping, where feasible, to reduce the conflicts with the existing visual quality and to respect the visual character of nearby visually sensitive land uses.

VQ-1.2 *Confer with the City of Livermore Regarding Installation of Sound Walls (Alternatives 1a, 1b, 2, 2a, 3a).* During the project design phase, BART shall confer with the City on the tradeoffs between noise impacts and secondary visual

impacts of proposed sound walls, prior to determining the final locations and heights of sound walls.

VQ-2 Obstruction of Important Views or Scenic Vistas

Mid-range views of rolling hills, long-range views of Mount Diablo or Brushy Peak, and views from designated scenic corridors in Livermore were evaluated to identify impacts of the BART extension alternatives. Blockage of these views because of elevated guideways, stations, parking facilities, or maintenance yards would result in an adverse effect on the views. A description of the impacts on important views and scenic vistas associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Any changes to important views or scenic vistas within the study area under the No Build Alternative would be in accordance with the existing plans and policies within the study area. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no impact on important views or scenic vistas.

All BART Extension Alternatives. BART facilities that have the potential to interfere with important views include station and parking facilities, maintenance yards, and aerial guideways and support structures. The tallest BART-related structure would be the communication towers at the yards. Although these facilities are tall (up to 100 feet), they are slender pole-like structures and would not occupy a substantial portion of a particular viewshed. As a result, they would not obstruct important views.

Scenic Public Views. Scenic public views of importance are those that feature Mount Diablo, or Brushy Peak, or are along the following City designated scenic corridors: North Livermore Avenue, Isabel Avenue, Doolan Road, Fallon Road, Greenville Road, and Altamont Pass Road. For all BART extension alternatives, the portion of the alignment at grade within the median of I-580 would not block long-range views to Mount Diablo or Brushy Peak from viewers south of the I-580 corridor. Within the median of I-580, the vertical profile of the BART extension alternatives would not be sufficiently high to interfere with views of these much higher elevation landforms. For Alternatives 1, 2, and 4, the station platform at the Isabel/I-580 Station would be at grade and for Alternative 3, it would be below grade, so that station-related facilities would neither positively nor adversely affect views of the Mount Diablo or Brushy Peak from vantage points south of I-580. Views of rolling hills to the north from I-580 may also be blocked by proposed parking structures such as those at the Isabel/I-580-Station under Alternatives 1, 2, 3, and 4, but this view blockage would be intermittent and minimal because of the speed of passing motorists along I-580. In summary, loss of views of major landforms and scenic resources in the region because of the BART extension alternatives would be less than significant.

A three-foot-high concrete safety barrier on the outer edges of the median would block close-up views of the guideway for motorists along locally-designated scenic routes (North Livermore Avenue, Isabel Avenue, Doolan Road, Fallon Road, Greenville Road, and Altamont Pass Road). As seen in Figure 3.5-8, Fallon Road and Doolan Road are scenic routes north of I-580. Traveling south on Fallon Road, there would be views of all of the BART extension alternatives; traveling south on Doolan Road, there would be views of Alternatives 1, 2, 3, and 4. As noted above, the vertical profile of the BART extension alternatives would not be sufficiently high, even where the BART extension would leave the I-580 median in a flyover to approach El Charro Road under Alternatives 1a, 1b, 2a, 3a, and 5, to adversely affect long-range views toward the south. Notably, these corridors are considered scenic because of the visual quality and beauty of the terrain and open space as these roads climb into the hills to the north, areas that would not be affected by the BART extension alternatives. Thus, changes to the views from these scenic roads would not be adversely affected by the BART to Livermore Extension Program.

Along Isabel Avenue, there would be an intermittent blockage of views for motorists traveling north along Isabel Avenue due to the pedestrian overcrossings that would connect passengers from either side of the station to the platform in the I-580 median and to the proposed parking structures of up to 45 feet in height on the station site. The aerial guideway along El Charro Road would only intermittently block views in that area and the Isabel/Stanley Station would not block any views from Isabel Avenue. The intermittent view blockage would thus affect small stretches of this locally designated scenic route but would not detract from the overall visual quality of Isabel Avenue which extends south of Vineyard Avenue and far north of I-580 into the foothills.

Traveling north and south along North Livermore Avenue, Alternatives 1 and 2 would cross the viewshed of motorists. Under both alternatives, the alignment would be at grade in the median of I-580. A three-foot-high concrete safety barrier on the outer edges of the median would block close-up views of the guideway for motorists along this locally-designated scenic route. More distant views would not be adversely affected since the vertical profile of Alternatives 1 and 2 would not interfere with longer-range views.

Where the BART alignment would be in an aerial structure as it approaches and connects to the Greenville East Station under Alternative 1, as shown in Figure 3.5-12, the aerial structure would not be tall enough to obstruct mid- and long-range views to the east and north of the alignment nor would it obstruct views from Altamont Pass Road, a locally designated scenic route. For Alternatives 1, 1a, and 1b, the Greenville East Station would be in an aerial structure with an elevated platform that would be located south of where I-580 crosses over Greenville Road, which is also designated as a local scenic road. A proposed parking structure that would be up to 45 feet in height and located east of Greenville Road as well as the elevated platform would not affect views from I-580 and the Altamont Pass Road. The Greenville Yard, which would be located northwest of the station at grade, would also not affect views

from I-580 or Altamont Pass Road. Impacts to views in the area would be low, given the location of the Greenville East Station and Yard at the base of the I-580 overpass.

No important scenic views are available from Las Positas Road (along Alternative 2), the Downtown Livermore Station (Alternatives 1a, 1b, 2a, 3, and 3a), the Portola/Railroad Yard (Alternatives 3 and 3a), or the Vasco Road Station and Vasco Yard (Alternatives 2 and 2a).

Overall, because none of the BART extension alternatives would obstruct important views or scenic vistas, they would have a less-than-significant impact with respect to important views or scenic vistas.

Views of Planned Development in the Stoneridge Drive/Staples Ranch Specific Plan Area. Visual impact analysis under CEQA is concerned with alterations to public views and vantage points, rather than loss or obstruction of private views. Moreover, views of planned development are not considered scenic views protected by CEQA and impacts to business signage do not typically qualify as significant visual impacts. However, during the scoping process, comments were received regarding the effect of the BART extension alternatives on views of new development proposed at the El Charro Road/I-580. The following assessment is provided to respond to this scoping comment. Views of planned development in the Stoneridge Drive/Staples Ranch Specific Plan area adjacent to the El Charro Road/I-580 interchange would not be obstructed by the BART extension alternatives. For Alternatives 1, 2, 3, and 4, Figure 3.5-18 shows that the freeway sign for the auto mall located adjacent to the improved El Charro Road off-ramp would be visible to eastbound motorists. The signage would not be obstructed by the at-grade alignment along I-580. For Alternatives 1a, 1b, 2a, 3a, and 5, Figure 3.5-19 shows that the alignment would be in an aerial guideway approaching the El Charro Road/I-580 interchange. The freeway sign would not be blocked by the aerial guideway and would be visible to motorists traveling eastbound or westbound on I-580. Also, because the aerial structure crosses over to the south side of the freeway at El Charro Road, it would not block views for future development in the El Charro Specific Plan area, east of El Charro Road.

VQ-3 Disturbance to Scenic Resources

All BART extension alternatives could potentially change or remove existing scenic resources or visual amenities that could significantly alter the existing visual character or quality of the setting. Generally, where the BART extension alternatives would alter existing elements in an area where the existing environment is of low aesthetic quality, the level of visual impact would not be considered potentially significant. On the other hand, where the existing visual setting is of high quality and contains scenic resources, such as major landscape features, historic buildings, and other visual amenities, the BART extension alternatives could change or remove scenic resources in a way that detracts from the visual quality and/or leads to the loss or removal of existing scenic resources. In these instances, the level of visual impact would be potentially significant. A more detailed description of the impacts resulting from disturbance to scenic resources associated with each alternative is provided below.

Source: DC&E 2009

TOP - I-580 AT EL CHARRO ROAD EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION AND PLANNED AUTO MALL (ALTERNATIVES 1, 2, 4)
FIGURE 3.5-18

Source: DC&E 2009

TOP - I-580 AT EL CHARRO ROAD EXISTING VIEW;
BOTTOM - PROPOSED VIEW WITH BART EXTENSION AND PLANNED AUTO MALL
(ALTERNATIVES 1A, 1B, 2A, 3A, 5)
FIGURE 3.5-19

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Any changes to the visual setting within the study area under the No Build Alternative would be in accordance with the existing plans and policies within the study area. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no impact on visual character or quality.

All BART Extension Alternatives. For all BART extension alternatives, changes to existing highway elements would not disturb or remove scenic resources. The alignments would not change or remove existing visually noteworthy landscaping, structures, or features of development outside of the highway corridor since the alignments would be constructed within the I-580 median.

Except for Alternatives 1, 2, 3, and 4, all other BART extension alternative alignments would run along El Charro Road and the UPRR and/or SPRR right-of-way and pass through the Downtown Livermore area. Construction of the alignments along the El Charro Road and the railroad rights-of-way would not require significant changes to or the removal of existing right-of-way elements that would detract substantially from the visual setting. As noted in the "Existing Conditions" section, none of these corridors contain significant scenic resources. The Downtown Livermore area encompasses portions of the City that are of high quality and visually distinctive historic buildings contribute to this setting; however, the alternatives that pass the Downtown area would not result in the removal of these scenic resources (see Section 3.6, Cultural Resources, for more detail).

For Alternatives 1a, 1b, 2a, 3a, and 5, the aerial structure along El Charro Road would not change or remove visually important landscaping or existing structures that would detract from the existing visual quality of the area along El Charro Road.

For Alternative 3a, the approach to the Downtown Livermore Station would include an elevated platform over and above an existing overpass at Livermore Avenue, as shown in Figure 3.5-17. The elevated platform would not change or remove existing scenic elements that would adversely alter the existing visual character or quality of the setting on Livermore Avenue since the elevated platform would be built above an existing overpass and would not otherwise alter existing elements on or along Livermore Avenue.

For Alternative 3, where the alignment would be a subway along Portola Avenue and Junction Avenue, the construction of seven above-ground ventilation shafts could remove some of the landscaping that contributes to the visual character of this corridor. However, this impact would be a construction-related effect and could be avoided through siting during the project-level design or mitigated through tree replacement and/or landscaping. Historic buildings, attractive streetscapes, and Portola Park and Doolan Park mark the alignment of Alternative 3 as it enters the Downtown area. These scenic resources would not be adversely affected in the

long run, because the alignment for Alternative 3 along this stretch would be in a subway and station-related elements at the surface would not be expected to result in removal of scenic resources that would substantially alter the visual character of this portion of the Downtown.

The BART extension alternatives would not lead to the loss or removal of scenic resources in the station areas, since no scenic resources are present at the Isabel/Stanley Station (Alternatives 3a and 5), the Isabel/I-580 Station (Alternatives 1, 2, 3, 4), the Downtown Livermore Station (Alternatives 1a, 1b, 2a, 3, and 3a), the Portola/Railroad Yard (Alternatives 3 and 3a), the Vasco Road Station and Vasco Yard (Alternatives 2 and 2a), or the Greenville East Station (Alternatives 1, 1a, 1b). Parking structures built at the proposed BART stations would be constructed on either vacant property, such as at Isabel/I-580 Station, Isabel/Stanley Station, and Greenville East Station, or as part of an expansion of an existing ACE facility, such as at Downtown Livermore Station and at the Vasco Road Station. Thus, stations would not require significant changes to or removal of existing elements in the existing visual setting.

Overall, because none of the BART extension alternatives would significantly change or remove existing scenic elements in a way that would adversely alter the existing visual character or quality of the setting, the BART extension alternatives would have a less-than-significant impact on scenic resources.

VQ-4 New Sources of Light or Glare Affecting Day or Nighttime Views

All BART extension alternatives would introduce new sources of light or glare along the trackway, at the proposed stations, and at the yards that may affect day or nighttime views. Where the alignments would introduce new sources of light or glare in proximity to commercial and residential structures, a significant impact may occur. The impacts of new lighting for the BART extension alternatives would be dependent on the station, yard, and tailtrack designs. A more detailed description of the impacts of light and glare associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Any changes to the visual setting within the study area under the No Build Alternative would be in accordance with the existing plans and policies within the study area. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no impact from light and glare.

All BART Extension Alternatives. Lighting for each of the alignment alternatives would primarily be added at station areas and yards along each alignment. Lighting along trackways would be minimal and would not contribute to a significant or potentially significant impact from new sources of light or glare.

Because lighting for each alignment alternative has not yet been designed for stations, yards, and tailtrack areas, the lighting intensity, design specifications, and hardware are unknown. For the purposes of this Program EIR, it is conservatively assumed that the BART extension alternatives could potentially result in new sources of substantial light or glare interfering with day or nighttime views.

For station platforms, yards, tailtrack areas proposed within the I-580 median, BART has existing stations within highway medians that have utilized proper design and construction to prevent adverse effects from new point sources of substantial light or glare. BART may use these existing stations as a model for Alternatives 1, 2, 3, and 4, all of which would include the Isabel/I-580 Station.

All other alignment alternatives that include either Isabel/Stanley, Downtown Livermore, Vasco, Greenville East, or any combination of these proposed stations, as well as the Greenville Yard, Vasco Yard and/or Portola/Railroad Yard, would be located off I-580 within a variety of visual settings. Lighting or glare at stations not located along I-580 could potentially have a moderate impact on day and nighttime views in the area, since these areas are proximate to and visible from residential and commercial areas.

Based on the above, there would be potentially significant impacts related to light and glare at stations and yards.

MITIGATION MEASURES. The mitigation strategy described below would substantially lessen or avoid potentially significant impacts of each of the alternatives. Similar lighting controls have been applied to existing BART stations, such as the existing Dublin/Pleasanton Station, which does not emit light and glare at excessive levels. The following mitigation measure would be sufficient to reduce potential impacts to less than significant for all alternatives. (LTS)

VQ-4.1 *Design Lighting Fixtures to Reduce Spillover and to Prevent Forming Significant Point Sources of Light.* BART shall develop design specifications and plans for its stations and maintenance yards that screen and shield light sources to reduce spillover light onto neighboring residential properties and to avoid aircraft safety concerns for planes taking off or landing at Livermore Municipal Airport, consistent with the Federal Aviation Administration regulations. These specifications shall be included in the contract documents for the selected BART extension alternative. Lighting shall be designed and installed as necessary for public access and safety at all station areas.

Any night lighting shall be focused downward, shielded and recessed within their fixtures so as not to introduce new light or glare that may adversely affect the vision of motorists along nearby roadways or residents within station areas or adjacent to maintenance yards. During development of station lighting plans, a

lighting design specialist shall be consulted to determine the location, intensity and type of light sources used.

Effect of UP Commuter Access Principles

Compliance with the UP Commuter Access Principles would require an additional 36-foot-wide right-of-way, north of the existing UPRR ROW between Murrieta Boulevard and First Street, approximately 1.7 miles, and east of Mines Road, about 3,500 feet. The visual character of this corridor is defined primarily by low-rise, single family residential areas between Murrieta Boulevard and the shopping center around P Street, and then mostly one-story industrial and commercial structures interspersed with residential uses until First Street; east of Mines Road, the BART extension alternatives would run along Contractors Place, which is marked by low-rise, large footprint industrial properties. Because this area is already visually defined by the UPRR ROW, the introduction of a BART extension would not adversely affect the visual character of the corridor, and a general review of the corridor does not indicate any visually distinctive or prominent scenic features that would be removed to accommodate the right-of-way. The BART guideway and vehicles would operate alongside the existing UP freight and ACE trains and would not introduce new physical features that could substantially obstruct scenic views or corridors. As a result, compliance with the UP Commuter Access Principles would have a less-than-significant visual quality impact.

Cumulative Analysis

The geographic context for this cumulative visual quality analysis includes foreseeable future development along the six corridors where the BART extension alternatives are proposed. These corridors include I-580, the UPRR right-of-way, the SPRR right-of-way, Las Positas Road, Portola Avenue, and El Charro Road. The geographic context also includes the Greenville Road and Altamont Pass scenic routes, near the I-580 interchange.

Foreseeable development to be analyzed under this cumulative analysis includes development under the Stoneridge Drive/Staples Ranch Specific Plan for the City of Pleasanton, El Charro Specific Plan for the City of Livermore, Downtown Specific Plan for the City of Livermore, Arroyo Vista Neighborhood Plan for the City of Livermore and the Brisa Neighborhood Plan for the City of Livermore. All of these planning areas are shown and described in Section 3.2, Land Use and in Figure 3.3-4, Special Planning Areas, and in the "Applicable Policies and Regulations" discussion in Section 3.3, Land Use.

VQ-CU-5 Cumulative Visual Quality Impacts

Under the cumulative scenario, development would intensify along I-580, the UPRR and SPRR right-of-way, Las Positas Road, Portola Avenue, El Charro Road, and in the vicinity of the Greenville Road and Altamont Pass. Increased development could obstruct background view of hillsides, reduce vegetation, and increase structures within allowed height and bulk limits. Cumulative development from the various plans identified above would follow development patterns as specified by various plans and zoning requirements,

and would be expected to support plan policies to protect hillsides and scenic resources and to promote visually complementary development. Significant impacts from the BART to Livermore Extension Program are identified in areas where the alignment would be aerial and sound walls might be needed to reduce potentially significant noise impacts. Development in these locations could cumulate with the BART extension alternatives. However, the Livermore Downtown Specific Plan, for example, contains an urban design component that seeks to enhance the visual character and increase the connectivity of areas in the Downtown. In other locations, where aerial alignments are proposed (along El Charro Road and along Las Positas Road), no development projects are foreseeable, so that there would be no other development whose visual impacts could cumulate with those of the aerial sections of Alternatives 1a, 1b, 2a, 3a, and 5. Moreover, discretionary projects that could substantially alter the visual setting by introducing visual elements out of character with the surrounding environment or removing scenic resources would be subject to environmental review under CEQA and would be expected to mitigate potentially significant visual impacts where feasible.

Cumulative impacts on views would be significant if views from designated scenic routes and protected viewer locations would be degraded on a cumulative scale. However, growth allowed under the aforementioned plans would maintain protected view corridors, viewsheds, and sensitive viewer locations because planning documents inherently protect views through their scenic policies. As such, while the BART extension alternatives would significantly impact views along scenic routes such as Greenville Road and Altamont Pass Road, other foreseeable development would not result in adverse impacts on views that would cumulate with impacts of the BART extension alternatives.

Cumulative development would increase lighting in the various planning areas, along the BART extension alternative corridors. It is expected that either (1) local jurisdictions would substantially reduce lighting spillage through project permitting processes, or (2) local ordinances to prevent substantial light spillage or glare would apply to cumulative development. These requirements would prevent light spillage that would adversely affect the environment. As such, while the BART extension alternatives could significantly result in light spillage, other foreseeable development would not result in adverse impacts from light spillage or glare that would cumulate with impacts of the BART extension alternatives.

3.6 CULTURAL RESOURCES

Introduction

Cultural resources are defined as prehistoric and historic-period archaeological resources and historic-period buildings, structures, and other objects. This section describes the cultural setting of the study area and identifies known cultural resources along the proposed alignments. Applicable federal, state, and local regulations that have been enacted to protect cultural resources are identified.

The BART extension alternatives traverse a historically rich area, and some pass through the original portions of Downtown Livermore that developed along railroad lines, as well as areas of high sensitivity for buried historic and prehistoric archaeological resources. The potential for the BART extension alternatives to result in adverse effects to these resources is documented in this section.

This section is based on a cultural resources records search from the Northwest Information Center (NWIC), correspondence with the Native American Heritage Commission (NAHC), PBS&J cultural resource staff reconnaissance-level surveys of the study area (conducted in October and November 2008), and reviews of applicable city and county surveys, including the 2005 East Alameda County Historical and Cultural Resources Survey, the 1988 City of Livermore Historical Resources Inventory, and the 2004 Livermore Downtown Specific Plan and Historical Resources Inventory.

One comment letter concerning cultural resources was received during the NOP comment period. NAHC submitted a letter that included its recommendations for assessing project-related impacts on cultural resources. The recommendations included requesting a records search from the appropriate information center, conducting an archaeological survey, requesting the NAHC to search the sacred lands file, contacting the NAHC-provided list of Native American contacts to obtain their input on the project, and including procedures for the identification and treatment of accidentally discovered archaeological resources and human remains in the EIR. All of the NAHC recommendations were either followed in the programmatic cultural resource investigation conducted for this EIR or are required in project-level mitigation measures included in this section.

Existing Conditions

Prehistoric Setting

The study area was likely influenced by three different prehistoric cultural regions: the Sacramento-San Joaquin River Delta, the southern San Joaquin Valley, and the San Francisco Bay Area. The general cultural sequence for the San Francisco Bay Area applicable to the study area is described below.[1]

[1] Hylkema, B., *Santa Clara Valley Prehistory: Archaeological Investigations at CA-SCL-690, the Tamien Station Site, San Jose, California*, Center for Archaeological Research at Davis, Davis, California, Publication 15, University of Davis, CA, 2007.

Terminal Pleistocene, 11500–8000 B.C. No evidence for occupation during this period has yet been discovered, presumably because the evidence has been washed away through stream action, buried under more recent alluvium, or submerged on the continental shelf. Most scholars assume that Clovis people, who were hunters of big game, lived or ranged through the study area during this time.

Early Holocene (Lower Archaic), 8000–3500 B.C. Prehistoric groups during this period employed a generalized mobile forager pattern. Characteristic artifacts from this period include millingslabs and handstones, as well as wide-stemmed and leaf-shaped projectile points. The earliest date for a millingslab component in the Bay Area, 7920 B.C., was obtained from a charcoal concentration found underneath a millingslab at Los Vaqueros Reservoir in the hills east of Mount Diablo. It was located four meters below the surface, along with a projectile point made of Napa Valley obsidian. Archaeobotanical remains also recovered from the same site suggested an economy focused on acorns and wild cucumbers. Burials during this period tend to be flexed, sometimes found underneath cairns of millingslabs.

This period differed from the preceding period in that a greater variety of resources was exploited. By the end of this period, hundreds of plants and animals were utilized for food, medicine, and craft materials. Some researchers have postulated that this change took place due to a decrease of available big game at the end of the Pleistocene. Another change from the preceding period was the emergence of seasonal migration. Bay Area prehistoric groups learned to schedule their movements seasonally to exploit resources as they became available. Winters were spent in base camps along the coast, and summers were spent in the interior valleys and hills. To effectively exploit varying resources, prehistoric groups developed or refined stone tool-manufacturing and basket-making technologies. Non-utilitarian items such as ritual objects and personal ornaments were also elaborated.[2]

Early Period (Middle Archaic), 3500–500 B.C. Prehistoric groups changed during this period from being highly mobile to sedentary or semi-sedentary. The appearance of substantial shell mounds in western Berkeley (CA-ALA-307 in the trinomial system[3]), Ellis Landing (CA-CCO-295), and Pacheco (MRN-152) as well as large house floors with postholes found at the Rossmoor Site (CA-CCO-309) are indicative of the change. Mortars and pestles, some made of wood, first appeared at the end of the previous period but greatly increased in number during this period. Other changes that occurred during this period include greater amounts of ornamental goods in graves and changes in internment practices, such as occasional burning before burial. An example of this last change was found at Los Vaqueros Reservoir (CA-CCO-637), approximately 10 miles north of the study area.

Trends that began during the Lower Archaic intensified during the Middle Archaic. Mobility became more restricted, as evidenced by greater uses of local lithic materials, as well as the previously mentioned substantial shell mounds and house floors. The presence of millingslabs and handstones

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2 Chartkoff, J. L. and K. K. Chartkoff, *The Archaeology of California*. Stanford University Press, Stanford, 1984.

3 The trinomial system used for resource identification by the California Historical Resources Information System (CHRIS) assigns a two-letter code CA (for California), a three-letter code for the relevant county (e.g., ALA for Alameda County), and a sequentially assigned number (e.g., CA-ALA-3 refers to the third trinomial assigned in Alameda County).

beginning during the Early Holocene evidenced the use of small, hard seeds, but during the Early Period relative numbers of these artifact classes decreased, while mortars and pestles greatly increased, indicating that the use of acorns became much more important. Evidence of far ranging trade is also present. New types of beads, made of shell found in the central and southern California coasts, indicate travel inland as far as the Great Basin.[4]

Lower Middle Period (Initial Upper Archaic), 500 B.C.–430 A.D. Changes in ornamental items mark the beginning of this period. Rectangular shell beads, which had been in use for 3,000 years, disappear from the archaeological record, not only from the Bay Area, but also from the Central Valley and southern California. Split-beveled and small saucer beads made from Olivella shell enter the record, as do circular Haliotis beads. Spire-lopped Olivella beads, however, are more commonly found in burial contexts. Bead types that previously had low representation became more prevalent, such as Olivella saucer beads.

Other artifact types that enter the archaeological record during this period include barbless fish spears, elk femur spatulae, and bone tubes and whistles. In some parts of the Bay Area, basketry awls with shouldered tips appear, which indicates that coiled basketry manufacture had begun. Mortars and pestles were the sole grinding tools for most of the region, although millingslabs were still in use around the periphery. Net sinkers, once prevalent, are now only found in very limited areas.

Upper Middle Period (Late Upper Archaic), A.D. 430–1050. The Upper Middle Period is characterized by dramatic changes in mortuary practices and, once again, ornaments. Earlier in time, individuals were buried in flexed positions, but this changed to an extended position during this period. The first such interment was found in the Livermore Valley at the Santa Rita village site (CA-ALA-413). The individual, a 30-year-old male, was found buried with 30,000 Olivella saucer beads (the largest documented California bead lot), quartz crystals, as well as spatulae encrusted with beads. This funerary style, called Meganos, seems to have begun inland and traveled toward San Francisco Bay.

The beginning of this period, in addition to exhibiting the spread of the Meganos mortuary practice, also saw the abandonment of over half the sites that had been occupied just previously, a large increase in the amount of sea otter bone in the still-occupied sites, and a general collapse of the Olivella trade network. As the period progressed, more changes in bead styles occurred, generally following the spread of Meganos mortuary style. Other artifacts which appear during this period are well-fashioned "show blades," fishtail charmstones, single-barbed bone fish spears, ear spools, and large mortars. Seed recovery from midden (i.e., soil which contains the byproducts of human activity) also increases in at least some sites.

[4] Bennyhoff, J. A. and R.E. Hughes, Shell Bead and Ornament Exchange Networks Between California and the Western Great Basin, *Anthropological Papers of the American Museum of Natural History 64*(2):79-175, 1987; Jackson, T.L. and J.E. Ericson, Prehistoric Exchange Systems in California, In *Prehistoric Exchange Systems in North America*, edited by T.G. Baugh and J.E. Ericson, pages 385-415, Plenum Press, New York, 1994.

Initial Late Period (Lower Emergent), A.D. 1050–1550. This period is marked by an increase in cultural complexity. Among the changes that occurred was an increase in sedentism (i.e., more permanent settlement), as well as higher levels of social organization and more complex ceremonial practices. Social stratification increased as social classes or division developed, and ceremonial functions became more integrated. Mortuary practices also point to increasing social stratification. Partial cremations appear, usually associated with the wealthiest grave offerings, although overall the number of burials found with beads decreases.

Artifacts associated with this period include fully shaped show mortars, new types of Olivella beads, as well as new types of multi-perforated and bar-scored Haliotis ornaments. Other artifacts that appear are the flanged pipe, banjo effigy ornaments, and bow-and-arrow technology. The banjo effigy ornaments may be the precursor to the ethnographically documented Kuksu cult, a wide spread ceremonial system practiced by various language groups around the Bay Area.

Terminal Late Period, A.D. 1550–Contact. Beads are once again a marker for change during this period. The Olivella sequin and cup beads distinctive of the previous period disappear and are replaced by greater numbers of clamshell disk beads, while Olivella lipped and spire-lopped beads are the types to be found in some areas of the Bay Area. Distributions of sites do not, however, change, though midden accumulations for this period are in general thinner. Another changing characteristic of this period is projectile point types. The Stockton serrated point series is replaced by simpler corner notched arrow points in some areas, while Desert side-notched points appear in others. Other artifacts that appear during this period are the toggle harpoon, hopper mortar, and magnesite tube beads.

Ethnographic Setting

Ethnographically the study area lies within the traditional territory of the Ohlone/Costanoan people.[5] Accounts from Spanish soldiers, however, suggest that another linguistic group may have been dominant in the area at the time of European contact.[6] Later ethnographic work, as well as the archaeological record, indicates that the inland area had strong ties to the coastal area, and many individuals with traditional ties to the area are of Ohlone/Costanoan descent.

The Ohlone/Costanoan inhabited the South Coast Ranges between San Pablo Bay to the north and Monterey to the south, and extending east to the Mount Diablo mountain range. The Ohlone/Costanoan political organization consisted of a small tribelet led by a chief and a council of elders. Within a tribelet's territory, parties would engage in seasonal forays to hunt, fish, and gather plant resources. Waterfowl was the primary food source of the Ohlone/Costanoan, but other faunal resources, including elk, deer, pronghorn, jackrabbits, fish, shellfish, a variety of rodents, and other bird species, were taken when encountered. Acorns were another staple of the Ohlone/Costanoan diet, with no fewer than four species of oak exploited. Other plants gathered for consumption included

[5] Kroeber, A.L., Handbook of the Indians of California, Bureau of American Ethnology Bulletin 78 Washington D.C., 1925; Levy, R. S., Costanoan. In *The Handbook of North American Indians, Volume 8, California*, Edited by R. F. Heizer, pp. 485-495, Smithsonian Institution, Washington D.C., 1978.

[6] Cook, S.F., *The Aboriginal Population of Alameda and Contra Costa Counties, California*, University of California Anthropological Records 16(4):131-156, Berkeley, CA, 1957.

seeds from the tarweed, chia, pine, holly-leaf cherry, a variety of berries, and roots.[7] In addition to manufacturing a range of flaked and ground stone tools, the Ohlone/Costanoan also constructed water crafts from fresh-water tule reeds (i.e., tule balsas), cordage from the fibers of various plants, and twined basketry.[8]

A breakdown of traditional Ohlone/Costanoan life occurred during the mission period.[9] Disease and a decrease in the birthrate caused the Ohlone/Costanoan population to drop from 10,000 in 1770 to less than 2,000 in 1882. Aboriginal practices also disappeared, as traditional ceremonies and activities were discouraged or prohibited.[10]

Historic Setting

Spanish and Mexican Periods. By the middle of the sixteenth century, Spain had emerged as the premier naval and military power in Western Europe, with colonies in North and South America and a network of trading interests throughout the Pacific. The Spanish colonization of California was achieved through a program of military-civilian-religious conquest in which soldiers secured areas for settlement by suppressing Indian and foreign resistance and established fortified structures (presidios) from which the colony would be governed. Civilians established towns (pueblos) and stock-grazing operations (ranchos), and the missionary component of the colonization strategy was led by Spanish priests, who were charged with converting Indians to Catholicism, introducing them to the benefits of Spanish culture, and disciplining them into a productive labor force. By the beginning of the nineteenth century, the growth of Spanish California had come to a halt. Embroiled in the Napoleonic wars and a subsequent struggle to throw off French rule, Spain was unable to effectively rule its North American colonies. In 1822, after more than a decade of revolutionary struggle, Mexico achieved independence from Spain, and California became a distant outpost of the Mexican Republic.

The issue during the Mexican period that had the greatest enduring effect on the future of California was the secularization of the missions. Under a law adopted by the Mexican congress in 1833, the mission lands were to be subdivided into land grants, or ranchos, to be offered to trustworthy citizens. About 500 ranchos were established in California during the Mexican period. The ranchos established in the study area were Rancho San Ramon (inclusive of what is now the City of Dublin), Rancho Valle de San Jose (inclusive of what is now the City of Pleasanton), and Rancho Las Positas (inclusive of what is now the City of Livermore). Although wheat was cultivated and sheep and horses were raised, the rancho economy was based primarily on stock raising for the hide and tallow trade. Cattle were driven to coastal locations where they were slaughtered and skinned; the hides and tallow (a product

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7 Levy, R. S., Costanoan, In *The Handbook of North American Indians, Volume 8, California*, Edited by R. F. Heizer, pp. 485-495, Smithsonian Institution, Washington D.C., 1978.

8 Levy, R. S., Costanoan, In *The Handbook of North American Indians, Volume 8, California*, Edited by R. F. Heizer, pp. 485-495, Smithsonian Institution, Washington D.C., 1978.

9 Hylkema, B., *Santa Clara Valley Prehistory: Archaeological Investigations at CA-SCL-690, the Tamien Station Site, San Jose, California*, Center for Archaeological Research at Davis, Davis, California, Publication 15, University of Davis, CA., 2007.

10 Levy, R. S., Costanoan, In *The Handbook of North American Indians, Volume 8, California*, Edited by R. F. Heizer, pp. 485-495, Smithsonian Institution, Washington D.C., 1978.

made from animal fat and used to make soap and candles) were then processed for transport to awaiting trade ships. Most of the labor on the ranchos was performed by former mission Indians, who worked almost entirely for food and shelter.

As early as the 1820s, British and American mountain men, fur traders, and entrepreneurs were venturing into California in search of fortune. The Mexican government was unable to halt the incursion and granted citizenship to foreigners who pledged to adhere to Mexican law. Many of the foreigners received generous land grants on which they established grazing and commercial operations, such as the vast New Helvetia rancho granted in 1839 to John Sutter in what is now the City of Sacramento. Within a short period of time the outsiders came to dominate commercial life in California, thereby posing a challenge to Mexican control of the region.

Beginning in the early 1840s, Mexico's hold on California was further threatened by the steady overland migration of American settlers into the region. The increased American presence in California was a product of the expansionist impulse that had come to dominate the American imagination and that contributed to a deterioration of relations between Mexico and the United States. War between the U.S. and Mexico broke out in May 1846, and many decisive battles took place in California. The United States eventually prevailed, and the American victory over Mexico was formalized in February 1848 with the Treaty of Guadalupe Hidalgo. California was admitted as the thirty-first state in the Union on September 9, 1850.

In January 1848, just a few days before the signing of the Treaty of Guadalupe Hidalgo, James Marshall discovered gold on the American River. Marshall's discovery triggered the gold rush, a massive influx of fortune seekers into California, which led to the creation of major cities such as San Francisco, Sacramento, and Stockton, as well as numerous smaller settlements and towns in and around the gold-bearing regions of the Sierra Nevada foothills.

United States Acquisition to Present Day. Alameda County was separated from Contra Costa County and a small portion of Santa Clara County in 1853. That same year, the eastern portion of the county, which includes the study area, was named Murray Township after early settler Michael Murray. By 1870, wheat cultivation had replaced cattle grazing as the dominant economic activity in the study area.

The City of Livermore was established in 1869 by William Mendenhall, who named the town after his friend Robert Livermore. The original town was laid out between Livermore Avenue to the east, Q Street to the west, Railroad Avenue to the north, and Fifth Street to the south. Livermore developed primarily as an agricultural community until the Central Pacific Railroad, the first transcontinental railroad, was completed through the town in 1869, also resulting in the establishment of what became Pleasanton (originally Alisal). In 1879, the main line of the railroad was moved to a new route across the Carquinez Strait, but the line through Livermore remained the principal connection of the area to market for its products. In 1909, the route of the Central Pacific Railroad (by this time known as the Southern Pacific Railroad), was joined by a parallel line, the Western Pacific Railroad.

Commercial establishments sprang up around the Livermore train depot. Land adjacent to the tracks filled with warehouses benefiting from the proximity to the railroad. First Street from Livermore Avenue to L Street was the prime location for shops, restaurants, hotels, livery stables, theaters, as well as residences. Civic uses also emerged during this period. Several buildings around the intersection of Livermore Avenue and First Street were used at various times as City Hall before it moved to South Livermore and Pacific Avenues in 1974. Until then, the comings and goings of the community and city staff were part of the town's daily activity. As the town grew, commercial uses extended east across Livermore Avenue to the McLeod Tract, which became part of the town in 1875. Commercial uses also spilled over to Second Street. First Street, between Maple and L Streets, however, was undeniably Livermore's Downtown and center. In Livermore's early days, the lack of transportation and the need to be near the railroad required building close to the downtown core, but by the 1930s, the automobile allowed people to live farther from the center. The city and surrounding environs began to expand in a low-density pattern. Many of its original farm fields were replaced with residential, shopping, office, and industrial areas, all served primarily by the automobile.

Native American Consultation

On October 20, 2008 PBS&J cultural resources staff requested the NAHC to search its sacred lands file to determine if any Native American cultural resources are located in the study area. The NAHC response letter stated that the search of the sacred lands file failed to indicate the presence of Native American resources in the immediate area. The NAHC letter included a list of Native American organizations and individuals who may have knowledge of cultural resources in the area. Letters that included a brief description of the alternatives and a study area map were sent to each organization/individual identified on the NAHC list. As of the publication of this document, PBS&J has received no responses from tribal representatives indicating the presence of Native American cultural resources. However, the absence of site-specific information in the sacred lands file or through correspondence with tribal representatives does not indicate the absence of cultural resources on the study area or in the immediate vicinity.

Northwest Information Center Records Search

The California Historical Resources Information System (CHRIS) is administered by the California Office of Historic Preservation (OHP) and operates as a repository of information regarding historical resources in California. Information maintained by the CHRIS is derived from the accumulated observations and assessments reported by professional and academic cultural resource specialists. Records searches are the primary means through which CHRIS information is disseminated. A records search consists of a review of historical resources data on file for a specific geographic area at a CHRIS Information Center.

PBS&J cultural resources staff requested a cultural resources records search for the study area from the Northwest Information Center (NWIC) on October 17, 2008. The search radius provided to the NWIC comprises the study area for the BART to Livermore Extension Program and includes all of the proposed alternatives (track infrastructure, passenger stations and platforms, parking facilities,

bus/transit intermodal facilities, storage and/or maintenance yards, and ancillary improvements) and a surrounding ¼-mile radius. The NWIC searched its records of recorded archaeological and historical resources within the study area, the OHP Historic Properties Survey, the California Inventory of Historical Resources, and historic maps. The records search results identified 127 previous cultural resource studies conducted in the study area and 41 recorded cultural resources in the study area.

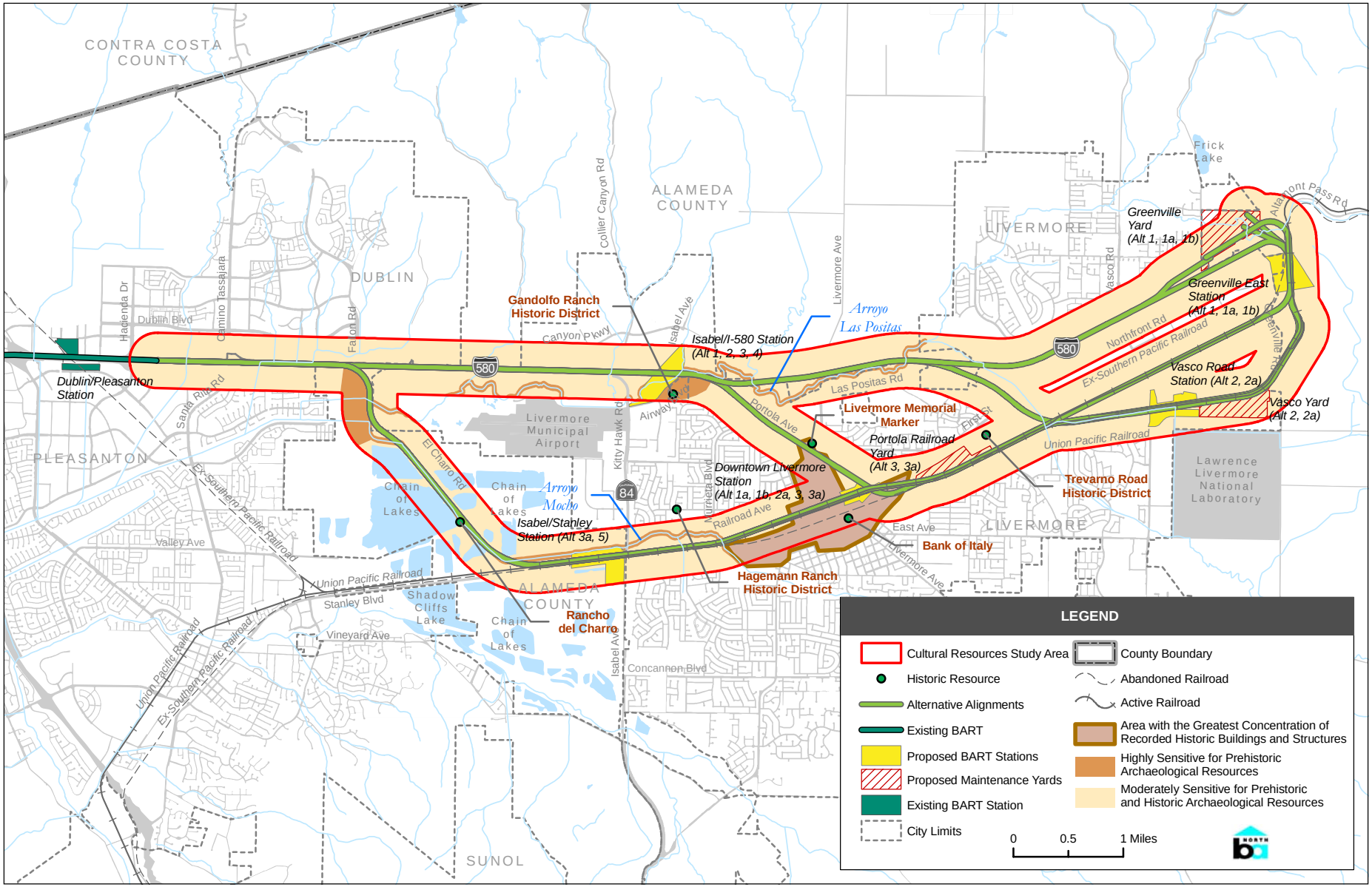
Recorded prehistoric and historic-age (i.e., 45 years old or older) cultural resources in the study area include isolated prehistoric artifacts, railroad segments, flood and irrigation canals, barns and other structural remnants of ranching and agricultural operations, and numerous historic-age residential and ranch properties. Table 3.6-1 provides a summary of recorded cultural resources in the study area. Pursuant to federal and State law, information within the CHRIS pertaining to historical resources of an archaeological nature is confidential, and therefore locations of resources are not provided in this section.

Reconnaissance Surveys and Identification of Cultural Resource Sensitivity

Following identification of known archaeological sites and historical resources by the NWIC, PBS&J cultural resources staff conducted three one-day reconnaissance-level surveys of the study area (i.e., the proposed alignment and station location alternatives and a surrounding ¼-mile radius). The surveys were conducted in October and November 2008 and included driving accessible alternative routes, visiting accessible known archaeological sites and historic properties, and identifying areas of potential sensitivity for unrecorded archaeological and historical resources. Based on the results of the records search, literature reviews, the reconnaissance surveys, and reviews of applicable city and county surveys, including the 2005 East Alameda County Historical and Cultural Resources Survey, the 1988 City of Livermore Historical Resources Inventory, the 2004 Livermore Downtown Specific Plan and Historical Resources Inventory, a map of general cultural resource sensitivity was prepared, which is included as Figure 3.6-1.

National Register and California Register Properties within the Study Area

The investigation identified numerous properties within the study area that are listed on local inventories (see “Impact Assessment and Mitigation Measures” below), along with four properties listed on the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), and/or California Historical Landmarks. The Bank of Italy (NRHP), the Hagemann Ranch Historic District (NRHP, CRHR), the Livermore Monument (State Landmark), and the Gandolfo Ranch District (CRHR) are all within the study area; however, only the Gandolfo Ranch District is within the area of impact for any of the alternatives.



Source: AECOM, May 4, 2009; PBS&J, 2009.

GENERAL CULTURAL RESOURCE SENSITIVITY

FIGURE 3.6-1

Table 3.6-1
Cultural Resources Identified by Northwest Information Center in the BART to Livermore Study Area

NWIC Resource Number	Trinomial	Resource Name	Resource Type	National, State, or Local List Status
P-01-001776	–	Arroyo Mocho Canal	Historic-period flood canal	Not listed
P-01-010526	–	–	Archaeological site with prehistoric and historic-period components	Not listed
P-01-002124	CA-ALA-518H	Oaks Business Park Agricultural Remains	Historic-period archaeological site	Not listed
P-01-002125	CA-ALA-519	Southern Pacific Railroad segment	Historic-period railroad segment and associated elements	Not listed
P-01-002205	–	Gandolfo Ranch	Historic-period ranch complex	CRHR
P-01-002199	–	–	Prehistoric isolate artifacts	Not listed
P-01-002198	–	–	Prehistoric isolate artifact	Not listed
P-01-002196	–	–	Historic-period barbed-wire fence	Not listed
P-01-002204	–	Gandolfo Ranch District	Historic-period ranch complex and associated features	Not listed
P-01-002203	–	–	Prehistoric isolate artifact	Not listed
P-01-002197	–	Well House	Collapsed historic-period well house and associated elements	Not listed
P-01-002108	CA-ALA-430/H	Robert Livermore Adobe Site	Historic-period archaeological site	California Historical Landmark
P-01-002190	CA-ALA-582H	Western Pacific Railroad	Historic-period railroad segment	Not listed
P-01-010779	–	–	Historic-period ranch property	Not listed
P-01-010780	–	–	Historic-period Quonset warehouse	Not listed
P-01-010512	–	–	Historic-period ranch property	Not listed
P-01-010513	–	–	Historic-period ranch house	Not listed
P-01-010513	–	–	Historic-period residence / office	Not listed
P-01-010515	–	–	Historic-period residence / office buildings	Not listed
P-01-010516	–	–	Historic-period residence	Not listed
P-01-010517	–	–	Historic-period residence	Not listed
P-01-010518	–	–	Historic-period residence	Not listed

Table 3.6-1
Cultural Resources Identified by Northwest Information Center in the BART to Livermore Study Area

NWIC Resource Number	Trinomial	Resource Name	Resource Type	National, State, or Local List Status
P-01-010519	–	–	Historic-period residence	Not listed
P-01-001773	–	Western Pacific Railroad	Historic-period railroad segment	Not listed
P-01-010629	–	South Bay Aqueduct	Historic-period water-conveyance conduit	Not listed
P-01-001774	–	Western Pacific Railroad	Historic-period railroad segment	Not listed
P-01-002122	CA-ALA-516		Historic-period ranch structures, remains of concrete wall, and associated debris	Not listed
P-01-002195	CA-ALA-584H		Historic-period building foundations	Not listed
P-01-002194	–	–	Historic-period steel-lined feed trough and debris	Not listed
P-01-002200	–	–	Prehistoric isolate artifact	Not listed
P-01-000067	CA-ALA-47	–	Prehistoric isolate artifacts	Not listed
P-01-002202	–	–	Prehistoric isolate artifact	Not listed
P-01-002201	--	–	Prehistoric isolate artifacts	Not listed
P-01-010432	--	Ising's Culligan building	Historic-period warehouse building	Not listed
P-01-010433	–	–	Historic-period building foundation	Not listed
P-01-010430	–	R.A. Hansen oil facility warehouses	Historic-period warehouse buildings	Not listed
P-01-000264	–	–	Historic-period residence and barn	Not listed
P-01-000263	–	–	Historic-period residence	Not listed
P-01-000262	–	–	Historic-period residence	Not listed
P-01-010781	–	–	Historic-period residence and outbuilding	Not listed
P-01-010670	–	–	Historic-period ranch complex	Not listed

Source: Northwest Information Center, *Proposed BART Dublin to Livermore Extension,* NWIC File 08-0490, November 5, 2008.

Applicable Policies and Regulations

State Regulations. Under CEQA, public agencies must consider the effects of their actions on both "historical resources" and "unique archaeological resources." Pursuant to Public Resources Code Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." Section 21083.2 requires agencies to determine whether proposed projects would have effects on "unique archaeological resources."

"Historical resource" is a term with a defined statutory meaning (see Public Resources Code, Section 21084.1 and CEQA Guidelines, Section 15064.5(a) and (b)). The term embraces any resource listed in or determined to be eligible for listing on the CRHR. The CRHR includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California State Landmarks and Points of Historical Interest.

Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be "historical resources" for purposes of CEQA unless a preponderance of evidence indicates otherwise (Public Resources Code, Section 5024.1 and California Code of Regulations, Title 14, Section 4850). Unless a resource listed in a survey has been demolished, lost substantial integrity, or there is a preponderance of evidence indicating that it is otherwise not eligible for listing, a lead agency should consider the resource to be potentially eligible for the CRHR.

In addition to assessing whether historical resources potentially impacted by a proposed project are listed or have been identified in a survey process, lead agencies have a responsibility to evaluate them against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources (Pubic Resources Code, Section 21084.1 and CEQA Guidelines, Section 15064(a)(3)). In general, an historical resource, under this approach, is defined as any object, building, structure, site, area, place, record, or manuscript that:

(a) Is historically or archeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California; and

(b) Meets any of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

(CEQA Guidelines, Section 15064.5(a)(3))

Archaeological resources can sometimes qualify as "historical resources" (CEQA Guidelines, Section 15064.5(c)(1)). In addition, Public Resources Code Section 5024 requires consultation with the Office of Historic Preservation when a project may impact historical resources located on State-owned land.

For historic structures, CEQA Guidelines Section 15064.5(b)(3) indicates that a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (1995) shall mitigate impacts to a level of less than significant. Potential eligibility also rests upon the integrity of the resource. Integrity is defined as the retention of the resource's physical identity that existed during its period of significance. Integrity is determined through considering the setting, design, workmanship, materials, location, feeling, and association of the resource.

As noted above, CEQA also requires lead agencies to consider whether projects will impact "unique archaeological resources." Public Resources Code Section 21083.2(g) states that "'unique archaeological resource' means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

(Public Resources Code, Section 21083.2(g).)

Treatment options under Section 21083.2 include activities that preserve such resources in place, including planning construction to avoid archaeological sites, deeding archaeological sites into permanent conservation easements, capping or covering archaeological sites with a layer of soil before building on the sites, and planning parks, green space, or other open space to incorporate archaeological sites.

Advice on procedures to identify cultural resources, evaluate their importance and estimate potential effects is given in several agency publications such as the series produced by the Governor's Office of Planning and Research (OPR). The technical advice series produced by OPR strongly recommends that Native American concerns and the concerns of other interested persons and corporate entities, including but not limited to, museums, historical commissions, associations and societies, be solicited as part of the process of cultural resources inventory. In addition, California law protects Native American burials, skeletal remains and associated grave goods regardless of their antiquity, and provides for the sensitive treatment and disposition of those remains.

Section 7050.5(b) of the California Health and Safety Code specifies protocol when human remains are discovered. The code states:

> In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of section 27492 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in section 5097.98 of the Public Resources Code.

CEQA Guidelines Section 15064.5(e) requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission must be contacted within 24 hours. At that time, the lead agency must consult with the appropriate Native Americans, if any, as timely identified by the Native American Heritage Commission. Section 15064.5 directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Applicable Historical Resource Inventories. The station and maintenance yards proposed for the BART extension alternatives are either in unincorporated Alameda County or Livermore. Local historical resource inventories for these jurisdictions identify resources that may be protected locally and under CEQA.

East Alameda County Historical and Cultural Resources Survey. In 2005 Alameda County performed a survey of the East County Area and produced a report titled Historical and Cultural Resources Survey: East Alameda County. The survey included unincorporated areas in the eastern portion of the County and resulted in a list of potential resources based on a visual inspection alone. NRHP, CRHR, or local significance criteria were not used to determine significance and it does not appear that a local register was adopted as a result of the survey.

Livermore Downtown Specific Plan and Historical Resources Inventory. The Livermore Downtown Specific Plan details land uses and their distribution, proposed infrastructure improvements, development standards, and design guidelines and proposed standards. The Historic Resources Inventory is an intensive historic resource survey of the Livermore Downtown Specific Plan area. Created in 2004, this document re-evaluates several properties in the downtown area that were previously identified in the 1988 Historical Resources Inventory and identifies additional historic resources. The 1988 Inventory is still used for areas outside of Downtown. For each identified historical property, the inventory includes site information, description, and significance.

Resources of Concern. Based on the review of available surveys and inventories, there are a number of known buildings that are identified as historic and may be affected by the BART extension alternatives. The following buildings are therefore of particular concern in the following assessment, although it is

noted that there may be other eligible buildings and properties that would be identified during the project-level environmental review:

- Gandolfo Ranch District, CRHR listed and potentially NRHP eligible, as a ranch complex;
- Ranch del Charro, locally listed house;
- Several Downtown buildings, locally listed; and
- 4221 Las Positas Road, locally listed house.

The Livermore Train Depot is a designated Historic Preservation Landmark Site that is eligible for listing on the California Register of Historic Resources, at the local level. The Train Depot is currently located in the downtown area at its original location approximately 600 feet from the UPRR tracks. The City is proposing to relocate this building to 2500 Railroad Court, adjacent to the UPRR tracks and the downtown ACE station. This project will require a separate environmental review by the City.

Impact Assessment and Mitigation Measures

Standards of Significance

For the purposes of this EIR, impacts on cultural resources are considered significant if the proposed program would:

- Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5; or
- Disturb any human remains, including those interred outside of formal cemeteries.

For each cultural resource impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, CR refers to Cultural Resources.

Methodology

The impact analysis for cultural resources is based on a cultural resources records search from the NWIC, correspondence with the NAHC, reconnaissance-level surveys of the study area, and reviews of applicable city and county surveys, including the 2005 East Alameda County Historical and Cultural Resources Survey, the 1988 City of Livermore Historical Resources Inventory, and the 2004 Livermore Downtown Specific Plan and Historical Resources Inventory.

The impact analysis considers the known cultural resource environment in the study area, the potential for previously undocumented cultural resources in the study area, and physical effects to known and previously undocumented cultural resources that could result from the BART extension alternatives. Impacts are assessed in accordance with thresholds of significance based on Section V, Cultural Resources, of the Environmental Checklist Form included as Appendix G of Title 14, California Code of Regulations, Chapter 3, Guidelines for Implementation of the California Environmental Quality Act.

Direct effects include removal or physical damage to the historic resource, such as may occur when construction or operational vibration is near enough to adversely affect the structure. FTA screening distances for fragile buildings have been used to estimate potential impacts from vibration; however, it should be recognized that physical effects vary with the type of construction and that the conclusions presented in this assessment are conservative. The analysis also considers the possibility that the setting of the historic resource may be disturbed sufficiently to compromise its historic status. Setting is the physical environment of a historic property and refers to the character of the place in which the property played its historical role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space. The physical features that constitute the setting of a historic property can be either natural or manmade, including such elements as:

- Topographic features (a gorge or the crest of a hill);
- Vegetation;
- Simple manmade features (paths or fences); and
- Relationships between buildings and other features or open space.[11]

Elements of the BART to Livermore Extension Program that could interfere with or compromise the setting include construction-period alterations, as well as the introduction of the stations, the maintenance yards, the parking garages, and the guideway. Research has not been performed at this program-level environmental documentation to understand the importance of a historic resource's setting and its contribution to the property's historic designation. As a result this analysis conservatively assumes that substantial noticeable changes to the setting of a historic property may be significant.

Environmental Analysis

Table 3.6-2 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are associated with potential permanent impacts from construction and operation; temporary impacts that could result during construction are addressed in Section 3.16 of this document. Permanent impacts refer to removal or physical damage to a historical resource. As shown in the table, all BART extension alternatives would result in potentially significant impacts to both historic and archaeological/prehistoric resources. Through identified mitigation measures, all potentially significant

[11] U.S. Department of the Interior, National Park Service, How to Apply the National Register Criteria for Evaluation <http://www.nps.gov/history/nr/publications/bulletins/nrb15/> Revised for Internet 2002.

impacts would be ameliorated but not necessarily to a less-than-significant level. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.6-2
Summary Comparison for Cultural Resources Impacts of the BART to Livermore Extension Program

	Historic Resources Impacts		Archaeological Resource/ Human Remains Impacts	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA
1 - Greenville East	PS	No	PS	Yes
1a - Downtown-Greenville East via UPRR	PS	No	PS	Yes
1b - Downtown-Greenville East via SPRR	PS	No	PS	Yes
2 - Las Positas	PS	No	PS	Yes
2a - Downtown-Vasco	PS	No	PS	Yes
3 - Portola	PS	No	PS	Yes
3a - Railroad	PS	No	PS	Yes
4 - Isabel/I-580	LTS	NA	PS	Yes
5 - Quarry	PS	No	PS	Yes

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant
NI = No Impact NA = Not applicable

CR-1 Historical Resources

Due to the proximity of the alignment alternatives to known historic and potential historic-age buildings, the alignment alternatives are considered highly sensitive for historical resources. Construction of BART tracks and maintenance facilities could potentially cause direct damage to historical resources from earth-moving and demolition activities, or construction-related vibration (see Section 3.10, Noise and Vibration, and Section 3.16, Construction, for analysis of vibration-related impacts). Project-level surveys would be required to provide a thorough assessment of the alternative's potential impacts on significant historic-age buildings or structures during construction. However, based on information in Section 3.10, Noise and Vibration, the potential for vibration impacts on historical resources during operation would be less than significant under all alternatives. Construction activities, if they involve impact pile drivers, could damage fragile buildings within 135 feet.[12] Two historical resource areas could

[12] The Federal Transit Administration (FTA) threshold for damage to structures is a peak particle velocity (PPV) of 0.5 inches per second.

be within this distance and could experience physical damage: Rancho del Charro and the downtown area. Other operational impacts to historical resources would be related to potential alteration of the resource setting through the introduction of project elements (e.g., track infrastructure, passenger stations and platforms, parking facilities, bus/transit intermodal facilities, storage and/or maintenance yards, and ancillary improvements) that contrast with the setting of the historical resource and could diminish the status of the resource as historic.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to historic resources.

Alternative 1 – Greenville East. There is a low potential for the portion of Alternative 1 in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within the median and no resources exist in proximity to median that could be damaged by construction or operational vibration. The proposed Isabel/580 Station area is about 300 feet from the Gandolfo Ranch District, a CRHR-listed and potentially NRHP-eligible historic-age ranch complex identified in the NWIC records search conducted for this project. At this distance, there would be no potential for physical damage to the Gandolfo Ranch District during construction of the Isabel/I-580 Station area (see Table 3.16-6 in Section 3.16, Construction Impacts). Because the station facilities including structured parking, would be set back and physically separate from the Gandolfo Ranch District by Airway Boulevard, the Isabel/I-580 Station would neither affect access to the district nor alter the visual setting substantially. As a result, Alternative 1 would have a less-than-significant impact on known historical resources. Once outside of the historic downtown core, historic-age built resources appear to be relatively sparse. Nevertheless, there is a moderate potential for previously unrecorded historic-age buildings and structures to exist in this portion of the alternative, and the impact would be considered potentially significant.

Alternative 1a – Downtown-Greenville East Via UPRR. There is a low potential for the portion of Alternative 1a in the median of I-580 to result in construction or operational impacts on historic-age buildings or structures because no resources exist within the median and there are none in proximity to the median that could be damaged by construction or operational vibration.

This alternative would include an aerial structure approximately 150 feet east of the Rancho del Charro property, a 1940s ranch complex that includes a house, stables, barn, and a eucalyptus row. The Rancho del Charro property was determined potentially significant in the 2005 East Alameda County Historical and Cultural Resources Survey. The elevated guideway along El Charro Road could require pile driving to erect the support columns. Pile driving at this

distance from the Rancho del Charro buildings could damage the structures, a potentially significant impact. The proximity of a highly visible aerial structure could also alter the setting of this historic ranch complex, which could diminish the historic resource.

This alternative would pass through Downtown Livermore via the UPRR corridor. The 1988 City of Livermore Historical Resources Inventory, the 2004 Livermore Downtown Specific Plan and Historical Resources Inventory, and the reconnaissance-level surveys conducted for this alternative identified numerous potentially significant resources in downtown, including three circa 1925 residences along Chestnut Street (1853, 1867, and 1881 Chestnut), and two circa 1880 farmhouses (228 K Street and 2152 Oak Street) in immediate proximity to the proposed tracks. All of these properties are within a block of the rail line. The closest is about 50 feet from the tracks; the furthest of these properties is about 250 feet away. The closer homes could be damaged if pile driving were needed to install the BART guideway. The setting on this area has been substantially altered by redevelopment and grade separation of Livermore Avenue and the tracks. In addition, these homes lie within the Livermore Downtown Specific Plan and their setting is proposed to be modified. As a result, introduction of an at-grade BART extension would not be expected to significantly alter the resource setting such that the historic character of these properties would be compromised.

This alternative would continue east of Downtown Livermore via the UPRR right of way to a terminus station at Greenville East. Although no recorded historical resources are located along this portion of the alternative, this area does not appear to have been intensively surveyed for historic-age buildings and structures. Once outside of the historic downtown core, historic-age built resources appear to be relatively sparse. Therefore, there is a moderate potential for previously unrecorded historic-age buildings and structures to exist in this portion of the alternative.

Due to the proximity of this alternative to the Rancho del Charro property, recorded historic-age buildings in Downtown Livermore, and areas of historic settlement along the entire proposed alignment, this alternative is considered highly sensitive for historical resources. Potential impacts on historical resources that could result from this alternative include damage caused by construction vibration. In addition, implementation of this BART alternative would place an aerial structure near the ranch house that could alter its setting and diminish the historic quality of the building. This impact is therefore considered potentially significant.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would have the same potential impacts as Alternative 1a, except Alternative 1b would follow an existing right of way previously operated by Southern Pacific Railroad (SPRR) to a terminus at Greenville East.

Due to the proximity of this alternative to the Rancho del Charro property, recorded historic-age buildings in Downtown Livermore, and areas of historic settlement, this alternative is considered highly sensitive for historical resources. Potential impacts on historical resources that could result from this alternative include damage caused by construction vibration, and

alteration of the resource setting through introduction of an aerial structure near Rancho del Charro. This impact is therefore considered potentially significant.

Alternative 2 – Las Positas. There is a low potential for the portion of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within or in proximity to the median that could be damaged by construction or operational vibration. In particular, the Gandolfo Ranch District is approximately 700 feet from the proposed alignment and thus would not likely experience damage from construction or operational vibration.

While this alternative would avoid potential effects to the Rancho del Charro property and resources in Downtown Livermore, this alternative would include an aerial structure that would pass near a potential historic resource, a house at 4221 Las Positas Road that is listed in the 2005 East Alameda County Historical and Cultural Resources Survey. This structure is more than 150 feet from the proposed alignment and thus would not likely experience damage from construction or operational vibration. The house is set back over 120 feet from Los Positas Road and is heavily screened from the road by mature trees. Nevertheless, the BART alignment on this segment would be elevated and could alter the resource setting.

Potential impacts on historical resources that could result from this alternative include alteration of resource setting through introduction of visually prominent aerial alignment along Los Positas Road. This impact is therefore considered potentially significant.

Alternative 2a – Downtown-Vasco. As is the case with Alternatives 1, 1a, and 1b, there is a low potential for the portion of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within or in proximity to the median that could be damaged by construction or operational vibration. This alternative would have the same potentially significant impacts on the Rancho del Charro property and historical resources in Downtown Livermore as Alternatives 1a and 1b.

Alternative 3 – Portola. There is a low potential for the portion of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within the median or in proximity to the median would be damaged by construction or operational vibration.

The alternative would transition from the I-580 median to Portola and Junction Avenues where it would continue in subway. Portola Avenue is the old Lincoln Highway, the first transcontinental highway, and some of the oldest buildings in Livermore are located along this route. Vibration impacts from construction could damage significant historical resources along this portion of the route.

This alternative would terminate at the existing ACE station in Downtown Livermore. A survey of the downtown area revealed many historic-age resources. The 1988 City of Livermore Historical Resources Inventory, the 2004 Livermore Downtown Specific Plan and

Historical Resources Inventory, and the reconnaissance-level surveys conducted for the BART to Livermore Extension Program identified numerous potentially significant resources in Downtown Livermore in proximity to alternatives; including three circa 1925 residences along Chestnut Street (1853, 1867, and 1881 Chestnut), and two circa 1880 farmhouses (228 K Street and 2152 Oak Street) in immediate proximity to the proposed track infrastructure.

Because this alignment would be underground along Portola Avenue and in the downtown area, it would not introduce new features that could disturb the resource setting in these areas. The proposed Portola/Railroad Yard would also be adjacent to the Trevarno Road Historic District, a collection of houses built from 1913 to 1915 along Trevarno Road, the location of fuse-manufacturing facilities, offices, and management housing for Coast Manufacturing and Supply Company. Trevarno Road was designated a Historic District by the City of Livermore in 1976. The yard site is currently occupied by industrial uses and operation, so that the new maintenance activities would not be expected to substantially change the setting of this district.

Due to the proximity of this alternative to the old Lincoln Highway, historic Downtown Livermore and the Trevarno Road Historic District, this alternative is considered highly sensitive for historical resources. Potential impacts on historical resources that could result from this alternative include damage caused by construction vibration. This impact is therefore considered potentially significant.

Alternative 3a – Railroad. There is a low potential for the portions of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within or in proximity to the median that could be damaged by construction or operational vibration. However, this alternative would include an aerial structure approximately 150 feet east of the Rancho del Charro property (see discussion of the Rancho del Charro property under Alternative 1a above) that could alter its resource setting.

This alternative would terminate at the existing ACE station in Downtown Livermore, similar to Alternative 3. Accordingly, the same historic resources in the vicinity of the terminus station identified for Alternative 3 also are relevant for Alternative 3a, including three circa 1925 residences along Chestnut Street (1853, 1867, and 1881 Chestnut), and two circa 1880 farmhouses (228 K Street and 2152 Oak Street). The proximity of the alignment to some of these resources could result in construction vibration impacts, as well as alteration of the resource setting due to this alternative's elevated alignment in the downtown area.

The proposed yard at the terminus of this alternative could affect the adjacent Trevarno Road Historic District (see discussion of the Trevarno Road Historic District under Alternative 3 above). This alternative could also affect potential historic-age buildings along First Street that back up to the railroad tracks.

Due to the proximity of this alternative to the Rancho del Charro property, historic Downtown Livermore, and the Trevarno Road Historic District, potential historic-age buildings along First

Street, this alternative is considered highly sensitive for historical resources. Potential impacts on historical resources that could result from this alternative include damage caused by construction vibration, and alteration of resource setting through introduction of an elevated alignment in the downtown area. This impact is therefore considered potentially significant.

Alternative 4 – Isabel/I-580. There is a low potential for the portions of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, because no resources exist within or in proximity to the median that could be damaged by construction or operational vibration. This impact is therefore considered less than significant.

Alternative 5 – Quarry. There is a low potential for the portions of this alternative in the I-580 median to result in construction or operational impacts on historic-age buildings or structures, as described in the previous alternatives. Like Alternatives 1a, 1b, 2a, and 3a, this alternative would include an aerial structure approximately 150 feet east of the Rancho del Charro property. Potential impacts on historical resources that could result from this alternative include damage caused by construction vibration, and alteration of resource setting because of the highly visible aerial guideway and support columns. This impact is therefore considered potentially significant.

MITIGATION MEASURE. The following mitigation measure applies to all of the alternatives described above, except Alternative 4, and would require a project-level study to determine impacts of the selected alternative on historical resources, pursuant to Section 15064.5 of the State CEQA Guidelines. Should it be determined that the BART extension alternative could impact significant historical resources, the following mitigation measure also requires the implementation of subsequent measures that call for preservation, rehabilitation, restoration, or reconstruction of the historical resources. The following mitigation measure would substantially lessen or avoid impact(s) as a result of the BART extension alternative. However, for those alternatives that involve a Downtown Livermore Station (Alternatives 1a, 1b, 2a, 3, and 3a), the proximity of historic resources may result in damage during construction and alteration to the setting. While mitigation measures exist to reduce damage from construction activities, it is not clear that these measures will be sufficient to avoid damage. Similarly, there are measures to address physical features of a historic property; however, until research is performed on these properties and their setting is better appreciated, it is not known if future measures would reduce impacts to less than significant. Therefore, for the purpose of this Program EIR, these alternatives have potentially significant and unavoidable historic resources impacts. (PSU)

CR-1.1 Conduct Project-Level Historical Resources Investigation (Alternatives 1, 1a, 1b, 2, 2a, 3, 3a, 5). During the project-level environmental review, BART shall retain a professional who meets the Secretary of the Interior's professional qualifications standards for architectural history to conduct a project-level study of the preferred alternative. The study shall include a review of the records search prepared for this

Program EIR and, if necessary, an updated records search. The study shall include formal evaluation of any potentially affected historic-age buildings, structures, or districts to determine if they qualify as historical resources pursuant to Section 15064.5 of the State CEQA Guidelines. The results of the study shall be compiled into a technical report or memorandum, which shall be submitted to BART. The study shall include recommended measures to avoid or reduce impacts on significant historical resources, including avoidance (such as reducing vibration levels such that fragile buildings would not be damaged), adaptive re-use, protection of the setting, to the extent feasible, if the setting is important to retaining the property's status as a historical resource, or written and photographic documentation. The report shall specify that written and photographic documentation shall be prepared in accordance the appropriate level of Historic American Buildings Survey (HABS) or Historic American Engineering Record (HAER) documentation. Where applicable, measures for preservation, rehabilitation, restoration, or reconstruction shall be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Should the project include federal funding or oversight or otherwise qualify as a federal undertaking, the historical resource study shall be prepared in accordance with Section 106 of the National Historic Preservation Act. The historical resource study and inclusive mitigation measures shall form the basis for the historical resources component of the project-level environmental documentation prepared for the project.

CR-2 Archaeological Resources or Human Remains

Many portions of the study area are highly sensitive for prehistoric archaeological resources, historic-period archaeological resources, and human remains. Earth-disturbing activity during construction of any portion of the alignment alternatives could encounter and damage subsurface archaeological resources or human remains. Project-level surveys would be required to provide a thorough assessment of an alternative's potential impacts on significant archaeological resources. A more detailed description of impacts to archaeological resources for each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed transit system and roadway improvements within the study area and region, including the widening of I-580. Effects of programmed projects within the study area associated with the No Build Alternative have been addressed in the previous environmental documents for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed projects, there would be no new impacts to archaeological resources or disturbance of human remains.

Alternative 1 – Greenville East. Alternative 1, including the proposed footprint of the Isabel/I-580 Station, is located along a segment of the Arroyo Las Positas. No archaeological sites have been recorded in this area, but several isolated artifacts have been recorded adjacent

to the route, making this portion of the alternative highly sensitive for prehistoric archaeological resources. In addition, ranching activities during the historic era increase the likelihood of encountering historic-period archaeological resources along the entire route. Although most of this alignment occurs within the I-580 median, earth-disturbing construction activities within or adjacent to the median, including widening activities, have the potential to encounter previously unrecorded archaeological resources.

The easternmost portion of the alternative occurs on geologic formations from the Pliocene Age that are unlikely to contain archaeological deposits; therefore, the areas of the Greenville East Station and the Greenville Yard are considered to be moderately sensitive for prehistoric archaeological resources.

Based on the record of known archaeological resources and observations during the reconnaissance-level surveys of the study area, this alternative is considered highly sensitive for prehistoric archaeological resources along the Arroyo Las Positas and moderately sensitive for prehistoric archaeological resources in the eastern portion of the alternative. Earth-disturbing activity during project construction, including excavation, grading, widening, and utilities trenching associated with the development of track infrastructure, passenger stations and platforms, parking facilities, bus/transit intermodal facilities, storage and/or maintenance yards, and ancillary improvements could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 1a – Downtown-Greenville East via UPRR. The western portion of Alternative 1a is located along a segment of the Arroyo Las Positas, an archaeologically sensitive area, and has the same high level of archaeological sensitivity as the corresponding portion of Alternative 1.

This alternative continues to El Charro Road along the Arroyo Mocho. In the 1950s, two archaeological sites were recorded south of Arroyo Mocho. In 1988, archaeologists identified prehistoric artifacts and human remains at the two sites and recorded additional archaeological sites east of El Charro Road. In 2004 Arroyo Mocho was widened to its current size and Arroyo las Positas was realigned through Staples Ranch to converge with Arroyo Mocho at El Charro Road. Human burials were recovered from Staples Ranch during the realignment of the arroyo. This portion of the alignment is highly sensitive for previously unrecorded prehistoric and historic-period archaeological resources.

The alignment continues into Downtown Livermore adjacent to the existing UPRR line. Downtown Livermore retains a number of historic-period buildings within the vicinity of the Livermore Central Station, and this area is therefore considered highly sensitive for historic-period archaeological resources. The UPRR corridor east of Downtown Livermore is considered to be moderately sensitive for prehistoric and historic-period archaeological resources.

The easternmost portion of the alternative is considered to be moderately sensitive for prehistoric archaeological resources, as described previously for Alternative 1.

This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas, highly sensitive for prehistoric-and historic-period resources and along El Charro Road, highly sensitive for historic-period archaeological resources in Downtown Livermore, and moderately sensitive for prehistoric and historic-period archaeological resources in the easternmost portions of the alternative. Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would have the same potential impacts as Alternative 1a. Although Alternative 1b would follow an existing right of way previously operated by Southern Pacific Railroad (SPRR) to a terminus at Greenville East, the SPRR area includes the same moderate sensitivity for archaeological resources as the corresponding UPRR alignment in Alternative 1b.

This alternative is highly sensitive for known and previously unrecorded prehistoric and historic-period archaeological resources and human remains along Arroyo Las Positas, highly sensitive for previously unrecorded historic-period archaeological resources in Downtown Livermore, and moderately sensitive for prehistoric and historic-period archaeological resources east of Downtown Livermore. Earth-disturbing activity during project construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 2 – Las Positas. Similar to Alternative 1, Alternative 2, including the proposed footprint of the Isabel/I-580 Station, is located along a segment of the Arroyo Las Positas, an archaeologically sensitive area, and historic-era ranching activities increase the likelihood of encountering historic-period archaeological resources along this entire route. Although much of this alignment occurs within the I-580 median, earth-disturbing construction activities within or adjacent to the median, including widening activities, have the potential to encounter previously unrecorded archaeological resources.

The portion of the alignment along Las Positas Road is an area of historic settlement activity and is therefore considered moderately sensitive for historic-period archaeological resources. Similar to Alternative 1a, the UPRR corridor east of Downtown Livermore considered to be moderately sensitive for prehistoric and historic-period archaeological resources.

The easternmost portion of the alternative occurs on geologic formations from the Pliocene Age that are unlikely to contain archaeological deposits; therefore, the areas of the Vasco Road Station and Vasco Yard are considered to be moderately sensitive for prehistoric and historic-period archaeological resources.

This alternative is highly sensitive for known and previously unrecorded prehistoric and historic-period archaeological resources and human remains along Arroyo Las Positas, moderately sensitive for historic-period archaeological resources along Las Positas Road, and moderately sensitive for prehistoric and historic-period archaeological east of Downtown Livermore. Earth-disturbing activity during project construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 2a – Downtown-Vasco. Alternative 2a would have the same potential impacts as Alternative 1a, with the exception that this alternative would terminate sooner in the existing UPRR right of way at the existing ACE station at Vasco Road. Consequently, this alternative would not include the potential archaeological impacts associated with development of the Greenville East Station and the Greenville Yard.

This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas, highly sensitive for prehistoric-and historic-period resources and along El Charro Road, highly sensitive for historic-period archaeological resources in Downtown Livermore, and moderately sensitive for prehistoric and historic-period archaeological resources in the easternmost portions of the alternative. Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 3 – Portola. Alternative 3 would have the same potential impacts as Alternative 1 and 2 up to the point at which Alternative 3 would transition from the proposed Isabel/I-580 Station and continue underground along Portola Avenue to Downtown Livermore. The construction activities associated with the underground segment have the potential to encounter and disturb buried prehistoric and historic-era deposits. The alternative would reach its terminus station at the ACE station in Downtown Livermore.

This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas, highly sensitive for buried prehistoric and historic-era deposits within underground segments along Portola Avenue, and highly sensitive for historic-period archaeological resources in Downtown Livermore. Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 3a – Railroad. Alternative 3a would have the same potential impacts as Alternative 1a, except this alternative would terminate at existing Livermore ACE Station in Downtown Livermore and therefore would not include the potential impacts that would be included with Alternative 1a east of Downtown Livermore.

This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas, highly sensitive for prehistoric-and historic-period resources and along El Charro Road, highly sensitive for historic-period archaeological resources in Downtown Livermore.

Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 4 – Isabel/I-580. Alternative 4 would have the same potential impacts as Alternative 1, except this alternative would terminate at the planned Isabel Avenue overpass/interchange. Consequently, this alternative would not include any of the potential impacts that Alternative 1 would have east of Isabel Avenue. This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas. Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

Alternative 5 – Quarry. Alternative 5 would have the same potential impacts as Alternative 1a, except this alternative would terminate at the Isabel Avenue (SR-84) and Stanley Boulevard intersection. Consequently, this alternative would not include the potential impacts that Alternative 1a would have east the Isabel Avenue (SR-84) and Stanley Boulevard intersection. This alternative is highly sensitive for prehistoric archaeological resources along Arroyo Las Positas and highly sensitive for prehistoric-and historic-period resources and along El Charro Road. Earth-disturbing activity during construction of any portion of this alternative could encounter and damage subsurface archaeological resources. This impact is therefore considered potentially significant.

MITIGATION MEASURES. The following mitigation measures apply to all of the BART extension alternatives and would require a project-level study to determine impacts of the selected alternative on archaeological resources and human remains, pursuant to Section 15064.5 of the State CEQA Guidelines. Should it be determined that the BART extension alternative could affect significant archaeological resources and human remains, the following mitigation measures also require the implementation of subsequent measures to avoid, where possible, impacts on significant archaeological resources and human remains. These measures shall be consistent with Public Resources Code Sections 21083.2(b) and 5097.98. The following mitigation measures would substantially lessen or avoid impact(s) as a result of the BART extension alternative, and this impact would be less than significant. (LTS)

CR-2.1 *Conduct Project-Level Archaeological Resources Investigation.* During the project-level environmental review, BART shall retain a professional who meets the Secretary of the Interior's professional qualifications standards for archaeology to conduct a project-level study of the preferred alternative. The study shall include:

- a review of the records search prepared for this program EIR and, if necessary, an updated records search.
- project-level pedestrian surveys of portions of the project site where archaeological resources could be encountered (e.g., unpaved areas).

- formal evaluation of any potentially affected archaeological resources to determine if they qualify as unique archaeological resources pursuant to Section 15064.5 of the State CEQA Guidelines.
- recommended measures consistent with Public Resources Code Section 21083.2(b) to avoid, where feasible, impacts on unique archaeological resources, including preservation in place, planning construction to avoid archaeological sites, deeding archaeological sites into permanent conservation easements, or planning parks, green space, or other open space to incorporate archaeological sites. Where avoidance or preservation in place is not feasible, excavation may be recommended as mitigation consistent with Public Resources Code Section 21083.2.

The results of the study shall be compiled into a technical report or memorandum, which shall be submitted to BART.

Should the project include federal funding or oversight or otherwise qualify as a federal undertaking, the archaeological study shall be prepared in accordance with Section 106 of the National Historic Preservation Act. The archaeological study and inclusive mitigation measures shall form the basis for the cultural resources component of the project-level environmental documentation prepared for the project.

CR-2.2 *Follow State Procedures to Address the Accidental Discovery or Recognition of Human Remains*. In the event that human remains are encountered during excavation, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:

- The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and
- If the coroner determines the remains to be Native American:

The coroner shall contact the Native American Heritage Commission within 24 hours. The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98.

Effect of UP Commuter Access Principles

Historical Resources. Compliance with the UP Commuter Access Principles could require the BART extension to operate in its own right-of-way north of the UPRR ROW. This change in the alignment for Alternatives 1a, 1b, 2a, 3, and 3a has the potential to disturb more historic properties in Downtown Livermore than described previously for these alternatives, which assumes that this BART extension alternative would be able to share the UPRR ROW. In addition, the shift in the BART alignment for these alternatives would require modifications to the proposed Portola/Railroad Yard proposed as part of Alternatives 3 and 3a. The tracks into the yard and the tailtracks would shift northward, bringing them closer to the neighboring Trevarno Road Historic District. Because of this proximity, construction and operation of the trackwork could result in noise, vibration, and visual impacts that could adversely affect the historic homes of this district.

Archaeological Resources or Human Remains. The change in the alignment for Alternatives 1a, 1b, 2a, and 3a to comply with the UP Commuter Access Principles would involve more ground disturbance and potentially affect more highly sensitive areas for historic-period archaeological resources in Downtown Livermore than identified earlier for these alternatives, which assumed that the BART extension alternatives would be able to share the UPRR ROW.

Cumulative Analysis

The cumulative analysis for impacts on cultural resources considers a broad cultural and regional system of which the resources are a part. The cumulative context for the cultural resources analysis is the Tri-Valley area, which includes Amador Valley, Livermore Valley and San Ramon Valley and the cities of Pleasanton, Livermore, Dublin, San Ramon, and Danville. The cumulative analysis combines historical resources, archaeological resources, and human remains into a single, non-renewable resource base and considers the additive effect of potential program impacts to significant regional impacts on cultural resources.

CR-CU-3 Cumulative Cultural Resources Impacts

The proposed BART to Livermore Extension Program, in combination with other projects in the Tri-Valley Area could cause a substantial adverse change in the significance of historical or archaeological resources or disturb human remains. Based upon previous cultural resource surveys and research, the Tri-Valley area has been inhabited by prehistoric and historic-period peoples for thousands of years. The BART extension alternatives, in combination with other development in the region, could result in the loss of significant cultural resources (including prehistoric and historic-period archaeological resources, human remains, and historic-period buildings, structures, districts, and other built environment features). Because all significant cultural resources and human remains are unique and non-renewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. For example, the loss of any one archaeological

site affects all others in a region because these resources are best understood in the context of the entirety of the cultural system of which they are a part.

Proper planning and appropriate mitigation can help to capture and preserve knowledge of such resources and can provide opportunities for increasing our understanding of the past environmental conditions and cultures by recording data about sites discovered and preserving artifacts found. Federal, State, and local laws are also in place, as discussed above, that protect these resources in most instances. Even so, it is not always feasible to protect these resources, particularly when preservation in place would frustrate implementation of projects. For this reason, the cumulative effects of the BART extension alternatives and other foreseeable development projects on cultural resources in the Tri-Valley Area would be potentially significant.

The BART extension alternatives would span a considerable length and disturb hundreds of acres of soils within areas that are highly sensitive for historical resources or highly sensitive for prehistoric archaeological resources, historic-period archaeological resources, and human remains. These resources are unique and non-renewable members of finite classes. The potential large-scale impacts of the selected BART extension alternative on such finite resources within the Tri-Valley Area would be cumulatively considerable. As such, the cumulative impact from the BART extension alternatives would be significant.

MITIGATION MEASURES. Mitigation Measures CR-1.1, CR-2.1, and CR-2.2 require project-level studies to determine impacts of the selected alternative on archaeological resources, human remains, and historical resources, pursuant to Section 15064.5 of the State CEQA Guidelines. The mitigation measures also require the implementation of measures to avoid, where feasible, impacts on significant archaeological resources, human remains, and historical resources. Implementation of the mitigation measures would substantially limit the program's contribution to the cumulative impact. Foreseeable projects in the Tri-Valley area that have the potential to adversely affect cultural resources would similarly be governed by provisions equivalent to those described in Mitigation Measures CR-1.1, CR-2.1, and CR-2.2, and this cumulative impact would be reduced to less than significant. (LTS)

3.7 GEOLOGY, SOILS, AND SEISMICITY

Introduction

This section summarizes the geologic, soil, and seismic hazards along the study area, the potential for transit service in this corridor to expose people or structures to these hazards, and the paleontological resources that exist along the corridor. The study area is in the Livermore Valley at the northern end of the Diablo Range, part of the northwest-trending Coast Ranges geomorphic province. The Livermore Valley, and the entire San Francisco Bay Area, is in the San Andreas Fault System, one of the most seismically active areas in the United States. As such, the study area is susceptible to potential seismic hazards, including fault rupture and groundshaking. Other geologic and soils issues associated with the alternatives include potential slope instability, expansive and corrosive soils, soil erosion, potential impacts on mineral resources, and excavation issues on steep or unstable slopes. These hazards are presented in this section.

In light of the above-mentioned hazards, the selected BART extension alternative would need to be designed to avoid structural damage or collapse from groundshaking during an earthquake or seismically induced ground failure, and to achieve acceptable levels of public safety. Portions of the BART extension alternatives, which would include both aerial and subway structures, would require special features for structural ductility and redundancy to withstand severe groundshaking, potential liquefaction, and other types of seismically induced ground failure. Portions of the selected alternative that encroach into active faults zones would require special design features to minimize potential damage from fault rupture and other seismic hazards. Also, site-specific investigations would be required for portions of the alternatives where potential for risk can be greatest; the result of the investigations may further result in design and construction constraints in order to avoid substantial risk. The various regulations that require these design features or additional investigations are discussed in this section.

Information applied to this analysis for geology, soils, and seismicity was obtained from various sources, including the City of Livermore General Plan,[1] El Charro Specific Plan EIR,[2] City of Pleasanton General Plan,[3] Bay Area to Central Valley High-Speed Rail Program EIR/EIS,[4] Soil Survey of Alameda County,[5] and I-580 HOV Widening Initial Study (IS).[6]

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1 City of Livermore, City of Livermore General Plan: 2003-2025, 2004

2 City of Livermore, *El Charro Specific Plan Environmental Impact Report*, 2007

3 City of Pleasanton, *Proposed Pleasanton General Plan 2005-2025 - Draft Environmental Impact Report*, 2008.

4 California High-Speed Rail Authority, *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS),* 2007.

5 U.S. Department of Agriculture, *Soil Survey Alameda County Area, California,* 1977.

6 Caltrans, *Environmental Assessment/Initial Study, I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive,* 2006.

Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). They are valuable, nonrenewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits. The age, abundance, and distribution of fossils depend on the geologic formation in which they occur and the topography of the area in which they are exposed. The geologic environments in which the plants or animals became fossilized usually were quite different from the present topography in which the geologic formations now exist. The fossil-bearing geologic formations in the study area are relatively young, having been deposited between about 1 million and about 24 million years ago. The unconsolidated deposits occur in the Livermore Valley along the north-central portion of the study area. The bedrock formations are concentrated in the Altamont Hills at the east end of the study area. This section of the EIR describes the paleontological setting of the study area, identifies areas of potential paleontological resources along the BART extension alternatives, and assesses the potential for the BART extension alternatives to cause adverse effects on these resources. Applicable federal, State, and local regulations that have been enacted to protect paleontological resources are identified.

This examination of paleontological resources is based on records searches at the University of California Museum of Paleontology, available at http://bscit.berkeley.edu/ucmp/loc.shtml; the American Museum of Natural History, Division of Paleontology, available at http://paleo.amnh.org/fossil/seek.html; the North American Mammalian Paleofaunal Database, available at http://www.nceas.ucsb.edu/~alroy/nampfd.html; and reviews of the California Public Utilities Commission, Draft EIR for the Tri-Valley 2002 Capacity Increase Project; SFPUC, Water System Improvement Program EIR; USGS OFR 96-252, Preliminary geologic map emphasizing bedrock formations in Alameda County, California: A digital database; Society of Vertebrate Paleontology Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources – Standard Guidelines and other maps and reports published by the California Geological Survey. No comments, concerns, or questions regarding geology, soils, seismicity, or paleontology were received in response to the NOP.

Existing Conditions

Regional Geology

The region, for the purposes of this geologic analysis, encompasses the San Francisco Bay Area. The diverse, geologic conditions underlying Livermore Valley and the greater San Francisco Bay Area are largely defined by the network of major active faults, or cracks in the Earth's crust, that occur within the region. The San Andreas Fault System, one of the most prominent geologic features in the region, is about 45 miles wide in the vicinity of the study area and includes several major fault zones, or areas with numerous fractures – the San Andreas, Hayward, and Calaveras Fault Zones – as well as other active and potentially active faults. Figure 3.7-1 shows the locations of the major faults in the vicinity

of the study area. The west end of the study area, in the City of Pleasanton, is east of the Calaveras Fault Zone. The east end of the study area, in the City of Livermore, is in the Greenville Fault Zone.

The San Andreas fault is more than 800 miles long, extending to a depth of 10 miles below ground surface. The San Andreas Fault separates two bedrock complexes or distinct groups of rocks: the Salinian Block and the Franciscan Formation. Bedrock is the solid rock that forms the Earth's crust and underlies all soil or other loose materials. The Salinian Block consists primarily of metamorphic and granitic rock. The Franciscan Formation, lying between the San Andreas and the Coast Range thrust fault zones is composed of marine sedimentary and volcanic rocks. However, chert and limestone are also found within the assemblage.[7]

The cities of Pleasanton, Dublin, and Livermore lie generally east of the San Andreas Fault and are underlain by the Franciscan Formation and partially by the Salinian Block. As bedrock eventually breaks down to form soil, the rocks of the Franciscan Formation and Salinian Block influence the types and characteristics of soils within the study area.

The San Andreas Fault Zone serves as the boundary between the Coast Ranges Geomorphic Province and the Pacific Ocean (geologic regions with distinctive landscapes or formations). The study area lies in the Coast Ranges Geomorphic Province, which contains mountain ranges and valleys that trend northwest, parallel to the San Andreas Fault. The ranges have been intensely uplifted, folded, and faulted throughout history and contain profound structural discontinuities. Older Cretaceous Franciscan bedrock and Salinian bedrock have been thrusted over younger Cenozoic marine sedimentary units through the uplift of the Coast Ranges.[8]

The soils that make up the Coast Ranges vary based on location. The majority of the geologic units in the Coast Ranges consist of loosely to moderately consolidated sandstones, siltstones, and mudstones with some metamorphic and granitic sequences.[9]

The cities of Pleasanton and Livermore are located within the Amador Valley and Livermore Valley, respectively, part of the Coast Ranges Geomorphic Province described above. Amador Valley joins Livermore Valley to the east. The underlying geology of Amador Valley consists of sedimentary rock along the Pleasanton and Main ridges, and thick deposits of unconsolidated sediment on the valley floor where most of the existing development is concentrated.

City of Livermore consists of lowland and upland areas. Lowland areas encompass the downtown area and central Livermore. These areas are underlain by alluvium that is younger than 2 million years old, and consists mainly of unconsolidated gravel, sand, silt, and clay deposits. The upland areas include

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[7] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009

[8] U.S. Department of the Interior, Bureau of Reclamation, *San Luis Drainage Feature Re-Evaluation Plan Formulation Report*, 2002.

[9] U.S. Department of the Interior, Bureau of Reclamation, *San Luis Drainage Feature Re-Evaluation Plan Formulation Report*, 2002.

the hills to the northwest, northeast and south of Livermore, and consist primarily of tilted sedimentary rocks of Tertiary age (between 2 million and 65 million years old).

Study Area Geology and Seismicity

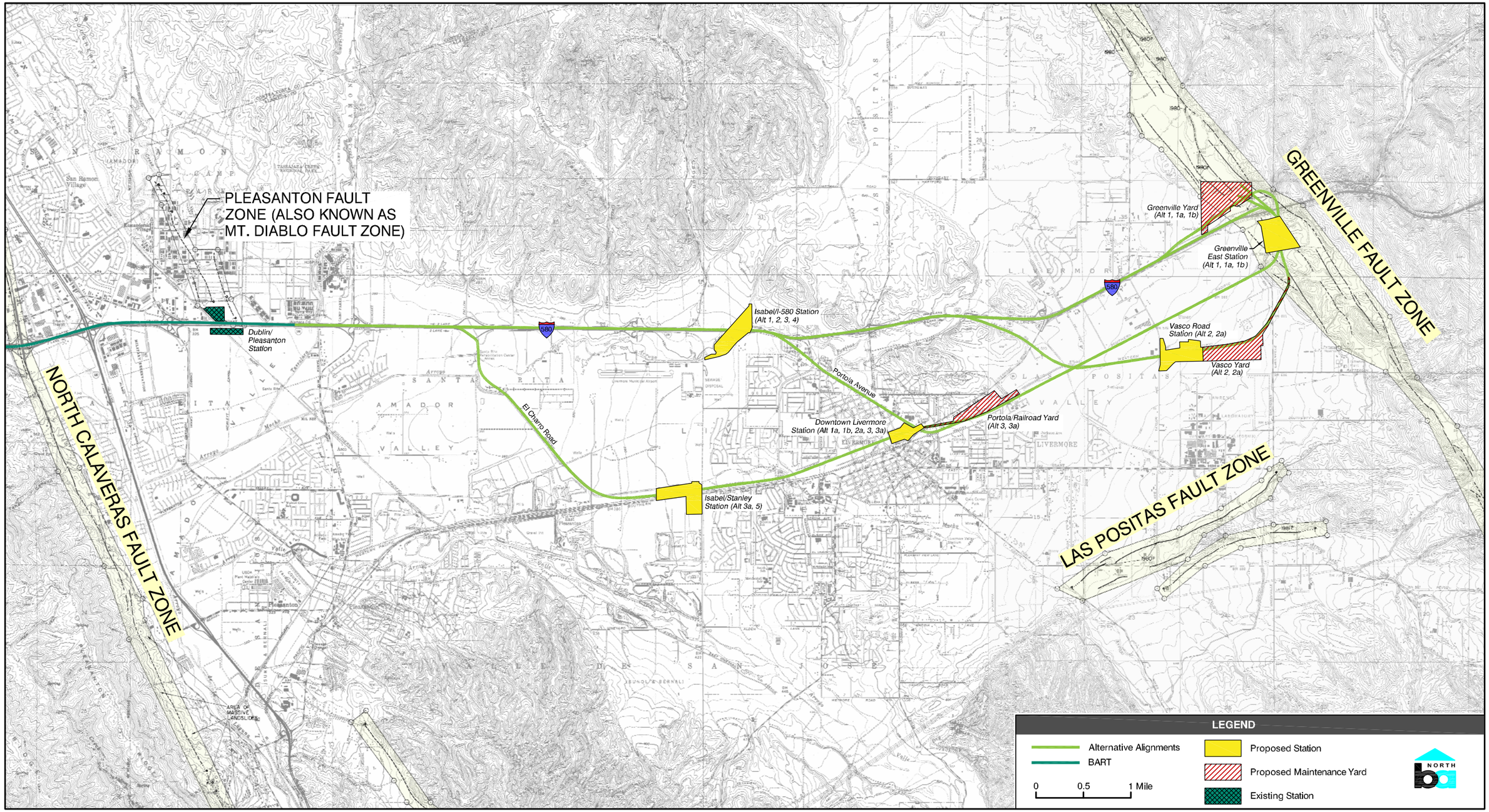
The following paragraphs describe the geologic conditions and seismic hazards along the study area. As elaborated below, potential for landslides, susceptibility to liquefaction, erosive and corrosive soils, and surface fault rupture are the main hazards that could affect the BART extension alternatives, and these are hazards that would need to be addressed in the design and construction of the selected alternative.

Geologic Units. The study area is underlain by three different types of geologic formations: a formation of unconsolidated surficial deposits, a more or less consolidated gravel formation, and three sandstone bedrock formations.[10] The primary geologic bedrock units underlying the proposed alignments are shown on Figure 3.7-2, which also provides information about the underlying geologic materials, such as age and composition (e.g., sand versus clay). The underlying geology is an important consideration in the design of the BART extension alternatives, as certain geologic materials can pose construction and design constraints. For example, younger soils are typically weaker in their ability to support different types of structures; alluvial sands, and bedrock present construction challenges; fractured rock that contains groundwater may be difficult to excavate using cut-and-cover methods; and faulted material may pose an additional challenge by creating unstable conditions at the subway face.

Quaternary, Undivided. These surficial deposits include gravels, sands, silts, and clays of the Holocene epoch (less than about 10,000 years old), and the Pleistocene epoch (about 1.6 million to about 10,000 years old). The deposits generally are fluvial in origin (river deposits) consisting of material eroded from the surrounding Coast Ranges that filled the structural trough which today forms the Livermore Valley between the Calaveras fault on the west and the Greenville fault on the east. The deposits are a heterogeneous mixture, the individual components of which vary proportionally to their mode of deposition; coarser materials from higher energy environments (main channels), finer materials from lower energy environments (back waters). This formation underlies almost the entire study area, with the exception of a central portion and the easternmost portion (see below).

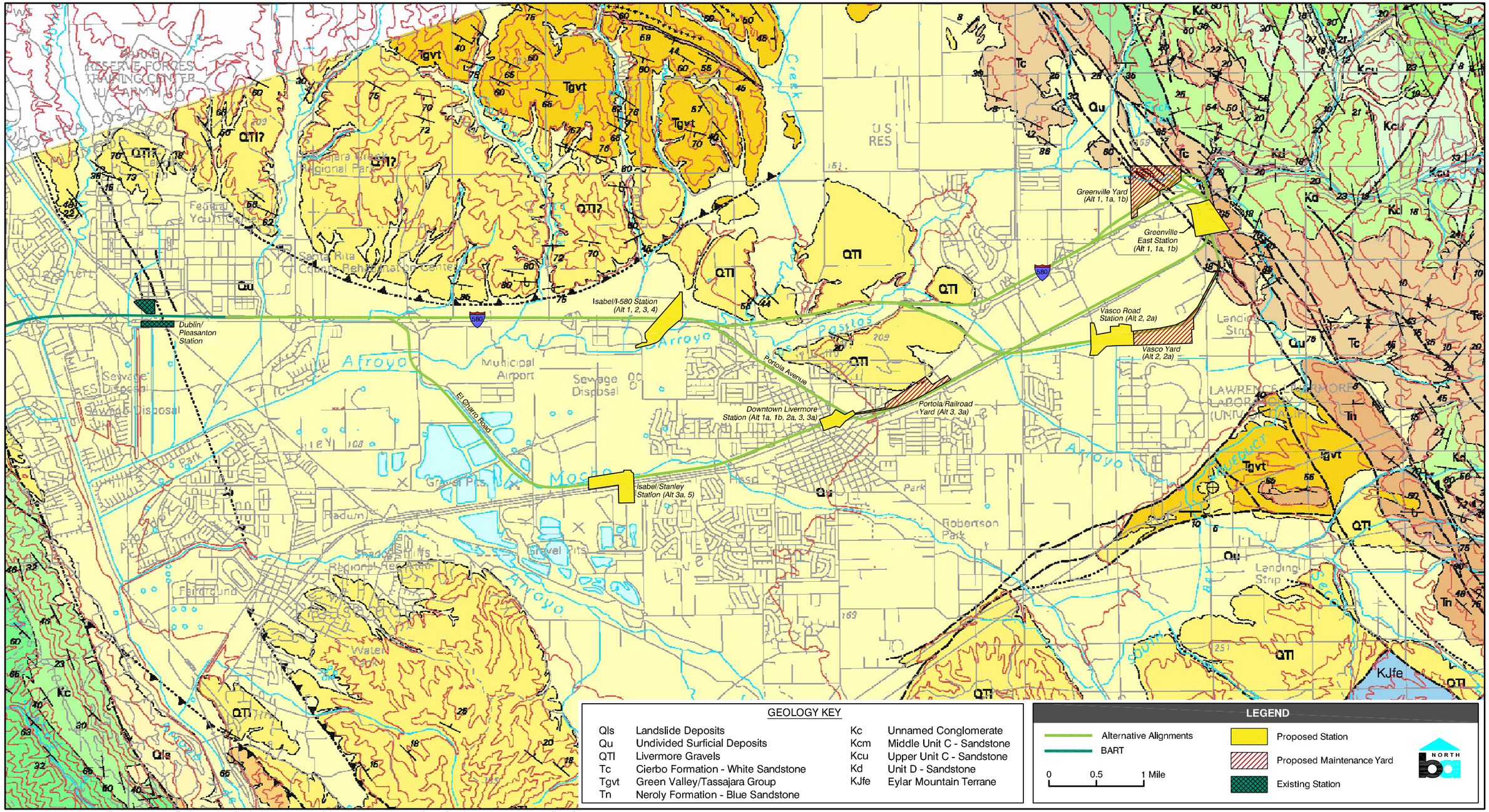
Quaternary/Tertiary, Livermore Gravels. The Livermore gravels consist mostly of poorly to moderately consolidated, indistinctly bedded, cobble conglomerate, conglomeratic sandstone, and coarse-grained sandstone of the Pliocene epoch (about 5.3 million to about 1.6 million years ago) and the Pleistocene epoch. This formation also is fluvial in origin and contains rocks probably derived from the Franciscan complex to the south. The formation includes some siltstone and claystone; the consolidated equivalent of the silts and clays deposited in back waters. The Livermore gravels underlie the north-central part of the study area.

[10] Graymer, R.W., D.L. Jones, and E.E. Brabb, *Preliminary geologic map emphasizing bedrock formations in Alameda County, California: A digital database*, U.S. Geological Survey Open-File Report 96-252, 1996.



Source: Fault Zone Maps, Special Studies Zones (Dublin, Livermore, and Altamont Quadrangles), The Resources Agency, Department of Conservation, January 1, 1982.

REGIONAL FAULTS
IN BART TO LIVERMORE STUDY AREA
FIGURE 3.7-1



Source: USGS Open-file 96-252, Preliminary Geologic Map Emphasizing Bedrock Formations In Alameda County, California

GEOLOGIC BEDROCK UNITS
IN BART TO LIVERMORE STUDY AREA
FIGURE 3.7-2

Tertiary, Neroly Sandstone. The Neroly formation is a massive, volcanoclastic marine sandstone; it consists mainly of volcanic particles deposited in an oceanic environment during the later part of the Miocene epoch (about 23.7 million to about 5.3 million years ago). Shale, siltstone, and tuff form layers within the upper part of the sandstone; a round-pebble conglomerate forms a layer at the base. The Neroly formation, together with the Cierbo formation (see below), forms the base of the Altamont Hills at the east end of the study area.

Tertiary, Cierbo Sandstone. The Cierbo formation is a massive, cross-bedded marine sandstone with a prominent conglomerate layer at the base. Most of the sandstone is shaley and the conglomerate is mainly pebbles in a sandy matrix with occasional cobbles and boulders. It also is late Miocene in age and, with the Neroly formation, forms the base of the Altamont Hills at the east end of the study area.

Cretaceous, Great Valley Sequence Unit D Sandstone. Unit D of the Great Valley Sequence is a medium to coarse grained, thick bedded, marine sandstone of the late Cretaceous epoch (about 100 million to about 65 million years ago). It contains interbedded siltstone and mudstone and locally includes a shale member. Unit D underlies the Tertiary sandstones at the east end of the study area and forms the core of the western flank of the Altamont Hills.

As previously described, the study area is in the Livermore Valley at the northern end of the Diablo Range, part of a northwest-trending Coast Ranges. The geology of the Diablo Range consists of a dense core of partially to completely metamorphosed rocks of the Franciscan Assemblage blanketed by sedimentary rocks of the Great Valley sequence with younger tertiary formations along the flanks of the range.[11] The Franciscan Assemblage consists of a mélange of coherent blocks (ranging in size from a few inches to several miles of sandstone, siltstone, chert, and greenstone (very hard rocks) in a matrix of sheared shale and serpentine (soft rocks).[12]

The Livermore Valley is a structural trough filled with Miocene and younger gravel-bearing formations, the most prominent being the Livermore Gravels. The Livermore Gravels consists of pebbly gravels, sandstone, and fine-grained rocks deposited in the basin during the late Miocene and Pleistocene in a braided stream environment.[13] Rocks of the Franciscan Complex are highly variable and include some rock units that are typically hard, and fracture zones are common.[14]

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[11] California High-Speed Rail Authority, *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*, 2008.

[12] California High-Speed Rail Authority, *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*, 2008.

[13] California Regional Water Quality Control Board, San Francisco Bay Region, *Order No. R2-2002-0041: Updated Waste Discharge Requirements And Recision of Order No. 97-050 For: Pleasanton Garbage Service Inc. Old Pleasanton Landfill*, 2002.

[14] California High-Speed Rail Authority, *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*, 2008.

The main bedrock units underlying the study area categorized as QT1, Tc1, and Qu. Figure 3.7-2 shows the various bedrock types under the study area, and a description of these bedrock types are provided in Table 3.7-1. QT1 underlies portion of Alternatives 1 and 2 alignments and includes chert, siltstone, and claystone. Tc1 underlies portions of Alternatives 1, 1a, 1b, 2, 2a, and 3, and includes sandstones. These bedrocks units are considered to be very hard and may pose construction constraints during excavation for the train stations and maintenance yards.

Table 3.7-1
Bedrock Units Underlying
the BART to Livermore Extension Study Area

Alternative	Bedrock Unit	Description
Alternatives 1, 1a, 1b, 2, 2a, 3, 3a, 4, 5	Qu	Surficial deposits (Holocene, or the last 10,000 years; and Pleistocene, or from 2 million to 11,000 years ago).
Alternatives 1, 1a, 1b, 2, 2a, and 3	Tc1	Cierbo Sandstone (late Miocene, or from 25 million to 13 million years ago). Light – gray, massive sandstone with marine fossils. Contains sandstone and conglomerate near the base.
Alternatives 1 and 2	QTl	Livermore gravels (Pliocene, or from 13 million to 2 million years ago; and Pleistocene). Poorly to moderately consolidated, indistinctly bedded, cobble conglomerate, gray conglomeratic sandstone, and gray coarse-grained sandstone. Also includes some siltstone and claystone. Clasts contain mostly graywacke, chert, and metamorphic rocks probably derived from the Franciscan complex.

Source: U.S. Geological Survey, Open File Report 96-252.

Faulting and Seismicity. The San Francisco Bay Area is in a seismically active region near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. For approximately the past 23 million years, about 200 miles of right-lateral slip has occurred along the San Andreas Fault System to accommodate the relative movement between these two plates. The relative movement between the Pacific Plate and the North American Plate generally occurs across approximately a 50-mile-wide zone extending from the San Gregorio – Seal Cove fault, offshore of the San Francisco peninsula, to the Great Valley Thrust Belt, northeast of the Coast Ranges. In addition to the right-lateral slip movement between tectonic plates, a compressional component of relative movement has developed between the Pacific Plate and a smaller segment of the North American Plate at the latitude of San Francisco Bay during the last 3.5 million years.[15] Strain produced by the relative motions of these plates is relieved by right-lateral strike-slip faulting on the San Andreas and related faults, and by vertical reverse-slip displacement on the Great Valley and other thrust faults in the central California area.[16]

[15] Fenton and Hitchcock, *Recent geomorphic and paleoseismic investigations of thrust faults in Santa Clara Valley, California*, in Ferriz, H. and Anderson, R. eds., Engineering Geology Practice in Northern California: California Geological Survey Bulletin 210, 2001, p. 239-257.

[16] A "reverse-slip" fault is one with predominantly vertical movement in which the upper block moves upward in relation to the lower block.

The San Francisco Bay Area and surrounding areas are characterized by numerous geologically young faults, see Figure 3.7-1. These faults can be classified as historically active, active, sufficiently active, or inactive, as defined below.[17]

- Historically Active – Faults that have generated earthquakes accompanied by surface rupture during historic time (approximately the last 200 years) and faults that exhibit a seismic fault creep defined as historically active.[18]
- Active – Faults that show geologic evidence of movement during Holocene time (approximately the last 11,000 years) are defined as active.
- Sufficiently Active – Faults that show geologic evidence of movement during the Holocene along one or more of their segments or branches and if their traces may be identified by direct or indirect methods are defined as sufficiently active and well-defined.
- Inactive – Faults that show direct geologic evidence of inactivity or lack of offset, during all of Quaternary time (approximately the last 1.6 million years) or longer are classified as inactive.

Although it is difficult to quantify the probability that an earthquake will occur on a specific fault, this classification is based on the assumption that if a fault has moved during the last 11,000 years, it is likely to produce earthquakes in the future.

Active faults within a 20-mile radius of the study area include the Greenville, Northern Calaveras, Concord-Green Valley, and Pleasanton faults. Further away, but within the San Francisco Bay Area are the Hayward and San Andreas faults. These faults are considered to be the most probable sources of future earthquakes and are in Alquist-Priolo Earthquake Fault Zones (for an explanation of Alquist-Priolo Earthquake Fault Zones and the Alquist-Priolo Earthquake Fault Zoning Act, please refer to the Applicable Policies and Regulations discussion later in this section). Other Quaternary faults within a 20-mile radius of the study area include the Livermore and Las Positas faults, neither of which is in an Alquist-Priolo Earthquake Fault Zone. Of all these faults, the Greenville, Las Positas and Livermore faults are in, or closest to, the study area.

These various fault zones in the vicinity of the study area are described below.

Greenville Fault Zone. The Greenville fault is a major zone of faults of the San Andreas Fault System extending about 56 miles northwest from Mount Diablo to San Antonio Valley.[19] It is in an Alquist-Priolo Earthquake Fault Zone. In the project area, surface traces of the Greenville fault are along the western face of the Altamont Hills, at the eastern end of Alternatives 1, 1a, and 1b.

The Greenville fault is a strike-slip fault. The fault is not a single trace, but contains numerous splays and en-echelon segments. The fault is active at least as far south as Corral Hollow, and estimates of

[17] CGS, *Fault Rupture Hazard Zones in California*, CDMG Special Publication 42, 2007, p.5.

[18] Fault creep is movement along a fault that does not entail earthquake activity.

[19] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

current slip rates, based on geologic structures and geomorphology are in the range of 0.02 to 0.03 inches/year. The Greenville fault has an estimated maximum earthquake of M6.9; the recurrence interval is estimated to be about 550 years.[20]

Earth Sciences Associates (1982)[21] estimated maximum credible earthquakes for each of the three segments of the Greenville Fault Zones as follows:

i) Greenville-Marsh Creek Segment (northeast and east of the Livermore Valley) has an estimated magnitude of M6.5;

ii) Arroyo Mocho Segment (in the Diablo Range southeast of the Livermore Valley) has an estimated magnitude of M6.5; and

iii) Clayton Segment (east of Mount Diablo and north of the Livermore Valley) has an estimated magnitude of (M6.24).

The Greenville-Marsh Creek fault has a lower slip rate than other faults in the San Andreas system with a long-term rate of approximately 0.04 to 0.12 inches/year.

On January 24, 1980, an earthquake of M5.8 (U.S. Geologic Survey) struck approximately 11 miles north of Livermore on the Greenville-Marsh Creek fault. The earthquake caused discontinuous surface rupture along several fault traces in the Greenville fault zone.

Northern Calaveras Fault Zone. The Northern Calaveras fault is part of the 75-mile-long Calaveras fault, which extends south from Hollister through the Diablo Range, east of San Jose, and along the Pleasanton-Dublin-San Ramon urban corridor. The Northern Calaveras fault is in an Alquist-Priolo Earthquake Fault Zone, has a relatively low level of seismicity, and may be locked.[22] Geologic and seismological data suggest that the Northern Calaveras fault may produce earthquakes with a maximum earthquake potential of M7.0 The fault transects I-580 at San Ramon Road, approximately two miles west from the existing Dublin/Pleasanton Station. The Northern Calaveras fault does not directly transect the BART extension alternatives.

Concord-Green Valley Fault Zone. Formerly consider two faults because their surface expressions are separated by Suisun Bay, the Concord-Green Valley fault is a Holocene strike-slip fault and is the easternmost expression of the northwest movement in the San Andreas Fault System in the San Francisco Bay Area. Segments of the fault on both sides of Suisun Bay are historically active and the fault is in an Alquist-Priolo Earthquake Fault Zone. It is approximately 17 miles northwest of the study area.

Pleasanton Fault Zone. Also known as the Mt. Diablo Fault, the Pleasanton fault is a Holocene strike-slip fault extending northwest from I-580 about 1.7 miles east of the Calaveras fault. It is mostly

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[20] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

[21] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

[22] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

concealed beneath the alluvial deposits of the Livermore Valley, but is sufficiently well-defined to be in an Alquist-Priolo Earthquake Fault Zone.

Las Positas Fault Zone. The Las Positas fault is an active fault trending northeast to southwest approximately 2.5 miles southeast of Downtown Livermore. Two traces are Alquist-Priolo Earthquake Fault Zones. The Las Positas fault is in proximity to the Isabel/Stanley and Downtown Livermore Stations.

Livermore Fault Zone. The Livermore Fault is considered to be a potentially active fault approximately five miles in length in Downtown Livermore. The fault crosses portions of the alignment for Alternatives 1, and 4 at I-580, to the west of Airway Boulevard and portions of the alignment for Alternatives 1a, 1b, 2a, and 3a at East Stanley Boulevard and east of Kitty Hawk Road. It is not in an Alquist-Priolo Earthquake Fault Zone.

Other faults in the region are listed below.

San Andreas Fault Zone. The San Andreas fault is expected to produce strong earthquakes in Northern California. The Loma Prieta Earthquake of October 17, 1989, on the San Andreas fault, caused major damage throughout most of the Bay Area, but relatively minor damage in Eastern Alameda County. Onshore segments of the fault are in Alquist-Priolo Earthquake Fault Zones.

Hayward Fault Zone. The Hayward fault extends northwest approximately 55 miles from San Jose to Point Pinole. It is a right-lateral strike-slip fault and is in an Alquist-Priolo Earthquake Fault Zone. The fault is very active, producing large historic earthquakes, fault creep, and abundant geomorphic evidence of fault rupture.[23]

The historic Hayward earthquake of 1868 is considered to have been one of the most destructive in California history. Surface rupture of the ground as a result of the earthquake was traced for 20 miles along the Hayward fault from Warm Springs in Fremont to San Leandro, and caused major damage to the East Bay towns. Since then, powerful earthquakes on the Hayward fault have occurred repeatedly. The United States Geological Survey (USGS) describes the Hayward fault as a tectonic hazard due anytime for another M6.8 to M7.0 earthquake.[24] Specifically, the estimated probability for earthquakes of magnitude equal to or greater than M6.7 in the 30 years between 2000 and 2030 on the Hayward fault system is 32 percent.

In addition, there are buried thrust faults, and inferred faults near the study area, such as the Mount Diablo Thrust. The state recognizes that buried thrust faults exist; however, their fault planes extend under wide area and extremely difficult to identify and characterize. Consequently, regulations such as the Alquist-Priolo Earthquake Fault Zoning Act have not been applied to them.

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[23] Bay Area Rapid Transit, *Final Environmental Impact Statement, and 4(f) / 6(f) Evaluation BART Warm Springs Extension,* 2006.

[24] United States Geological Survey, *Understanding Earthquake Hazards in the San Francisco Bay Area – USGS Fact Sheet 2008-3019,* 2008.

Groundshaking. Because active fault zones occur in the vicinity of the study area, the study area is susceptible to potentially high-intensity groundshaking in the event of an earthquake on these fault zones. Sufficiently intense groundshaking can move buildings off their foundations, or cause foundations to crack and crumble.

The intensity of groundshaking depends on several factors. Ground motions caused by the same earthquake will vary because of the soil and rock conditions, distance from the causative fault, and direction from the epicenter. Areas that are underlain by loosely compacted soils may experience the greatest amount of groundshaking damage, even if these areas are not closest to the fault rupture.

Fourteen earthquakes of M6.0 or greater have occurred in the Bay Area in historical times. Earthquakes of this magnitude pose significant groundshaking hazard to the study area.

The Richter scale and the Modified Mercalli (MM) intensity scale are two common measurements of earthquakes. The Richter scale quantifies the strength of an earthquake, and the MM intensity scale is commonly used to describe the force of an earthquake at a given location and its effects on persons or structures. The MM scale consists of 12 increasing levels of intensity, from imperceptible shaking to catastrophic destruction. Table 3.7-2 provides an abbreviated description of the 12 levels of the MM intensity scale and the corresponding Richter scale measurement. Table 3.7-3 lists the faults in the vicinity of the study area and the potential earthquake magnitude and intensity associated with those faults.

Because there are numerous faults zones in the vicinity of the study area, major earthquakes have occurred and are expected to occur again in the near future. The 1999 Working Group on California Earthquake Probabilities estimate that there is a 70 percent probability of at least one earthquake with a magnitude of M6.7 or greater to occur on one of the major faults in the San Francisco Bay region before 2030. They estimated there is a 30 percent chance of one or more such earthquakes occurring along the Calaveras, Mount Diablo Thrust, or Greenville faults before 2030. All of the project alternatives will be subjected to strong groundshaking from earthquakes originated on any of the active faults in the region. Peak ground accelerations are expected to reach 0.59g (59 percent of the force of gravity).

Table 3.7-2
Modified Mercalli and Richter Scales

MM Intensity Value	Intensity Description	Richter Magnitude
I–II	Usually detected only by instruments	2
III	Felt indoors	3
IV–V	Felt by most people; slight damage	4
VI–VII	Felt by all; many frightened and run outdoors; damage minor to moderate	5
VII–VIII	Everybody runs outdoors; damage moderate to major	6
IX–X	Major damage	7
X–XII	Total and major damages	8+

Source: *City of Livermore General Plan*, Public Safety Element.

Table 3.7-3
Seismic Characteristics of Known Faults
in the Vicinity of the BART to Livermore Extension Study Area

Fault	Location	Seismic Characteristics
Greenville	Traverses the study area at the Greenville Road Interchange	Each of the three segments of this active fault is capable of generating earthquakes in the range of Richter magnitude 6.6 to 6.9. If all segments ruptured, a 7.2 magnitude earthquake would be expected. The USGS estimates a six percent probability of a 6.7 magnitude or greater earthquake during the period 2000 to 2030. Within a designated Alquist-Priolo Earthquake Fault Zone.
Northern Calaveras	Traverses I-580 at San Ramon Road, approximately 2.6 miles west of study area	This active fault is a branch of the San Andreas Fault. Fault traces within the Northern Calaveras Fault Zone are capable of generating an earthquake with a magnitude of Richter 6.3. Designated an Alquist-Priolo Earthquake Fault Zone.
Concord-Green Valley	Approximately 17 miles northwest of study area	Formerly consider two faults separated by Suisun Bay. Easternmost expression of the San Andreas Fault System in the San Francisco Bay Area. Capable of generating a magnitude 6.9 earthquake. Designated an Alquist-Priolo Earthquake Fault Zone.
Pleasanton	North of I-580 about 1.7 miles east of Calaveras Fault Zone	Also known as Mt. Diablo Fault. Mostly concealed beneath the alluvial deposits of the Livermore Valley. Capable of generating a magnitude 6.2 earthquake. Designated an Alquist-Priolo Earthquake Fault Zone
Las Positas[a]	Approximately 2.5 miles southeast of study area	This active fault could potentially generate an earthquake of Richter magnitude 6.3. The probability of an earthquake on the fault has not been determined.
Livermore[a]	Traverses the study area at I-580 to the west of Airway Boulevard; and at East Stanley Boulevard (to the east of Kitty Hawk Road.)	Considered potentially active, the fault is capable of generating an earthquake with a moment magnitude of 6.2. (The moment magnitude scale is a successor of the Richter scale.)
Mount Diablo Thrust[a]	Mapped in the hills northwest of the study area	This fault presents the potential of generating a magnitude 6.7 earthquake with a four percent probability of occurring during the period 2000 to 2030. Strong groundshaking would be expected in Livermore.

Source: *City of Livermore General Plan*, Public Safety Element.

Note:

a. Not within an established Alquist-Priolo Earthquake Fault Zone.

Liquefaction. Liquefaction occurs when groundshaking increases pore pressure in loose, fine-grained, uniformly sized, saturated soil causing it to react like quicksand. The potential for liquefaction depends on soil conditions and groundwater levels. An area of loose, fine-grained, uniformly sized soil has higher susceptibility to liquefaction when groundwater tables are high. The *City of Livermore General Plan*, Public Safety Element includes a Liquefaction Susceptibility Map,[25] which shows the liquefaction potential in the study area.

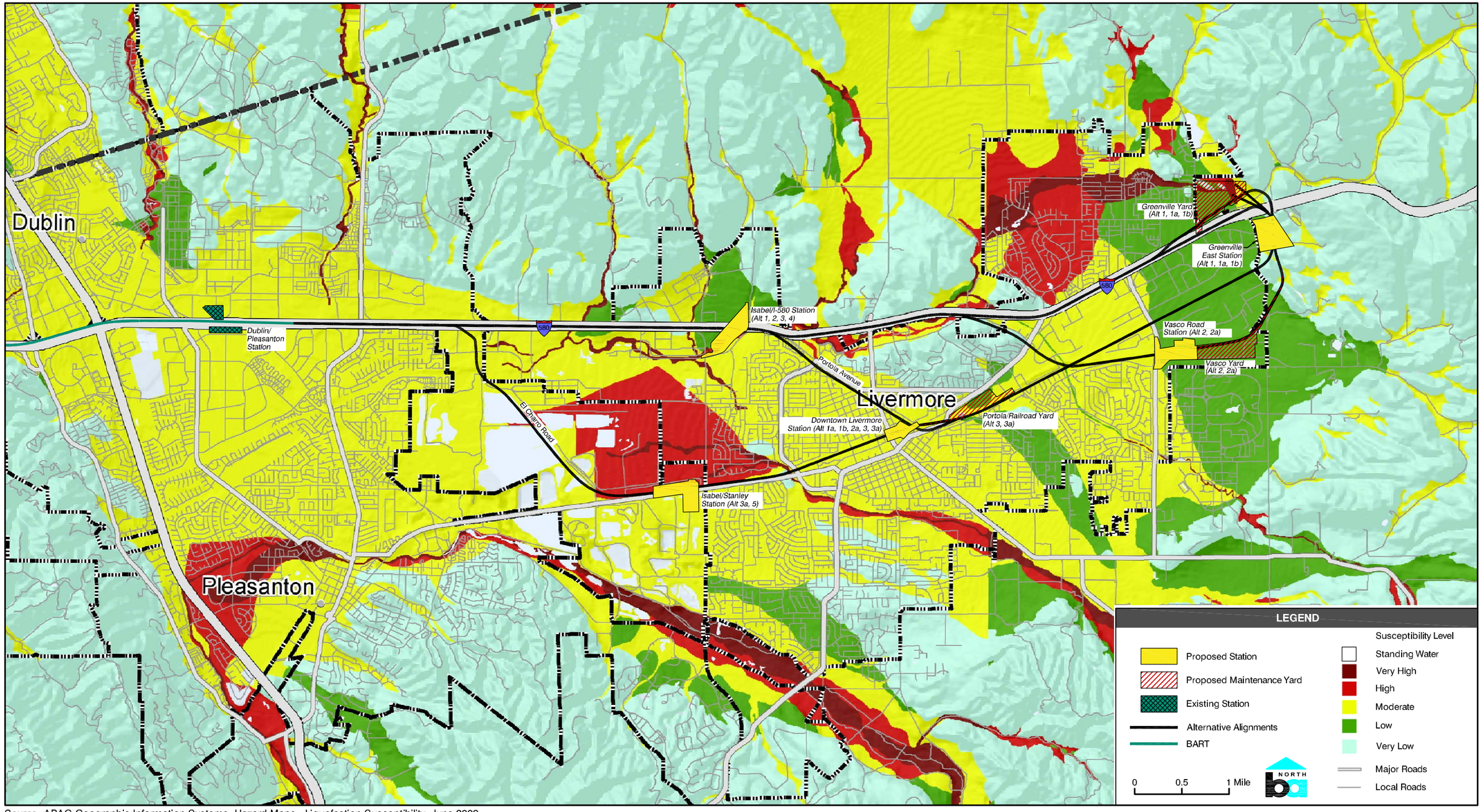
As shown in Figure 3.7-3, the western segments of the study area are within areas of high to very high liquefaction potential. Eastward, most of the study area occurs in areas with low to moderate liquefaction susceptibility, although the study area would traverse some area with very high or high susceptibility west of the proposed Isabel/I-580 Station, Isabel/Stanley Station, along I-580, and at the site of the proposed Greenville Yard. Table 3.7-4 summarizes liquefaction susceptibility hazard categories in vicinity of the project area.

Table 3.7-4
Summary Descriptions of Liquefaction Susceptibility Categories

Liquefaction Susceptibility	Description
Very Low	Expect less than 2% of future liquefaction effects to occur within geologic units assigned Very Low susceptibility. An estimated Peak Ground Acceleration (PGA) of 0.6 times the force of gravity (0.6g) is necessary to trigger liquefaction in deposits assigned Very Low susceptibility. PGA is the maximum acceleration experienced during the course of the earthquake motion.
Low	Expect about 2% of future liquefaction effects to occur within geologic units assigned Low susceptibility. An estimated PGA of 0.5g is necessary to trigger liquefaction in deposits assigned Low susceptibility.
Moderate	Expect about 20-30% of future liquefaction effects to occur within geologic units assigned Moderate susceptibility. An estimated PGA of 0.2 to 0.3g is necessary to trigger liquefaction in deposits assigned Moderate susceptibility.
High	Expect about 20-30% of future liquefaction effects to occur within geologic units assigned High susceptibility. An estimated PGA of 0.1 to 0.2g is necessary to trigger liquefaction in deposits assigned High susceptibility.
Very High	Expect about 40-50% of future liquefaction effects to occur within geologic units assigned Very High susceptibility. An estimated PGA of 0.1 is necessary to trigger liquefaction in deposits assigned Very High susceptibility.

Sources: Witter, R.C., Knudsen, K.L, Sowers, J.M., Wentworth, C.M., Koehler, R.D., Randolph, C.E., Brooks, S.K., and Gans, K.D., *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region*, California: U.S. Geological Survey Open-File Report 2006-1037, 2006.(http://pubs.usgs.gov/of/2006/1037/)

[25] Figure 10-2, *Liquefaction Susceptibility Map of the Planning Area*, Source: ABAG, 2002, LSA Associates Inc.



Source: ABAG Geographic Information Systems, Hazard Maps - Liquefaction Susceptibility, June 2009

LIQUEFACTION SUSCEPTIBILITY MAP
IN BART TO LIVERMORE STUDY AREA
FIGURE 3.7-3

Landslides, Lateral Spreading, and Subsidence

Other potential geologic hazards that may occur in the study area are landslides, lateral spreading, and subsidence.

Landslides. Areas with high landslide potential encompass slopes steeper than can be supported by the soil or rock material forming the slope. As shown in Figure 3.7-4, most of the study area would be in areas with "least" landslide susceptibility. However, small segments of the eastern portions of Alternatives 1, 1a, 1b, and 2 would be in areas with "greatest" landslide susceptibility. Table 3.7-5 summarizes landslide hazard categories in vicinity of the project area.

Table 3.7-5
Description of Categories of Landslide Susceptibility Hazards

Landslide Susceptibility	Description
Least Susceptible Area – 1	Landslide and other features related to slope instability are very rare to non-existent within this area. Land within area 1 will probably remain relatively stable unless topography is radically modified.
Marginally Susceptible Area – 2	This area includes gentle to moderate slopes underlain by relatively competent material or colluvium[a] that is considered likely to remobilize under natural conditions. The stability of slopes within Area 2 may change radically in response to modification of the adjacent terrain.
Generally Susceptible Area – 3	Slopes within this area are at or near their stability limits due to a combination of weaker materials and steeper slopes. Although most slopes within Area 3 do not currently contain landslide deposits, the materials that underlie them can be expected to fail, locally when, when modified because they are close to their stability limits.
Most Susceptible Area – 4	This area is characterized by steep slopes and includes most landslides in upslope areas, whether apparent active at present or no, and slopes upon which there is a substantial evidence of downslope creep of surface materials. Slopes within Area 4 should be considered naturally unstable, subject to failure, even in the absence of the activities of man.

Sources: Majmundar, H.H.; 1991; Landslide Hazards in Livermore Valley and Vicinity, Alameda and Contra Costa Counties, California; California Division of Mines and Geology (renamed California geological survey in 2002) Open File Report 91-02 (Plates 21A1 and 21A2)

Note:

a. Loose sediment that has been deposited or built up at the bottom of a low-grade slope or against a barrier on that slope.

Lateral Spreading. Lateral spreading occurs when liquefaction behind free faces causes subsurface soil layers to move horizontally. Lateral spreads are most common on slopes in areas of loose, saturated soils with high or very high potential for liquefaction.

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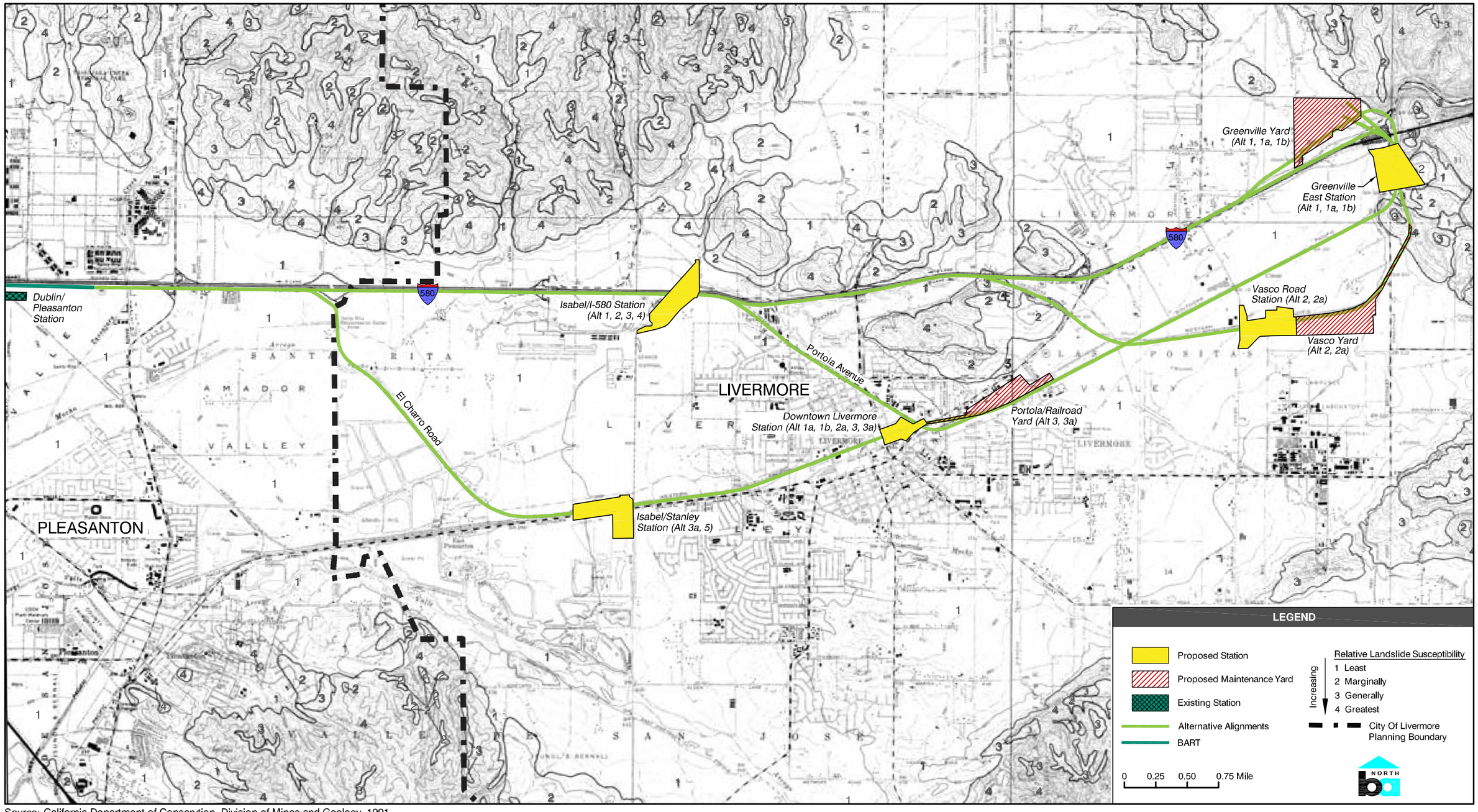

Source: California Department of Conservtion, Division of Mines and Geology, 1991

LANDSLIDE HAZARD SUSCEPTIBILITY MAP
IN BART TO LIVERMORE STUDY AREA
FIGURE 3.7-4

As shown in Figure 3.7-3, the western segment of the study area would be in areas of high to very high liquefaction susceptibility. Other portions with high or very high liquefaction susceptibility are along the site of the Isabel/I-580 Station, along I-580, and in the vicinity of the proposed Isabel/Stanley Station and Greenville Yard. The remaining segments of the study area would be in areas of low to moderate liquefaction potential, and thus low lateral spreading potential. It should be noted that the area near the Vasco Road Interchange has the potential for localized and random settlement because of underlying loose sands.[26]

Subsidence. Subsidence is the sinking of an area with little or no horizontal motion. In the Bay Area, it is caused primarily by excessive groundwater or natural gas withdrawal.[27] Weak soils also are prone to subsidence. The cities of Pleasanton, Dublin, and Livermore supplemented their water supply with groundwater obtained from the groundwater basins underlying the cities. Long-term groundwater withdrawals have the potential to cause subsidence if recharge rates are not sufficient to maintain current water table levels. The Main Basin (managed by the Zone 7 Water Agency) serves large capacity municipal production wells and is used to store and distribute high quality imported water through Zone 7's recharge program. Groundwater recharge occurs through natural and artificial recharge from rainfall, releases from the South Bay Aqueduct of Lake Del Valle, and gravel mining recharge to the Arroyo Mocho and Arroyo Del Valle, but the majority of recharge is through artificial recharge and recharge through stream channels. Consequently, potential for groundwater induced subsidence is considered to be low. Groundwater recharge is explained in Section 3.8, Hydrology and Water Quality, of this EIR.

Soils

According to the Natural Resources Conservation Survey, the soils in the study area include clay, clay loams, very gravelly coarse sandy loam, and silty clays. As shown in Figure 3.7-5, the areas proposed for the stations and maintenance facilities are underlain by the following soil types: clay and silt loam (Isabel/I-580 Station);

- very gravelly coarse sandy loam, gravelly loam and loam (Downtown Livermore Station and Portola/Railroad Yard);
- loam and silt loam (Vasco Road Station and Vasco Yard);
- loam, clay loam (Greenville East Station and Greenville Yard); and
- gravelly loam (Isabel/Stanley Station).

The study area is underlain by erosive and expansive soils, which may present design and construction constraints. These soil properties are described below.

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[26] Caltrans, *Environmental Assessment/Initial Study, I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive,* 2006.

[27] City of Pleasanton, *Proposed Pleasanton General Plan 2005-2025 - Draft Environmental Impact Report*, 2008.

Expansive Soils. Expansive soils are soils that swell or shrink when they absorb or lose water. This reaction can cause cracking, tilting, and, occasionally, collapse of foundations or structures. The presence of expansive soils may indicate a potential for settlement. Settlement takes place when vertical loads compress weak soils by squeezing out air and water, causing supported structures to sink. If different soil conditions cause the ground under a structure to settle to different depths (differential settlement), structural damage such as cracked foundations, cracked columns, and even collapse could result.

The soils underlying the study area, as identified previously and in Figure 3.7-4, have a high expansion potential that could damage foundations for the stations, maintenance facilities and structures associated with all the BART extension alternatives unless treated as required by the BART's design specifications and the building codes of the jurisdictions through which the project would be constructed.

Erosive Soils. Erosive soils are those that are easily worn away and transported to another area either by wind, water, or gravity. Soils that contain high amounts of loose sand and silt (fine soil particles smaller than sand) are more easily erodible than soils which are more consolidated. Excessive soil erosion can lead to damage of building foundations and roadways. Moderately erodible soils underlying the study area, as identified previously and in Figure 3.7-4, occur in the upland, north and east of Livermore Valley.[28]

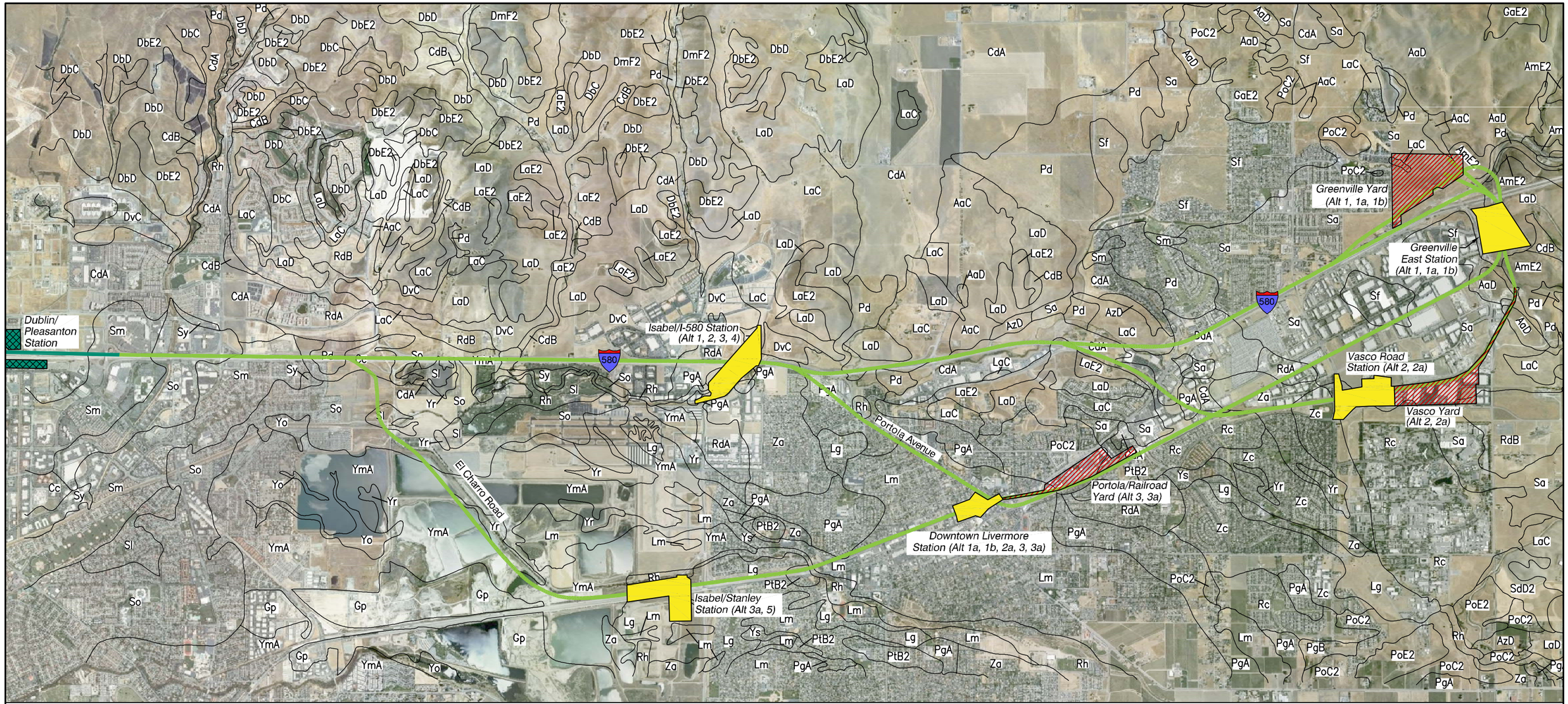
Corrosive Soils. Corrosivity is the ability of soil to break down certain substances, particularly metals. Corrosive soils may have adverse effects on the long-term structural stability of steel and concrete. Soils that are highly alkaline or highly acidic are likely to be corrosive. The soils in the study area, as identified in Figure 3.7-4, are considered to have a high corrosion potential to steel, and would cause damage to surface piping and weaken building foundations.

Mineral Resources

The California Geological Survey (CGS) is responsible for preparing Mineral Land Classification Maps that designate Mineral Resource Zones (MRZ). MRZs define areas where important mineral deposits occur, based on the value of the mineral resource. MRZs are defined as follows:

- MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence;
- MRZ-2: Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists;
- MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data;
- MRZ-4: Areas where available information is inadequate for assignment to any other MRZ zone.

[28] U.S. Department of Agriculture, *Soil Survey Alameda County Area, California,* 1977.



SOILS TYPE KEY

AaC	Altamont clay	DbD	Diablo clay	Lg	Livermore gravelly loam	RdA	Rincon clay loam	So	Sycamore silt loam
AaD	Altamont clay	DbE2	Diablo clay	Lm	Livermore very gravelly coarse sandy loam	RdB	Rincon clay loam	Sy	Sycamore silt loam over clay
AmE2	Altamont Clay	DmF2	Diablo clay	Pd	Pescadero clay	Rh	Riverwash	YmA	Yolo loam
AzD	Azule clay loam	DvC	Diablo clay	PgA	Pleasanton gravelly loam	RoF	Rock land	Ys	Yolo sandy loam
CdA	Clear Lake clay	GaE2	Gaviota rocky sandy loam	PgB	Pleasanton gravelly loam	Sa	San Ysidro loam	Yr	Yolo gravelly loam
CdB	Clear Lake clay	Gp	Gravel pit	PoC2	Positas gravelly loam	SdD2	Shedd silt loam	Yo	Yolo loam over gravel
Cc	Clear Lake clay	LaC	Linne clay loam	PoE2	Positas gravelly loam	Sf	Solano fine sandy loam	Zc	Zamora silty clay loam
DaA	Danville silty clay loam	LaD	Linne clay loam	PtB2	Positas gravelly loam	Sl	Sunnyvale clay loam	Za	Zamora silt loam
DbC	Diablo clay	LaE2	Linne clay loam	Rc	Rincon loam	Sm	Sunnyvale clay loam over clay		

LEGEND

- Proposed Station
- Proposed Maintenance Yard
- Existing Station
- Alternative Alignments
- BART

0 0.25 0.50 0.75 Mile

NORTH

Image Source: Google Earth Pro, Version 5.0.11337.1968
Data Source: Soil Survey: Alameda Area, California, US Department of Agriculture, Series 1961, No.41, March 1966

SOIL TYPE LOCATION MAP
IN BART TO LIVERMORE STUDY AREA
FIGURE 3.7-5

The Livermore Valley is underlain by alluvial deposits which contain significant reserves of sand and gravel suitable for use as aggregate in cement production. Sand and gravel mining has been a common regional operation prior to the 20th century.[29] The region has been mapped by the CGS and much of the Livermore Valley floor south of the I-580 is classified as an area of significant mineral resources, including areas mapped as either MRZ-2 or MRZ-3.[30]

Figure 8-3 of the *City of Livermore General Plan,* Open Space and Conservation Element indicates State-designated Mineral Resource Sectors A-1 and A-2 in the vicinity of the study area in lands classified as MRZ-2.[31] Mineral Resource Sectors are areas where mineral extraction is occurring and areas that have current land uses that are similar to areas where mining has occurred.[32] Mineral resources in the study area include gravel that is mined in the southwestern portion of the study area, in Alameda County between I-580 and the UPRR tracks (Resource Sector A-1) and south of Stanley Boulevard (Resource Sector A-2) in an area known as the Chain of Lakes. Existing quarry lands are owned by Rhodes & Jamieson Aggregates Mines. The pits near Stanley Boulevard are leased and operated by Vulcan Materials Company (Vulcan). Vulcan presently mines aggregate and operates an associated processing plant on approximately 1.1 acres of land.[33]

Vulcan holds an active permit to mine the SMP-16 area south of Stanley Boulevard, in the southwest corner of the intersection of Stanley Boulevard and Isabel Avenue; the area has been mined for sand and gravel products at least since the 1950s. A Reclamation Plan for the property has been approved by the County and mining can occur on any part of the property. Current mining operations (commenced in 2008) are ongoing in the SMP-16 area north and south of Stanley Boulevard, and are anticipated to be completed by 2013.

Farther west, between Isabel Avenue and Vineyard Avenue, extracted material from SMP-16 south of Stanley Boulevard is transported by a conveyor system under Stanley Boulevard to the Vulcan processing plant north of Stanley Boulevard and west of El Charro Road. Material is washed, crushed, and separated into different grades, then stock piled for use in hot mix asphalt, road base, and other construction uses.[34]

The property northwest of the intersection of Stanley Boulevard and Isabel Avenue and properties farther north near the airport (formerly known as SMP-38, -39, and -40) were proposed for mining operations to commence upon the completion of the existing mining operations in 2013; however, those plans were withdrawn and the area northwest of the intersection of Stanley Boulevard and Isabel

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29 City of Livermore, *El Charro Specific Plan Environmental Impact Report*, 2007.

30 City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

31 Figure 8-3, *Mineral Resources Sectors Within Planning Area*. Source: California Department Of Conservation, Division of Mines and Geology, 1996.

32 City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

33 City of Livermore, *El Charro Specific Plan Environmental Impact Report*, 2007.

34 Vulcan Materials Company, Western Division, *SMP-16 Periodic Review of Mining and Reclamation Report by Permittee*, 2008.

Avenue is not covered by any mining permit or reclamation plan.[35] Future mining is planned for the area south of Stanley Boulevard.[36]

As shown in Figure 3.7-4 and described in Table 3.7-5, the quarry lands are considered to have the "least" landslide susceptibility and would be expected to remain relatively stable unless the topography were radically modified. The soils in the quarry lands are Yolo loams. These soils are well drained and considered to have a "slight" erosion hazard, indicating that little or no erosion is likely.[37] The quarries are in Quaternary deposits Qa (Latest Pleistocene to Holocene alluvial deposits). Liquefaction susceptibility associated with these deposits is moderate.[38]

Paleontological Resources

Fossil localities in Alameda County occur in the marine and non-marine formations, described above. Many of the fossils in undivided Quaternary sediments and the Livermore gravels are fragmented vertebrate fossils, including extinct bison, camels, boney fish, mammoths, and horses. Fossils in the Neroly, Cierbo, and Unit D sandstone formations generally are marine invertebrates such as bivalves (clams) and microfossils (foraminifera). The distribution of fossil localities and the location of corresponding geologic units indicate that most of the vertebrate paleontological resources in Alameda County are southeast of Interstate 680 in the upland foothills of the Diablo Range and in the Livermore Valley. Fossil localities diminish west of Interstate 680 because much of that area is underlain by young alluvial and basin deposits that do not contain abundant fossil remains. Invertebrate paleontological resources occur throughout the Altamont Hills east of the study area.

Alameda County has more than 120 fossil localities recorded in the University of California Museum of Paleontology (UCMP) database. Slightly more than half the localities contain megafossils (vertebrates or invertebrates identifiable without the aid of a microscope). Most (75 percent) are on the west slope of the Coast Ranges or in the valleys near Walnut Creek and Livermore in the undivided Quaternary deposits or the Livermore gravels. All are vertebrate fossil sites, mostly containing fragmentary records of large vertebrates, including the extinct camel (Camelidae), horse (Equus sp.), giant ground sloth (Xenarthra), tapir (Tapirus sp.), and mammoth (Mammuthus sp.). The presence of mammoth suggests a Pleistocene, rather than Holocene, age for the fossil assemblage.

The Neroly and Cierbo formation sandstones represent sediments laid down in an increasingly shallow sea during the middle to late Miocene epochs. These formations contain valuable plant records of middle to late Miocene times. Of the Neroly and Cierbo formation localities in Alameda County that

[35] Bruce Jensen, Senior Planner, County of Alameda, personal communication with George Burwasser, PG 7151, PBS&J, November 2, 2009.

[36] Vulcan Materials Company, Western Division, *SMP-16 Periodic Review of Mining and Reclamation Report by Permittee*, 2008.

[37] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

[38] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009.

contain neither microfossil nor invertebrates, all are collections of plant specimens. No vertebrate fossils have been recovered from the Neroly or Cierbo formations in Alameda County.

The Cretaceous rocks of Unit D of the Great Valley Sequence represent deep marine sediments deposited at depths of several thousand feet in an ocean west of the Cretaceous volcanic island chain in what is now the Sierra Nevada mountains. Megafossils are rare throughout the Great Valley Sequence, partially because of the depth at which the sediments were deposited, and of the forty Cretaceous megafossil localities recorded in Alameda County by UCMP, only one vertebrate and four plant fossil collections are known, none of which is in the study area.

Identification of Paleontological Resource Sensitivity. The Conformable Impact Mitigation Guidelines Committee of the Society of Vertebrate Paleontology (SVP, 1995) published Standard Guidelines in response to a recognized need to establish procedures for the investigation, collection, preservation, and cataloguing of fossil-bearing sites. The Standard Guidelines are widely accepted among paleontologists, followed by most investigators, and identify the two key phases of paleontological resource protection as (1) assessment and (2) implementation. Assessment involves identifying the potential for a project site or area to contain significant nonrenewable paleontological resources that could be damaged or destroyed by project excavation or construction. Implementation involves formulating and applying measures to reduce such adverse effects. The SVP defines the level of potential as one of three sensitivity categories for sedimentary rocks: High, Moderate, and Low, as listed below. Two additional categories, Marginal and Zero, define non-sedimentary rocks.

- High Sensitivity – Assigned to geologic formations known to contain paleontological localities with rare, well-preserved, and/or critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleobiology and evolutionary history (phylogeny) of animal and plant groups. Generally speaking, highly sensitive formations are known to produce vertebrate fossil remains or are considered to have the potential to produce such remains.
- Moderate Sensitivity – Assigned to geologic formations known to contain paleontological localities with moderately preserved, common elsewhere, or stratigraphically long-ranging fossil material. The moderate sensitivity category also is applied to geologic formations that are judged to have a strong, but unproven potential for producing important fossil remains (e.g., Pre-Holocene sedimentary rock units representing low to moderate energy, of marine to non-marine depositional settings).
- Low Sensitivity – Assigned to geologic formations that, based on their relative youthful age and/or high-energy depositional history, are judged unlikely to produce important fossil remains. Typically, low sensitivity formations may produce invertebrate fossil remains in low abundance.
- Marginal Sensitivity – Assigned to geologic formations that are composed either of pyroclastic volcanic rocks or metasedimentary rocks, but which nevertheless have a limited probability for producing fossil remains from certain sedimentary lithologies at localized outcrops.

- Zero Sensitivity – Assigned to geologic formations that are entirely plutonic (volcanic rocks formed beneath the earth's surface) in origin and therefore have no potential for producing fossil remains.

In the context of CEQA, fossils of land-dwelling vertebrates and their environment are considered important (i.e., significant) paleontological resources. Such fossils typically are found in river, lake, and bog deposits, although they may occur in nearly any type of sedimentary sequence.

The undivided Quaternary deposits in the study area fit the definition of High Sensitivity for paleontological resources. Because the Holocene and Pleistocene deposits are not differentiated, it is not possible to provide a systematic separation of the more sensitive Pleistocene deposits from the less sensitive Holocene deposits. The Livermore gravels fit the definition of High Sensitivity for paleontological resources. These are readily identifiable deposits with a discrete age range that does not extend to the Holocene. The Neroly, Cierbo, and Unit D sandstones contain valuable invertebrate fossil assemblages, but, because they comprise marine microfossil and invertebrate megafossil specimens, they do not fit the definition of High Sensitivity for paleontological resources, particularly in the context of CEQA.

Applicable Policies and Regulations

Alquist-Priolo Earthquake Fault Zoning Act. The State legislation protecting the population of California from the effects of fault-line ground-surface rupture is the Alquist-Priolo Earthquake Fault Zoning Act. This law was passed in response to the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. At the directive of the Act, in 1972 the State Geologist began delineating Earthquake Fault Zones (called Special Studies Zones prior to 1994) around active and potentially active faults to reduce fault rupture risks to structures for human occupancy.[39] This Act has resulted in the preparation of maps delineating Earthquake Fault Zones to include, among others, recently active segments of the San Andreas and Hayward faults. The Act prohibits the building of structures intended for human occupancy across traces of active faults and provides for strictly regulated special seismic design considerations if developments are planned in areas adjacent to active or potentially active faults.[40]

The California Geological Survey (CGS) is charged with identifying active faults and delineating the Earthquake Fault Zones around such traces where surface fault rupture is most likely to occur. According to the Act, a fault is considered active and eligible for zoning consideration if one or more of its segments shows evidence of surface displacement in the last 11,000 years.[41]

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[39] Alquist-Priolo Earthquake Fault Zoning Act, California Public Resources Code, Division 2, "Geology, Mines, and Mining," Chapter 7.5 "Earthquake Fault Zones," Sections 2621 through 2630; signed into law December 22, 1972, most recently amended October 07, 1997.

[40] Bay Area Rapid Transport, *Final Environmental Impact Statement, and 4(f) / 6(f) Evaluation BART Warm Springs Extension,* 2006.

[41] http://www.consrv.ca.gov/CGS/rghm/ap/Pages/index.aspx.

Seismic Hazard Mapping Act. The state regulations protecting the public from geoseismic hazards, other than surface faulting, are contained in California *Public Resources Code*, Division 2, Chapter 7.8 (the Seismic Hazards Mapping Act), described here, and 2007 California *Code of Regulations*, Title 24, Part 2 (the *California Building Code* [CBC]), described below. Both of these regulations apply to public buildings, and a large percentage of private buildings, intended for human occupancy.

The Seismic Hazard Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The act directs the California Geological Survey to identify and map areas prone to the earthquake hazards of liquefaction, earthquake-induced landslides, and amplified groundshaking. The act requires site-specific geotechnical investigations to identify potential seismic hazards and formulate corrective measures prior to permitting most developments designed for human occupancy (which would include BART stations and maintenance facilities) in the Zones of Required Investigation.

As of February 2009, 117 official seismic hazard zone maps showing areas prone to liquefaction and landslides had been published in California, and more are scheduled for 2010. The mapping is being performed in Southern California and the San Francisco Bay Area. Twenty-seven official maps for the San Francisco Bay Area have been released, with preparation of additional maps for San Mateo, Santa Clara, Alameda, and Contra Costa Counties planned or in progress. The project area is on the Seismic Hazard Maps for the 7.5-minute quadrangles of Dublin, Livermore, Altamont, Niles, and La Costa Valley.

Section 2697 of the Seismic Hazards Mapping Act mandates that, prior to the approval of a project in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard must be prepared. After a report was approved, subsequent geotechnical reports would not be required, provided that new geologic information warranting further investigation was not recorded. The California Building Code requires that the recommendations of the report be incorporated in the building design.

California Building Code (CBC). The project is located in a seismically active area and must, therefore, comply with California Code of Regulations Title 24, also known as the CBC. The CBC is applicable only to building structures included in the project. The CBC is a design code for structures to withstand seismic hazards and provides standards for project construction, including excavation, grading, earthwork construction, fill embankments, expansive soils, foundation investigations, liquefaction potential, and soil strength loss. The CBC is based on the 2006 International Building Code, which is published by the International Conference of Building Officials. The Code is widely used throughout the United States, generally adopted on a state-by-state or district-by-district basis, and has been modified for California conditions with more detailed and stringent regulations.

California Department of Transportation (Caltrans). Much of the study area lies in the I-580 right-of-way, and any work in this right-of-way is subject to Caltrans requirements governing allowable actions and modifications to the right-of-way. The State of California has established construction standards and design criteria for roadways to safeguard life and property. Construction standards and seismic design criteria are contained in such regulatory codes as Caltrans *Seismic Design Criteria*

Version 1.2 (December 2001), *Highway Design Manual, Sections 110.6,* Earthquake Consideration (November 2001), and *113, Geotechnical Design Report* (November 2001), or similar codes adopted by a city for roadway corridor protection. These criteria deal with pavement and subsurface utility design (flexible joints and couplings, overpass construction, etc.), slope stability (especially slumping, settling, and liquefaction in fills), alignment modification to reduce exposure to fault rupture or intense groundshaking, and ground failures such as liquefaction. Prior to construction, geotechnical studies are required to be undertaken: recommended seismic-protection measures are required to be accommodated in the project design. The recommendations provide the required protection from the anticipated effects of seismic groundshaking. Adherence to these standards of protection is mandatory and would reduce the risk of injury or death from earthquakes to the maximum extent technically practicable.

The State regulations guidelines protecting bridges and overpasses from geoseismic hazards are contained in Caltrans *Bridge Design Specifications*, *Bridge Memos to Designers*, *Bridge Design Practices Manual*, and *Bridge Design Aids Manual*. These manuals provide state-of-the art information to address geoseismic issues that affect the design of transportation infrastructure. Bridge design is required to be based on the "Load Factor Design methodology with HS20-44 live loading (a procedure to incorporate the estimated weight of the vehicles and/or pedestrians on the bridge with the weight of the bridge for loading calculations)." Seismic resistant design is required to conform to the Bridge Design Specifications, and Section 20 of Bridge Memos to Designers, as well as the Caltrans Seismic Design Criteria. The seismic provisions contained in these design guidelines, or similarly accepted ones, would be applied to the construction of the rail overcrossings proposed for the study area.

Surface Mining and Reclamation Act. The Surface and Mining Reclamation Act (SMARA) was enacted for the dual purpose of identifying and mapping economically valuable mineral resources (including gold, sand, and gravel) and establishing a regulatory framework for the operation and eventual reclamation of surface mining operations. Section 3704, Performance Standards for Backfilling, Regrading, Slope Stability, and Recontouring, of SMARA requires the quarry operator to compact any fill in accordance with the current County Building Code specifications and create finals slopes no steeper than 2:1 (horizontal to vertical). Cut slopes, including final quarry walls and faces, are required to have a minimum slope stability factor of safety that is suitable for the proposed end use and conform to the surrounding topography and/or approved end use.

It is the County's responsibility, as the State's agent for SMARA enforcement, to inspect the slopes and assure that they are stable.

California Public Resources Code. Several sections of the California Public Resources Code (PRC) protect paleontological resources. Section 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontologic feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted permission. Section 0244 requires reasonable mitigation for impacts on paleontological resources that occur as a result of development on public lands. The sections of the California Administrative Code pertaining to the State Division of Beaches and Parks afford protection to geological features and "paleontological materials," but grant the

director of the state park system authority to issue permits for specific activities that may result in damage to such resources, if the activities are in the interest of the state park system and for state park purposes (California Administrative Code Sections 4307–4309; as cited in USFWS/CDFG, 2006).

An additional section of the Public Resources Code that is applicable to paleontological resources is Section 5097.5, which provides that any unauthorized removal or destruction of archaeological or paleontological resources on sites located on public lands is a misdemeanor.

California Environmental Quality Act Statute and Guidelines. CEQA requires that public agencies identify the environmental consequences of their proposed projects and project approvals. Appendix G to the Guidelines for the Implementation of CEQA (Public Resources Code Sections 15000 et seq.) indicates that a project would have a significant impact if it would directly or indirectly destroy a unique paleontological resource or site.

Other state requirements for paleontological resource management are in California Public Resources Code Chapter 1.7, Section 5097.5 through 5097.9 (Stats. 1965, c. 1136, p. 2792), Archaeological, Paleontological, and Historical Sites. This statute defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor and specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources.

BART Facility Standards. With regard to seismic safety, the BART extensions alternatives would be subject to the BART Facility Standards, which specify design criteria to protect structures and persons from geoseismic hazards. The BART Facility Standards specify design criteria to ensure that all structures, equipment, and supports are designed to survive ground motions without collapse. The objectives are to ensure safety, prevent prolonged interruption of project operations due to structural failure or damage, and to protect the permanent stationary facilities.

All BART structures—including aboveground passenger stations, aerial structures, retaining walls, and cut-and-cover subway structures would be designed and built in accordance with seismic design standards contained in the BART Facilities Standards, Release 1.2 (May 2004), The design criteria include the following:

- Aerial structure design shall meet the requirements of the Caltrans Bridge Design Specifications (CBDS), American Concrete Institute Building Code Requirements for Reinforced Concrete, ACI 318 (ACI) (which covers material design and construction of concrete structures); American Institute of Steel Construction, Manual of Steel (AISC) *Allowable Stress Design, Part 5 – Specifications and Codes*; and American Institute of Steel Construction, *Load and Resistance Factor Design*.
- Cut-and-cover subway line structures shall be designed according to the provisions of ACI-318, and shall comply with the requirements set out in Article 6.4 of the BART Facilities Standards. In addition, for cut-and-cover structures longer than 1500 feet, deformations/stresses caused by horizontal seismic waves shall be considered in seismic design.

- Design of at-grade-station structures and buildings would be governed by the provisions of the CBC as modified in Articles 6.5.3 through 6.5.7 of the BART Facilities Standards. Station structures and buildings shall be designed with an importance factor of 1.5 (specified in the BART Design Standard as structures whose integrity is essential to the normal operation of BART trains).
- Parking Station (classified as non-essential structures) shall be designed with an importance factor of 1.25 and shall comply with the provision of Articles 6.5.4 and 6.5.5 set forth in the BART Facilities Standards.

Soil Erosion Control Regulations. Construction, including excavation and grading of areas in the study area, could lead to soil erosion. Soil erosion causes the loss of topsoil and can have a local impact on water quality due to increased sediments in stormwater. Additional information on erosion control is available in the Section 3.8, Hydrology and Water Quality, of this EIR. The regulations applicable to soil erosion and stormwater issues are highlighted below.

National Pollutant Discharge Elimination System. The National Pollutant Discharge Elimination System (NPDES) is a permit program that controls water pollution by regulating sources that discharge pollution into waters of the U.S. Non-point-source pollutants in stormwater may include suspended sediment released from soil erosion at construction sites. In California, the State Water Resources Control Board (SWRCB) is authorized by the United States Environmental Protection Agency (USEPA) to administer the NPDES program through the Regional Water Quality Control Boards (RWQCBs). All construction activity that occurs within the cities of Pleasanton, Dublin, and Livermore requires an NPDES permit. Additional information on the NPDES permit program is available in the Section 3.8, Hydrology and Water Quality.

Alameda Countywide Clean Water Program. Alameda County, its 14 incorporated cities, and the Alameda County Flood Control District Zone 7 joined to form the Alameda Countywide Clean Water Program (ACCWP). ACCWP is responsible for implementing at the local level, pollution control standards for stormwater runoff to the San Francisco Bay consistent with the federal Clean Water Act. The ACCWP obtained a Joint Municipal NPDES permit from the San Francisco Bay RWQCB. The permit contains a comprehensive plan to reduce the discharge of pollutants to the "maximum extent practicable." The permit requirements are implemented by the cities of Pleasanton, Dublin, and Livermore in their respective jurisdictions.

Impact Assessment and Mitigation Measures

Standards of Significance

The alternatives would result in significant geoseismic impacts if they would:

- Expose people, or structures to potential substantial adverse effects, including the risk of loss, injury, death involving (i) rupture of a known earthquake fault, (ii) strong seismic groundshaking, (iii) seismic-related ground failure, including liquefaction, or (iv) landslides;

- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsiding, liquefaction or collapse;
- Be located on expansive soil as defined in Section 1802.3.2 of the California Building Code (22007), creating substantial risks to life or property;
- Result in a loss of availability of a known mineral resource that would be of value to the region and the residents of the State;
- Result in a loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan; or
- Directly or indirectly destroy unique paleontological resource or site.

For each geologic or paleontologic impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, GEO refers to Geology, Soils, and Seismicity.

Environmental Analysis

Table 3.9-4 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, all BART extension alternatives would experience less-than-significant impacts related to geology, soils, and seismicity. Several of the BART extension alternatives could affect access to or extraction of significant mineral resources in the area. All BART extension alternatives would result in potentially significant impacts related to paleontological resources. An explanation of these conclusions is provided under the subsequent impact discussions. Impacts related to soil erosion are addressed in Section 3.8, Hydrology and Water Quality.

GEO-1 Ground Rupture

The BART extension alternatives would experience potential for fault or ground rupture if portions of the alternatives would occur within an Alquist-Priolo Earthquake Fault Zone. As shown in Figure 3.7-1, the eastern portion of the study area that includes portions of Alternatives 1, 1a, and 1b are within the Greenville Fault Zone, a designated Alquist-Priolo Zone Fault. The remaining alternatives (i.e., Alternative 2, 2a, 3, 3a, 4, and 5) do not encroach into Alquist-Priolo Earthquake Fault Zones.

The potential for fault rupture within the defined earthquake fault zone is considered high. Without proper design, Alternatives 1, 1a, and 1b could expose persons to injury from fault rupture, experience structural damage and interruption of transportation services.

The BART extension alternatives would be constructed to BART Facility Standards, which would substantially improve the ability of all structures and structural supports to survive ground motions without collapse, with the objectives of ensuring safety, preventing prolonged interruption of operations due to structural failure or damage, and protecting permanent stationary facilities. Under the BART Facility Standards, which incorporate State and federal code requirements, site-specific investigations would be required in Alquist-Priolo Earthquake Fault Zones that would determine the location of fault traces on site. The regulations prohibit construction of structures for human occupancy, such as stations and maintenance buildings, atop fault traces and require rail lines to cross fault traces as nearly perpendicularly as possible. Aerial structures would be designed to the following standards:

i) Caltrans Bridge Design Specifications;

ii) American Concrete Institute Building Code Requirements for Reinforced Concrete, ACI 318 (ACI);

iii) American Institute of Steel Construction, Manual of Steel (AISC) Allowable Stress Design, Part 5 – Specifications and Codes; and

iv) the American Institute of Steel Construction, *Load and Resistance Factor Design*.

Station structures and buildings would be constructed in accordance with the CBC, as incorporated into the BART Facility Standards. The required design and constraints would reduce risk to people, loss of structures, injury or death from ground rupture so that potential ground rupture would be less than significant, as summarized in Table 3.7-6.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to ground rupture.

Alternative 1 – Greenville East. Alternative 1 would originate at the existing end-of-track just east of the Dublin/Pleasanton BART Station and would terminate near Greenville Road. The eastern portions of this alternative encroaches into the Greenville Fault Zone (designated as an Alquist-Priolo Earthquake Fault Zone). The eastern portion of Alternative 1 includes the Greenville East Station and Greenville Yard. The proposed Greenville East Station, Greenville Yard, and associated components would be in the Alquist-Priolo Earthquake Fault Zone.

The potential for fault rupture in the defined earthquake fault zone is considered high. Ground rupture along the Greenville fault during an earthquake would pose public safety risks and could damage below-ground structures, the Greenville East Station and parking structures, and the Greenville Yard maintenance buildings. Additionally, fault rupture could interrupt BART services and cause potential derailment. Thus, Alternative 1 could have severe ground rupture because the proposed structures would be in an Alquist-Priolo Earthquake Fault Zone.

Table 3.7-6
Summary Comparison for Geology, Soils, and Seismicity Impacts of the BART to Livermore Extension Alternatives

	Ground Rupture		Seismic Groundshaking		Ground Failure, including Landsliding, Liquefaction, Lateral Spreading, and Soil Subsidence		Soil Constraints		Loss of a Mineral Resource or Mineral Resource Recovery Site		Paleontological Resources	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 - Greenville East	LTS	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
1a - Downtown-Greenville East via UPRR	LTS	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
1b - Downtown-Greenville East via SPRR	LTS	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
2 - Las Positas	NI	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
2a - Downtown-Vasco	NI	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
3 - Portola	NI	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
3a - Railroad	NI	NA	LTS	NA	LTS	NA	LTS	NA	S	No	PS	Yes
4 - Isabel/I-580	NI	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA	PS	Yes
5 - Quarry	NI	NA	LTS	NA	LTS	NA	LTS	NA	S	No	PS	Yes

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact NA = Not applicable

The BART extension alternatives would be constructed to the BART Facility Standards, which incorporate national and State safety requirements for structural, mechanical, and electrical design. Because portions of this alternative would be in an Alquist-Priolo Earthquake Fault Zone, BART Facility Standards require site-specific investigations to determine presence of fault traces under proposed structures. In the event that fault traces were discovered, occupiable structures could not be constructed atop the traces and track alignments would need to cross fault traces as nearly perpendicular as possible to minimize risk. Additionally, all structures, equipment, and equipment supports would be designed to withstand ground motions without collapse. The required design and constraints would ensure that unacceptable risk from ground rupture under Alternative 1 would be reduced to levels consistent with professional engineering practices and public health and safety standards. Accordingly, impacts from ground rupture would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would terminate near Greenville Road, and components of this alternative would be in the Alquist-Priolo Earthquake Fault Zone for the Greenville fault, similar to Alternative 1. This alternative would be constructed to the BART Facility Standards, as described previously. Therefore, the potential for risks from ground rupture would be reduced to acceptable levels, similar to Alternative 1, and would be less than significant.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would terminate near Greenville Road, and components of this alternative would be in the Alquist-Priolo Earthquake Fault Zone for the Greenville fault, similar to Alternatives 1 and 1a. This alternative would be constructed to the BART Facility Standards, as described previously. Therefore, the potential for risks from ground rupture would be reduced to acceptable levels, similar to Alternatives 1 and 1a, and would be less than significant.

Alternative 2 – Las Positas. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

Alternative 2a – Downtown–Vasco. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

Alternative 3 – Portola. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

Alternative 3a – Railroad. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault

Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

Alternative 4 – Isabel/I-580. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

Alternative 5 – Quarry. As described previously, alignments and associated station and maintenance structures for this alternative would not be in an Alquist-Priolo Earthquake Fault Zone. Consequently, there would be no impacts related to ground rupture under this alternative.

GEO-2 Seismic Groundshaking

Proximity to known active fault zones affects the potential for risk from seismic groundshaking. Active earthquake faults occur within 20 miles of the study area, as listed in Table 3.7-3. As described under Existing Conditions, Alternatives 1, 1a, and 1b would encroach into the Greenville Fault Zone, capable of generating up to a 7.2 magnitude earthquake. Alternatives 2a, 3, 3a, 4, and 5 would experience strong groundshaking from the Greenville fault and other surrounding faults. Other known active earthquake faults within 20 miles of the study area include Concord-Green Valley, Northern Calaveras, and Pleasanton faults.

Other faults not designated as Alquist-Priolo Earthquake Fault Zones in the vicinity of the study area include Las Positas fault, an active fault that is approximately 2.5 miles to the southeast of the study area; and the Livermore fault, a potentially active fault in the Downtown Livermore area. The Mount Diablo Thrust is another potential source of groundshaking and is in the hill areas northwest of the BART extension alternatives.

The USGS estimates a six percent probability of a 6.7 magnitude or greater earthquake during the period 2000 to 2030. The Livermore fault has the potential of generating an earthquake with a moment magnitude of 6.2. Las Positas fault could potentially generate an earthquake of magnitude 6.3; the North Calaveras fault is also capable of generating an earthquake with a magnitude of 6.3. The Mount Diablo Thrust presents the potential of generating a magnitude 6.7 earthquake with a four percent probability of occurring during the period 2000 to 2030.

Because the study area occurs within 20 miles of known active faults, all BART extension alternatives could experience strong seismic groundshaking in an event of a major earthquake. Horizontal and vertical accelerations from earthquakes along the faults would have the potential to expose above-grade structures to lateral stresses and below-grade structures to lateral earth pressures, causing moderate to major damage as well as risk of human injury. The BART extension alternatives would be constructed to the BART Facility Standards, which require site-specific investigations to identify fault traces and require that all structures, equipment, and supports are designed to survive ground motions without collapse. The BART Facility

Standards were developed with the objectives of ensuring safety, preventing prolonged interruption of project operations caused by structural failure and damage, and protecting station facilities in accordance with various State codes and regulations. The required design criteria would reduce potential effects from groundshaking to acceptable levels consistent with professional engineering practices and public health and safety standards. Accordingly, impacts from seismic groundshaking would be less than significant.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to groundshaking.

All BART Extension Alternatives. All alternatives would experience strong groundshaking because of their proximity to active faults as described in Table 3.7-3. As described above, the eastern portions of Alternatives 1, 1a, and 1b would be in the Greenville Fault Zone, thus would most likely experience the greatest groundshaking compared to the remaining alternatives.

The alignment and station structures, and associated aboveground and aerial structures for the remaining alternatives (Alternatives 2, 2a, 3, 3a, 4, and 5) would experience strong groundshaking because of their proximity to active faults as described in Table 3.7-3, thus expose persons and structures to risks associated with the seismicity of the San Francisco Bay area.

Horizontal and vertical accelerations from earthquakes along the faults described above would have the potential to expose above-grade structures to lateral stresses and below-grade structures to lateral earth pressures, causing moderate to major damage. The effect of groundshaking on structures is related to their form, structural design, materials, construction quality, and distance and direction from the causative fault.

All BART extension alternatives would be constructed to the BART Facility Standards, which incorporate national and State safety requirements for structural, mechanical, and electrical design. BART Facility Standards require that all structures, equipment, and equipment supports be designed to withstand ground motions without collapse. Required adherence to the BART Facility Standards and other regulations described under "Applicable Policies and Regulations" would ensure passenger safety; prevent prolonged interruption of project operations caused by structural failure or damage; and protect station facilities. Given these design requirements, potential groundshaking concerns for all BART extension alternatives would be reduced to an acceptable level consistent with professional engineering practices and public health and safety standards. As a result, this impact would be less than significant.

GEO-3 Impacts from Ground Failure, Including Landsliding, Liquefaction, Lateral Spreading, and Soil Subsidence

Geotechnical Hazards. This impact assessment considers geotechnical hazards that may affect the design of the BART extension alternatives. As described below, these hazards can result in damage to the BART guideway, station and maintenance facilities, and other improvements that would accompany the extension of transit services.

Liquefaction. Liquefaction is the rapid transformation of saturated, loose, fine-grained sediment to a fluid-like state due to earthquake ground failure. The BART extension alternatives would be exposed to significant risk from potential liquefaction if proposed structures would be located on or within soils with moderate to very severe liquefaction susceptibility. As shown in Figure 3.7-3, the western segment of all the BART extension alternatives would be in areas of high to very high liquefaction potential. Portions of the area proposed for the Isabel/Stanley Station (proposed under Alternative 3a and 5) have a high liquefaction potential; Isabel/I-580 Station (proposed under Alternatives 1, 2, 3, and 4) and Downtown Livermore Station (proposed under Alternatives 1a, 1b, 2, 3, and 3a) would be in areas of moderate liquefaction; Vasco Road Station and Vasco Yard (proposed under Alternatives 2 and 2a) would be in an area of low to moderate liquefaction; and Greenville East Station and portions of the Greenville Yard (proposed under Alternatives 1, 1a, and 1b) would be in areas of low to moderate liquefaction. Portions of the Greenville Yard would be in areas of high to very high liquefaction. Thus, at least a portion of all the BART alternatives would have the potential to experience liquefaction effects.

Landslides. Severe landslide potential occurs on steep slopes. The BART extension alternatives would be exposed to significant risk from landslides if proposed structures were built on slopes with "greatest" to "marginal" susceptibility to landslides as depicted in Figure 3.7-4. As shown in Figure 3.7-4, most segments of Alternatives 1, 1a, 1b, 2, 2a, 3, 3a, 4, and 5 would be in areas with "least" landslide susceptibility, this includes the area around the Vulcan Quarry. As described in Table 3.7-5, land designated as having "least" landslide susceptibility will probably remain relatively stable if present conditions remain.

Small segments of the eastern portions of Alternatives 1, 1a, and 1b would be in areas with "greatest" landslide susceptibility; that is, all the station areas and maintenance yards would be in areas of "least" landslide susceptibility with the exception of a small portion of the Greenville East Station. Thus, portions of Alternatives 1, 1a, and 1b would have higher potential to experience landslides compared to the remaining alternatives.

Lateral Spreading. Lateral spreading occurs when liquefaction on gentle slopes causes subsurface soil layers to move downslope. Although slopes throughout the study area generally are gentle, areas where there would be high or very high landslide susceptibility are limited to certain portions of the study area. As shown Figure 3.7-3, the western segment of all the BART extension alternatives would be in areas with high to very high susceptibility to

liquefaction. Alternatives 1, 2, 3, and 4 could experience high to very high potential for liquefaction, and thus lateral spreading, at and just east of Isabel/I-580 Station, along I-580. Alternatives 1a, 1b, 2a, 3a, and 5 would transect areas with high potential for liquefaction in the vicinity of the Isabel/Stanley Station, and potentially could experience lateral spreading at these areas. As such, all of the BART extension alternatives could experience lateral spreading.

Soil Subsidence. Land surface subsidence can result from both natural and man-made phenomena. Soil subsidence occurs when subsurface soil compacts and the surface collapses as a result of groundwater extraction/removal or seismic events. Long-term groundwater withdrawals have the potential to cause subsidence if recharge rates were not sufficient to maintain current water table levels. As discussed further in Section 3.8, Hydrology and Water Quality, the study area is above the Livermore Valley Groundwater Basin (ID 2-10).[42] This Basin is divided into a primary, Main Basin, and secondary, Fringe Basins. The study area is above both the Fringe and Main Basins (see Figure 3.8-5 in Section 3.8). The Main Basin serves large capacity municipal production wells. Currently, Zone 7 manages the Main Basin so that under non-emergency conditions, including several multi-year droughts, groundwater elevations do not drop below historic low levels through annual conjunctive use practices. The existing Zone 7 Groundwater Management Plan includes development of the Chain of Lakes for future groundwater potential recharge on the order of 37,000 acre-feet per year. As such, groundwater levels in the study area are managed so that levels do not drop below historic levels. Through Zone 7's management, soil subsidence is not expected to occur in the study area as a result of groundwater extraction.

Because of the density of underlying soils, natural subsidence induced by seismic events may occur. Subsidence due to hydrocompaction occurs when very loose and dry fined sediments are moistened. As the sediments dry out, their high porosity structure is preserved by particles that act as bridges to cement larger particles together. The initial wetting (adding of water) causes the sediments to lose their strength, and the sediments subside under their own weight. Subsidence would impact the integrity of foundations and infrastructure. According to the soils survey undertaken by the Natural Resources Conservation Survey, the soils that occur in the study area include clay, clay loams, very gravelly coarse sandy loam, and silty clays; these soils are conducive to hydrocompaction to varying degrees. Other soil types, such as gravel, rock land, and riverwash also occur within or around the study area.

The potential for ground subsidence to impact the BART extension alternatives would need to be evaluated during site-specific geotechnical investigations for design purposes.

Ground Failure. Potential impacts of landslides and liquefaction may include ground fissures, differential settlement, and displacement of foundations that would damage project structures. Potential failure of slopes supporting the proposed structures could be considered life-

[42] California Department of Water Resources, *California Groundwater Bulletin* 118; San Francisco Hydrologic Region, Livermore Valley Groundwater Basin, http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/2-10.pdf, updated January 20, 2006.

threatening. Potential impacts of lateral spreading and subsidence may include damage to the overlying structures, which could cause injury to passengers and staff occupying the structures. The BART extension alternatives would incorporate design criteria for all structures, equipment, and equipment supports to withstand ground motions without collapse. Implementation of the various codes and regulations described under "Applicable Policies and Regulations" would ensure passenger safety, prevent prolonged interruption of project operations caused by structural failure or damage, and protect station facilities.

As summarized in Table 3.7-6 the proposed BART extension alternatives would have less-than-significant impacts on ground failure, including landsliding, liquefaction, lateral spreading, and soil subsidence because the design standards, to which the system would be built, would reduce the risk to acceptable levels. Alternatives 1, 1a, and 1b would have the higher potential to experience ground failure in comparison to Alternatives 2, 2a, 3, 3a, 4, and 5.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to ground failure.

All BART Extension Alternatives. All of the BART extension alternatives would be exposed to geotechnical hazards present in the study area.

Liquefaction. All alternatives would run through an area with high to very high liquefaction susceptibility in the western portion of the study area, and thus also lateral spreading, as shown in Figure 3.7-3.

The eastern portions of Alternatives 1, 1a, and 1b that include the Greenville East Station and portions of the Greenville Yard would be located in areas of low to moderate liquefaction; however, portions of the Greenville Yard would be in areas of high to very high liquefaction. Additionally, under Alternative 2, there is high potential for liquefaction at and east of the Isabel/I-580 Station, along I-580 and where tracks would be built. As noted above, portions of the area proposed for the Isabel/Stanley Station (proposed under Alternative 3a and 5) have a high liquefaction potential, and moderate to low susceptibility west of this station. The Downtown Livermore Station (proposed under Alternatives 1a, 1b, 2a, 3, and 3a) would be in an area of moderate liquefaction; Vasco Road Station and Vasco Yard (proposed under Alternatives 2 and 2a) would be in an area of low to moderate liquefaction.

In summary, at least a portion of all the BART alternatives are in areas with severe liquefaction potential.

Landslides. Figure 3.7-4 shows that the majority of Alternative 1 would be in areas with least landslide susceptibility, including the Greenville East Station and portions of the Greenville

Yard. Portions of the Greenville East Station would be in areas with greatest susceptibility to landslide hazard.

Alternative 2 would transect areas that are "marginally susceptible" and "generally susceptible" to landslides. Thus, potential landslides could affect the aerial structure and footings of Alternative 2.

Alternatives 1a, 1b, 2a, 3a, and 5 would follow El Charro Road, in the vicinity of the Vulcan Materials Quarry. The area where the quarry exists is considered to have "least" landslide susceptibility. As described in Table 3.7-5 land designated as having "least" landslide susceptibility would probably remain relatively stable unless the topography is radically modified.

The Quarry's sandy soil will necessitate the use of steel pipe piles, rather than pre-cast concrete piles, as vertical support for the elevated guideway. Retaining walls probably would not be needed because the horizontal separation between the proposed construction area, and the pits appears to be sufficient to allow grading of the necessary retaining slopes.

Subsidence. All alternatives would experience low potential for subsidence due to groundwater extraction because sufficient groundwater recharge occurs through Zone 7 Water Agency management. Subsidence caused by hydrocompaction may affect Alternatives 1, 1a, and 1b. As shown on Figure 3.7-4, these alternatives would be built on loams, and clays. These soils are conducive to subsidence and would expose persons and new facilities and trackwork to new risk.

For reasons previously described soil subsidence from groundwater extraction is not anticipated, but could result from hydrocompaction as a result of the existing loam soils and clays that are conducive to subsidence. Hydrocompaction could pose risks for the new facilities and trackwork. Alternatives 4 and 5 would include less structures and shorter alignments than the other alternatives.

Although there is a potential for ground failure under all the extension alternatives, all extension alternatives would incorporate design criteria for structures, equipment, and equipment supports to withstand ground motions without collapse. Implementation of the various codes and regulations described under "Applicable Policies and Regulations" would ensure passenger safety; prevent prolonged interruption of project operations caused by structural failure or damage; and protect station facilities. Because the design criteria would be incorporated in the design and construction of all extension alternative components, potential concerns from ground failure including landslides, liquefaction, lateral spreading, and soil subsidence would be reduced to acceptable levels consistent with professional engineering practices and public health and safety standards. As a result, this impact would be less than significant.

GEO-4 Soil Constraints

Soil Limitations and Potential Hazards. This impact assessment considers the soil types found in the study area and the potential hazards they create for BART structures. As described below, these hazards can result in damage to the BART guideway, station and maintenance facilities, and other improvements that would accompany the extension of transit services.

Expansive Soils. Expansive soils are soils that expand or contract when they absorb or loose water. Expansive soils have the potential to damage structural foundations for stations, maintenance buildings, and parking structures. Expansive soils can damage pavements, retaining walls, and other rigid structures such as aerial structures. Clay soils can expand when saturated with water and are considered to have a high expansion potential. Soils underlying the BART extension alternatives include clay, clay loams, very gravelly coarse sandy loam, and silty clays. The proposed stations and maintenance facilities are underlain by the following soil types: clay and silt loam (Isabel/I-580 Station); very gravelly coarse sandy loam, gravelly loam and loam (Downtown Livermore Station and Portola/Railroad Yard); loam and silt loam (Vasco Road Station and Vasco Yard); loam, clay loam (Greenville East Station and Greenville Yard); and gravelly loam (Isabel/Stanley Station). Other soil types, such as gravel, rock land, and riverwash occur within or around the study area (see Figure 3.7-4).

Corrosive Soils. Corrosivity is the ability of soil to break down metals or concrete. Soils that are highly alkaline or highly acidic are likely to be corrosive to soils. Soils underlying the BART extension alternatives include clay, clay loams, very gravelly coarse sandy loam, and silty clays. These soils are considered to have a high corrosion potential, and could damage surface metal pipes and weaken building foundations. Other soil types, such as gravel, rock land, and riverwash occur within or around the study area (see Figure 3.7-4).

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects in the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to expansive or corrosive soils.

All BART Extension Alternatives. Portions of all of the BART extension alternatives would be built on clay, clay loams, very gravelly coarse sandy loam, and silty clays soils that are prone to expansion or exhibit high corrosion characteristics. The new stations, yards, and trackwork could be affected by the shrinking and swelling associated with expansion soils or weakening of foundations associated with corrosive soils. All of the extension alternatives would incorporate design criteria described under "Applicable Policies and Regulations," which require a site-specific geotechnical investigation to determine the presence of expansive and corrosive soils. In the event that such soils are present under certain proposed structures,

the BART Facility Standards and CBC would ensure that all structures, equipment, and equipment supports are designed to provide personal safety and prevent structural damage caused by expansive and corrosive soils. Given that the design criteria would be incorporated in the design and construction of the BART extension components, risk from these soils would be reduced to acceptable levels, consistent with professional engineering practices and public health and safety standards. As a result, this impact would be less than significant.

GEO-5 Loss of a Mineral Resource or Mineral Resource Recovery Site

Figure 8-3 of the *City of Livermore General Plan*, Open Space and Conservation Element, indicates that Alternatives 1a, 1b, 2a, 3a, and 5 would cross State-designated Mineral Resource Sectors in areas designated as MRZ-2.[43] Alternatives 1a, 1b, 2a, 3a, and 5 would follow El Charro Road adjacent to currently active quarry lands and reclaimed quarry pits in Alameda County, near Stanley Boulevard known as the Chain of Lakes area. The Chain of Lakes area's sandy soil would necessitate the use of steel pipe piles, rather than pre-cast concrete piles, as vertical support for the guideway. Retaining walls probably would not to be needed because the horizontal separation between the proposed construction area and the quarries appear to be sufficient to allow grading of the necessary retaining slopes. The Isabel/Stanley Station associated with Alternatives 3a and 5 would occupy an approximately 33-acre site divided by Stanley Boulevard and bounded by quarry lands on the west (Resource Sectors A-1 and A-2) and on the south (Resource Sector A-2). None of the BART extension alternatives would involve extraction or disposal of mineral resources.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects in the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on mineral resources or minerals recovery.

Alternative 1 – Greenville East. Alternative 1 would not be within a State-designated Mineral Resource Sector and would have no impact on the availability of such a resource. Also, this alternative would not run along active mining operations, and would have no impact on access to these activities.

Alternative 1a – Downtown-Greenville East Via UPRR. Alternative 1a would not involve extraction or disposal of mineral resources. Alternative 1a would follow El Charro Road through the Chain of Lakes area; however, the proposed tracks would not encroach into areas where minerals are actively being recovered. Quarry pits adjacent to most of the proposed

[43] Figure 8-3, *Mineral Resources Sectors Within Planning Area*. Source: California Department Of Conservation, Division of Mines and Geology, 1996.

alignment have been fully extracted. Truck access to mineral extraction areas on either side of El Charro Road is limited to two to three at-grade connections with El Charro Road. The BART aerial guideway in this stretch would primarily run along the west side of El Charro Road. This aerial guideway would be designed so that the support columns would avoid obstruction of these access points and avoid disturbance to the conveyor system that transports quarried materials under El Charro Road, as well as the one road undercrossing of El Charro Road for quarry trucks.

Alternative 1a would run adjacent to the Vulcan aggregate plant site, recycle plant, and settling ponds. The proposed elevated tracks in this area would not limit access to the Vulcan facilities during operation. The alignment would follow Stanley Boulevard south of the extended mining operation site (which commenced in 2008). However, this mining area is not adjacent to the proposed alignment and access to the pits would not be limited during construction or operation. Consequently, there would be no impact related to loss of access to mineral resources along this alignment.

Alternative 1b – Downtown-Greenville East Via SPRR. Alternative 1b would not involve extraction or disposal of mineral resources. Also, like Alternative 1a, Alternative 1b would not encroach into areas where minerals are actively being recovered and would have elevated tracks in the vicinity of the Vulcan facilities. As such, Alternative 1b would also have no impact on the availability of, or access to, mineral resources.

Alternative 2 – Las Positas. Alternative 2 would not be within a State-designated Mineral Resource Sector and would have no impact on the availability of such a resource. Also, this alternative would not run along active mining operations, and would have no impact on access to these activities.

Alternative 2a – Downtown-Vasco. Alternative 2a would not involve extraction or disposal of mineral resources. Also, like Alternatives 1a and 1b, Alternative 2a would not encroach into areas where minerals are actively being recovered and would have elevated tracks in the vicinity of the Vulcan facilities. As such, Alternative 2a would also have no impact on the availability of, or access to, mineral resources.

Alternative 3 – Portola. Alternative 2 would not be within a State-designated Mineral Resource Sector and would have no impact on the availability of such a resource. Also, this alternative would not run along active mining operations, and would have no impact on access to mining operations.

Alternative 3a – Railroad. Alternative 3a would not involve extraction or disposal of mineral resources. This alternative would have elevated tracks in the vicinity of the Vulcan facilities and would thus not impede access to the Vulcan facilities during operation, as described previously for Alternative 1a.

The Isabel/Stanley Station associated with Alternative 3a would be constructed on an approximately 33-acre site divided by Stanley Boulevard and bounded by quarry lands on the

west (Resource Sectors A-1 and A-2) and on the south (Resource Sector A-2). The Isabel/Stanley Station would eliminate access to underlying aggregate deposits in Resource Sector A-2. When these quarry lands were originally designated in 1983, all of Sector A was estimated to contain 383 million tons of sand and gravel resources.[44] By the time the Livermore General Plan was updated in 2004, about 27 percent (104 million tons) of material had been removed.[45] The portion of the proposed Isabel/Stanley Station site south of Stanley Boulevard covers about 3 percent (8 million tons) of the remaining resources in Sector A. Because an estimated 271 million tons of resources remain in Sector A, plus an additional estimated 176 million tons of reserves in nearby Sectors B and C,[46] the loss of access to mineral resources at the proposed Isabel/Stanley Station site is considered significant.

Alternative 4 – Isabel/I-580. Alternative 4 would not be within a State-designated Mineral Resource Sector and would have no impact on the availability of such a resource. Also, this alternative would not run along active mining operations, and would have no impact on access to these activities.

Alternative 5 – Quarry. Alternative 5 would not involve extraction or disposal of mineral resources. This alternative would have elevated tracks in the vicinity of the Vulcan facilities and would thus not impede access to the Vulcan facilities during operation. Like Alternative 3a, Alternative 5 would include the Isabel/Stanley Station, which would result in a significant loss of access to mineral resources at the site of the station.

MITIGATION MEASURE. A significant impact to mineral resources would occur with Alternatives 3a and 5. The loss would be a direct effect of constructing the Isabel/Stanley Station which would eliminate access to underlying aggregate deposits in Resource Sector A-2. It is possible that the portion of the station footprint south of Stanley Boulevard could be excavated and reclaimed prior to implementation of a BART station at this location. As a result, this impact would be revisited at the time a project-level environmental document is undertaken. For purposes of this Program EIR, the loss of access to mineral resources in Sector A is considered potentially significant and unavoidable. (PSU)

GEO-6 Paleontological Resources

Most portions of the study area are highly sensitive for paleontological resources. Several isolated paleontological resources have been recorded adjacent to the route, making this portion of the study area highly sensitive for paleontological resources; all extension alternatives would run along I-580 at various lengths.

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[44] California Geological Survey, *Mineral Land Classification: Aggregate Materials in the San Francisco Monterey Bay Area, Part II: Classification of Aggregate Resource Areas, South San Francisco Bay Production Consumption Region*, Special Report 146, Part II, 1983, pp 25 – 30, plates 2.14 and 2.52.

[45] City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004, Figure 8-3.

[46] CGS, 1983, op. cit. and City of Livermore, 2004, op. cit.

Earth-disturbing activity that extends beyond the previously disturbed zone (three to four feet below the existing ground surface) during construction of any portion of the alignment alternatives in the undivided Quaternary deposits or the Livermore gravels could encounter and damage subsurface paleontological resources. Therefore, all BART extension alternatives would have a potentially significant impact on paleontological resources.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements throughout the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for those projects. Because there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on paleontological resources.

Alternative 1 – Greenville East. Alternative 1, including the proposed footprint of the Isabel/I-580 Station, would be aligned along I-580. Several isolated paleontological resources have been recorded adjacent to the route, making this portion of the alternative highly sensitive for paleontological resources. Although most of this alignment would be constructed in the I-580 median, earth-disturbing construction activities within or adjacent to the median, including widening activities, have the potential to encounter previously unrecorded paleontological resources.

The easternmost portion of the alternative would be constructed in geologic formations of the Pliocene Epoch that are unlikely to contain paleontological deposits of significance; therefore, the area of the Greenville East Station is considered to be of low sensitivity for paleontological resources.

Based on the record of known paleontological resources in the vicinity of the study area, this alternative is considered highly sensitive for paleontological resources along I-580 and of low sensitivity for paleontological resources in the eastern portion of the alternative. Earth-disturbing activity during project construction, including excavation, grading, widening, and utilities trenching associated with the development of track infrastructure, passenger stations and platforms, parking facilities, bus/transit intermodal facilities, storage and/or maintenance yards, and ancillary improvements could encounter and damage subsurface paleontological resources. Therefore, this alternative would have a potentially significant impact.

Alternative 1a – Downtown-Greenville East Via UPRR. The western portion of Alternative 1a would be aligned along I-580, El Charro Road, Railroad Avenue, and the Union Pacific Railroad (UPRR). These areas are considered paleontologically sensitive. The easternmost portion of the alternative would be constructed in geologic formations of the Pliocene Epoch that are unlikely to contain paleontological deposits of significance; therefore, the area of the Greenville East Station is considered to be of low sensitivity for paleontological resources. Earth-disturbing activity during project construction could encounter and damage subsurface

paleontological resources in the highly sensitive areas. Therefore, Alternative 1a would have a potentially significant impact.

Alternative 1b – Downtown-Greenville East Via SPRR. Alternative 1b would have the same potential impacts as Alternative 1a. Although Alternative 1b would follow an existing right of way previously operated by Southern Pacific Railroad (SPRR) to a terminus at Greenville East, the SPRR area includes the same high sensitivity for paleontological resources as the corresponding UPRR alignment in Alternative 1b. Because this alternative is highly sensitive for known and previously unrecorded paleontological resources along I-580, El Charro Road, Railroad Avenue, and the SPRR, earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 1b would have a potentially significant impact.

Alternative 2 – Las Positas. As is the case with Alternatives 1, 1a, and 1b, Alternative 2 would be constructed along a paleontologically sensitive area, including the proposed footprint of the Isabel/I-580 Station and the I-580 alignment. This alternative is also highly sensitive for paleontological resources along the UPRR. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 2 would have a potentially significant impact.

Alternative 2a – Downtown-Vasco. Alternative 2a would have a similar alignment as Alternative 1a, with the exception that Alternative 2a would terminate just northwest of the Vasco Yard. Similarly, this alternative transects areas that are highly sensitive for known and previously unrecorded paleontological resources along I-580, El Charro Road, Railroad Avenue, and the UPRR. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 2a would have a potentially significant impact.

Alternative 3 – Portola. Alternative 3 would have the same potential impacts as Alternative 1 and 2 up to the point at which Alternative 3 would transition from the proposed Isabel/I-580 Station and continue underground along Portola Avenue to Downtown Livermore. The tunneling activities associated with the underground segment have the potential to encounter and disturb buried paleontological deposits. The alternative would reach its terminus station at the existing ACE station in Downtown Livermore. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 3 would have a potentially significant impact.

Alternative 3a – Railroad. Alternative 3a would follow an alignment similar to Alternatives 1a and 2a, except that Alternative 3a would terminate at the existing ACE station in Downtown Livermore. Alternative 3a would transect areas that are highly sensitive for known and previously unrecorded paleontological resources along I-580, El Charro Road, and Railroad Avenue. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 3 would have a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 follow a similar route as Alternative 1, 2, and 3, except that Alternative 4 would terminate just east of the proposed Isabel/I-580 Station. This alternative would transect areas that are highly sensitive for paleontological resources along I-580. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 4 would have a potentially significant impact.

Alternative 5 – Quarry. Alternative 5 would follow the same route as Alternatives 1a, 1b, and 3a, except that Alternative 5 would terminate just east of the proposed Isabel/Stanley Station. This alternative is highly sensitive for known and previously unrecorded paleontological resources along I-580, El Charro Road, and Railroad Avenue. Earth-disturbing activity during project construction could encounter and damage subsurface paleontological resources. Therefore, Alternative 5 would have a potentially significant impact.

MITIGATION MEASURES. The following mitigation measure applies to all of the alternatives described above, and would require a project-level study to determine impacts of the selected alternative on paleontological resources. Should it be determined that the BART extension alternative could impact significant paleontological resources, the following mitigation measure requires the implementation of subsequent measures for preservation. The following mitigation measure would substantially lessen or avoid impact(s) as a result of the BART extension alternative, and this impact would be less than significant. (LTS)

GEO-6.1 Conduct Project-Level Paleontological Resources Investigation. During the project-level environmental review, BART shall retain a professional who meets the professional qualifications standards for principal paleontologist to conduct a project-level study of the preferred alternative. The study shall include:

- a review of the records search prepared for this program EIR and, if necessary, an updated records search;
- project-level pedestrian surveys of portions of the project site where paleontological resources could be encountered;
- formal evaluation of any potentially affected paleontological resources to determine if they qualify as unique paleontological resources; and
- recommended measures to avoid, where feasible, impacts on unique paleontological resources, including preservation in place, planning construction to avoid paleontological sites, deeding paleontological sites into permanent conservation easements, or planning parks, greenspace, or other open space to incorporate paleontological sites. Where avoidance or preservation in place is not feasible, excavation may be recommended as mitigation.

The results of the study shall be compiled into a technical report or memorandum which shall be submitted to BART.

Should the selected alternative include federal funding or oversight or otherwise qualify as a federal undertaking, the paleontological study shall be prepared in accordance with Section 106 of the National Historic Preservation Act. The paleontological study and inclusive mitigation measures shall form the basis for the paleontological resources component of the project-level environmental documentation prepared for the selected alternative.

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in traversing new or different areas of geoseismic hazards or paleontological sensitivity or in exposing the alternatives to different risks or hazards. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the geoseismic and paleontological analysis or conclusions presented earlier in this section.

Cumulative Analysis

The BART extension alternatives and other foreseeable development would be exposed to potential geologic hazards related to soil and geologic conditions, and to groundshaking from seismic events on active faults in the region. Although similar types of events may occur widely throughout an area, they are highly localized (even site-specific). For example, a seismically induced landslide on one hillside would affect only the area downslope and/or upslope from the initial ground failure and not necessarily trigger landslides on other ridges. Such events are not compounded by additional development when relevant plans, codes, and regulations are enforced on a project-specific or site-specific basis. The BART extension alternatives and other foreseeable development would be designed in accordance with appropriate geotechnical and seismic guidelines as described earlier in this section. The adherence to all relevant plans, codes, and regulations with respect to design and construction would reduce impacts to the extent feasible, and, because the impacts would not compound, no accumulation of impacts from geologic hazards would occur.

The California Building Code and other regulations such as the BART Facility Standards are intended to reduce the risk of structural collapse and loss of life in new projects, but major damage and harm to humans could occur on a broader regional basis because cumulative development may attract people to less seismically stable areas. Because new projects constructed on a cumulative basis throughout the region would be built to current, safer seismic standards than were applied to existing older structures, fewer people would be expected to be injured or killed as a result of damage to the newer structures, and less cumulative property damage would be expected to result from cumulative development.

GEO-CU-7 Cumulative Loss of a Mineral Resource or Mineral Resource Recovery Site

The cumulative analysis for impacts on mineral resources includes all current and future development projects in Aggregate Resources Sectors of the South San Francisco Bay Production-Consumption Region that may create cumulative impacts when combined with the impacts associated with the BART extension alternatives (specifically, Alternatives 3a and 5, each of which include the Isabel/Stanley Station).

Current and future development in the South San Francisco Bay Production-Consumption Region could interfere with the availability of regionally and locally important mineral resources. Urban uses have been, and continue to be, permitted in areas designated by the state and City's General Plan as containing mineral resources of local, regional, and/or statewide importance. Because some urban uses, such as residential development, transportation facilities, and sensitive facilities (schools, hospitals, etc.), generally would be considered inconsistent with mineral extraction activities, development of these uses in the vicinity of mineral resource sites could hinder or preclude mineral extraction activities. Other types of development would not necessarily be inconsistent with mineral resource extraction; because of the nature of non-residential and commercial projects, some uses such as pumps, wells, and other unoccupied uses, would not be incompatible with concurrent extraction activities. Therefore, cumulative development in the South San Francisco Bay Production-Consumption Region could result in the loss of availability of an unspecified quantity of mineral aggregate resources, which would be considered a significant cumulative impact.

The proposed Isabel/Stanley Station site contains about 3 percent of the remaining resources in Sector A and construction of the facility would preclude access to the resources if they could not be recovered prior to station construction. This project and future development in the South San Francisco Bay Production-Consumption Region would be subject to CEQA requirements which would include investigation of, and recommended mitigation for, impacts resulting from incompatible adjacent land uses. Implementation of compatible projects that could occur in Aggregate Resources Sectors would not necessarily result in the loss of availability of known mineral resources. Nonetheless, because of the continued pressure of urban development on Aggregate Resource Sectors, the incremental (3 percent) contribution to the loss of access to Aggregate Resource Sectors under Alternative 3a and 5, combined with the reasonably foreseeable incursion into Aggregate Resource Sectors of land uses incompatible with mining activities would be cumulatively considerable for the South San Francisco Bay Production-Consumption Region. The proposed BART extension alternatives and related projects in the Production-Consumption Region would contribute to a significant cumulative impact, and the BART extension alternative's incremental contribution to these cumulative effects would be cumulatively considerable. Consequently, the cumulative impact is considered significant and unavoidable.

GEO-CU-8 Cumulative Impacts to Paleontological Resources

The cumulative analysis for impacts on paleontological resources considers a broad cultural and regional system of which the resources are a part. The cumulative context for the paleontological resources analysis is the Tri-Valley area, which includes Amador Valley, Livermore Valley and San Ramon Valley and the cities of Pleasanton, Livermore, Dublin, San Ramon, and Danville. The cumulative analysis considers paleontological resources throughout this region as a single, non-renewable resource base and considers the additive effect of potential project impacts to significant regional impacts on paleontological resources.

The proposed BART to Livermore Extension Program, in combination with other projects in the Tri-Valley Area could cause a substantial adverse change in the significance of paleontological resources. The proposed program, in combination with other development in the region, could contribute to the loss of significant paleontological resources. Because all significant paleontological resources are unique and non-renewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. For example, the loss of any one paleontological site affects all others in a region because these resources are best understood in the context of the entirety of the paleontological system of which they are a part.

Proper planning and appropriate mitigation can help to capture and preserve knowledge of such resources and can provide opportunities for increasing our understanding of the past environmental conditions by recording data about sites discovered and preserving fossils found. Federal, State, and local laws are in place, as described above, that protect these resources in many instances. Even so, it is not always feasible to protect these resources, particularly when preservation in place would frustrate implementation of projects, and for this reason the cumulative effects of the proposed BART extension alternatives and related projects in the region would be considered a significant cumulative impact.

Because the BART extension alternatives as well as other development in the Tri-Valley area have the potential to adversely affect significant paleontological resources that are unique and non-renewable members of finite classes, their incremental contribution to these cumulative effects would be potentially cumulatively considerable and the cumulative impact is considered potentially significant.

MITIGATION MEASURES. Mitigation Measure GEO-6.1 would require project-level studies to determine impacts of the selected alternative on paleontological resources. The mitigation measure requires the implementation of measures to avoid, where feasible, impacts on significant paleontological resources. Implementation of the mitigation measure would substantially reduce the program's contribution to the cumulative impact. Similar measures, pursuant to CEQA, the Antiquities Act, and other regulations and ordinances cited above under "Applicable Policies and Regulations," would likely be required of other development projects with a potential to disturb paleontological resources, and this cumulative impact would be less than significant. (LTS)

3.8 HYDROLOGY AND WATER QUALITY

Introduction

This section describes the hydrology (drainage) and water quality conditions within the study area, which is defined for the purposes of this analysis as an area defined by the footprint of each BART extension alternative (guideway right-of-way and proposed station facilities), plus 100 feet on each side of the footprint. Data used to prepare this section was taken from the:

- El Charro Specific Plan Environmental Impact Report, City of Livermore, January 2007;
- Urban Water Management and Water Shortage Contingency Plan – 2005 (Zone 7 Water Agency, 2005 [UWMP]);
- Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin (Jones and Stokes, 2005 [GMP]);
- Zone 7 Stream Management Master Plan (RMC Water and Environment, 2006 [SMMP]); and
- Final Stream Management Master Plan Environmental Impact Report (Environmental Science Associates, 2006 [SMMPEIR]).

The Association of Bay Area Governments (ABAG) hazards maps, soil surveys from the Department of Agriculture, California Department of Water Resources publications, and scientific studies were also referenced for this analysis. Evaluation of project hydrology and water quality effects of the BART extension alternatives was also prepared using available reference materials (U.S. Geological Survey [USGS] topographic maps, climate information). Impacts associated with contaminated soils and hazardous materials are discussed in greater detail within Section 3.12, Public Health and Safety.

No concerns or questions related to this section were raised during the scoping period in response to the NOP.

Existing Conditions

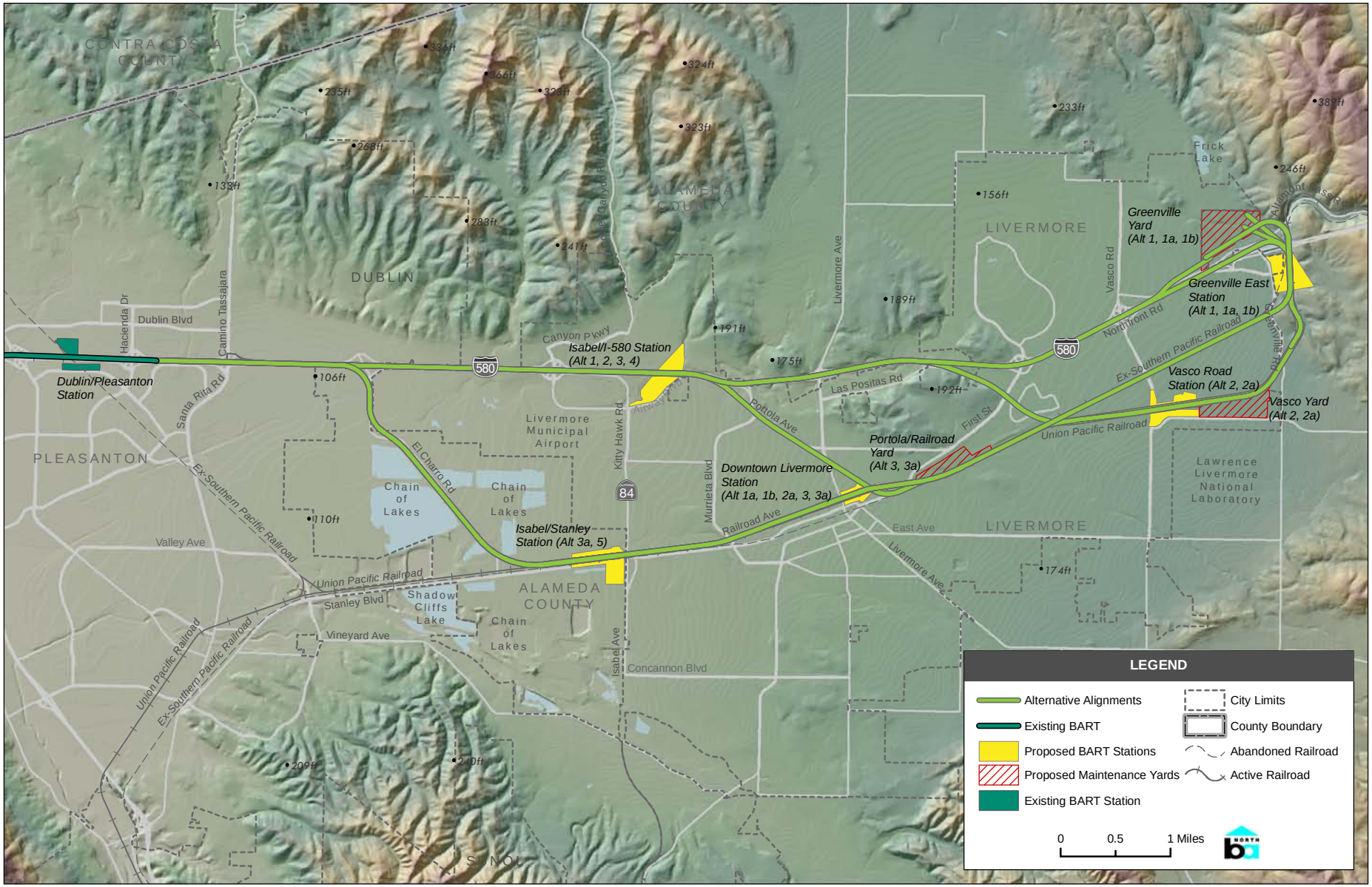
Existing Physical Conditions

The study area is within the Amador and Livermore Valleys[1] and is relatively flat with elevations ranging from about 330 feet above mean sea level (msl) on the west[2] to 600 feet above msl on the east.[3] North of the study area are the Black Hills of the Diablo Mountain Range, with the Diablo Mountain Range continuing to the south (see Figure 3.8-1 for an overview to the topographic relief in Livermore-Amador Valley).

[1] The Livermore and Amador Valleys are often referred to as the Livermore-Amador Valley when discussing the combined system.

[2] United States Geological Survey, *Dublin, California, United States, Topographic Map*, July 1, 1989.

[3] United States Geological Survey, *Livermore, California, United States, Topographic Map*, July 1, 1989.



Source: AECOM May 4, 2009; USGS DEM.

TOPOGRAPHY IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.8-1

About 38 percent of soils within the study area have low surface runoff rates (hydrologic group[4] A or B) and the rest have high surface runoff (hydrologic groups C to D).[5] About nine percent of soils are poorly- to somewhat poorly-drained, 11 percent are somewhat excessively-drained, and about one percent is excessively-drained; the remainder are moderately well-drained to well-drained. Within the study area, the depth of the seasonal high water table is generally about four to five feet below ground surface.[6]

The Alameda County Flood Control and Water Conservation District Zone 7 (Zone 7) is responsible for providing water supplies and flood control within the Livermore-Amador Valley. The study area is located many miles inland from coastal areas of the San Francisco Bay and is not be subject to tsunamis. The study area is not near steep slopes and debris-flow source areas,[7] and therefore mudflow effects would not be expected in the study area. Section 3.7, Geology, Soils, & Seismicity, describes geologic conditions and hazards in more detail.

Surface Water Hydrology

The study area is primarily located within the Livermore planning watershed (PWS) of the Alameda Creek hydrologic subarea, in the South Bay hydrologic unit in Alameda County. The Livermore PWS encompasses about 49,473 acres within the 448,000-acre Alameda Creek Watershed in the San Francisco Bay Region. The eastern tip of the study area is located within the Patterson Pass PWS and Altamont Creek PWS (see Figure 3.8-2). The Patterson Pass PWS (about 4,714 acres in size) and Altamont Creek PWS (4,415 acres in size) are also within the greater Alameda Creek Watershed.

The Alameda Creek Watershed drains primarily westward to the San Francisco Bay (Bay) from the area bounded by the Altamont Pass in the east, Mount Hamilton in the south, and the Black Hills in the north. The regional climate is a Mediterranean climate with wet winters and dry summers.

As shown in Table 3.8-1, the study area receives approximately 14.3 inches of rain annually, over 82 percent of which occurs during the November to March time period.

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4 Hydrologic Group is used to identify soil runoff potential and is classified as A, B, C, or D, based on soil texture, which affects potential infiltration rates, Hydrologic Group A consists of soil textures with the lowest runoff potential and high infiltration rate when saturated, and Hydrologic Group D consists of soil textures with the highest runoff potential and lowest infiltration rates when saturated.

5 Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Web Soil Survey*, http://websoilsurvey.nrcs.usda.gov/, accessed March 9, 2009.

6 Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture, *Soil Datamart*, Tabular Data Version 3.0 Survey Area Ca609, http://soildatamart.nrcs.usda.gov/Report.aspx?Survey=CA609&UseState=CA, revised December 21, 2001,

7 Association of Bay Area Governments, *ABAG Geographic Information Systems*, Hazard Maps, Debris-Flow Source Areas, 2007, http://gis.abag.ca.gov/website/landslides_df/viewer.htm, accessed March 9, 2009.

Table 3.8-1
Period of Record Monthly Climate Summary for Livermore
1/ 1/1903 to 12/31/2007

	Average Max. Temperature (F)	Average Min. Temperature (F)	Average Total Precipitation (in.)
Jan	56.7	36.6	3.02
Feb	61.2	39.4	2.47
Mar	65.2	41.2	2.16
Apr	70.5	43.5	1
May	76.4	47.6	0.45
Jun	83.1	51.6	0.1
Jul	89	54.2	0.02
Aug	88.2	54	0.04
Sep	85.8	52.3	0.22
Oct	77.8	47.6	0.64
Nov	66.4	41	1.56
Dec	57.6	37	2.58
Annual	73.2	45.5	14.27

Source: Western Region Climate Center, Gage 044997 (Livermore, CA), http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4997, accessed March 9, 2009.

Annual runoff within the Alameda Creek watershed is highly variable and is subject to periodic droughts. Many of the tributaries that supply flow to Alameda Creek are historically intermittent and can become isolated from the mainstem[8] beginning in early to mid-summer, in particular, natural and channelized streams draining the Livermore-Amador Valley.[9] The arroyos and creeks draining to the Livermore-Amador Valley exhibit highly variable daily flows and are rarely perennial[10] in their lower reaches.[11] Flow within Alameda Creek tributaries also vary greatly with rising and falling water tables in the area and water supply activities; creek channels are often used to move water supplies from one area to another so the flow regime is artificially controlled.[12] Additionally, discharges from quarries in the City of Pleasanton area ("Chain of Lakes") result in year-round flow in Arroyo de la Laguna.[13]

[8] The "mainstem" of a river refers to the main drainage pathway as opposed to the tributaries that feed into the main drainage pathway.

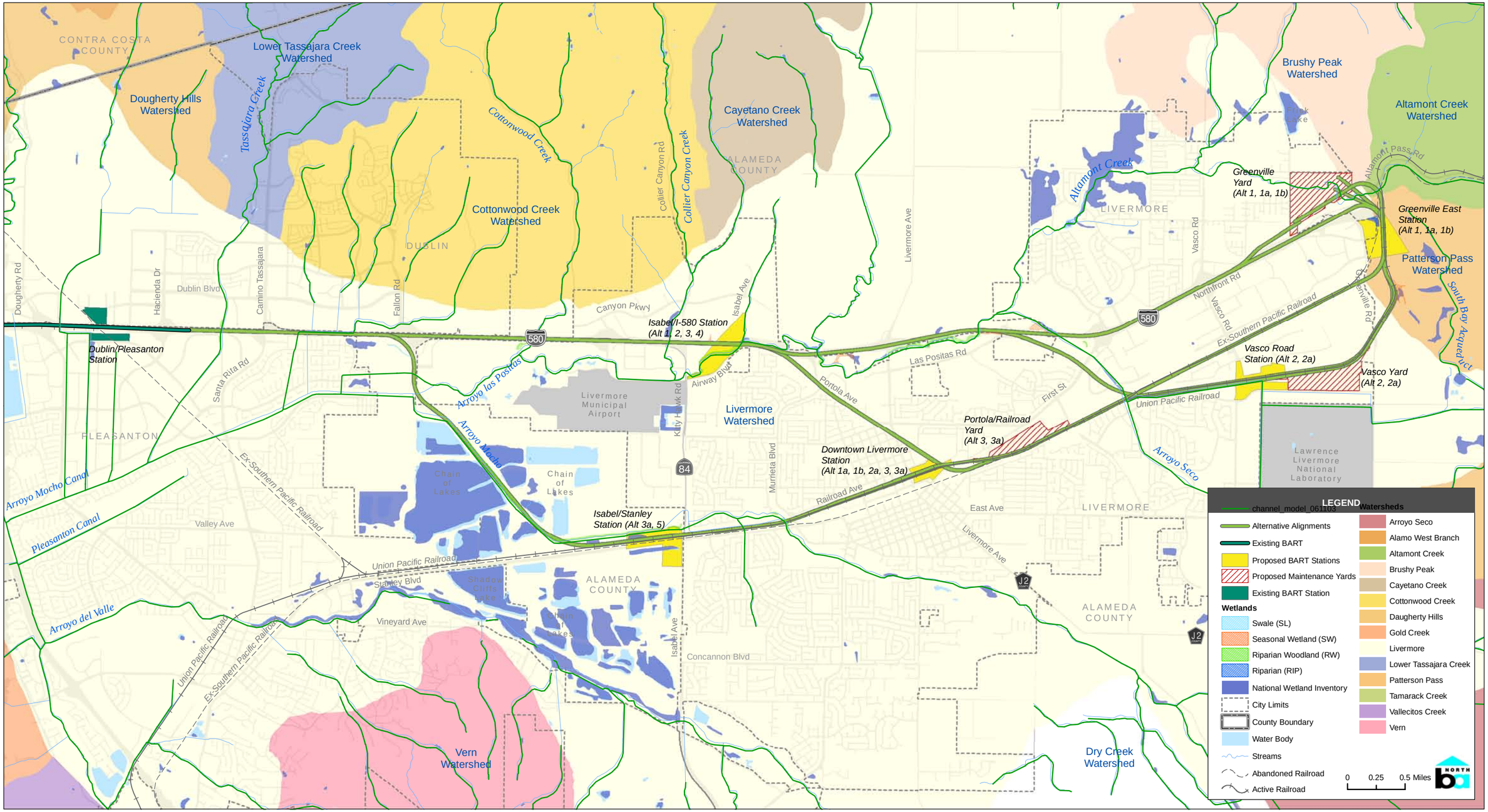
[9] Gunther, A.J, J. Hagar, and P. Salop. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed*, 2000, prepared for the Alameda Fisheries Restoration Workgroup., February 7, 2000. p. 10.

[10] "Perennial" refers to a flow regime where the stream flows year-round.

[11] SMMPEIR, Draft MEIR, Chapter 3, prepared for the Zone 7 Water Agency, August 2006, p. 3.2-14.

[12] Gunther, A.J, J. Hagar, and P. Salop. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed*, 2000, prepared for the Alameda Fisheries Restoration Workgroup., February 7, 2000. p. 10.

[13] Gunther, A.J, J. Hagar, and P. Salop. *An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed*, 2000, prepared for the Alameda Fisheries Restoration Workgroup., February 7, 2000. p. 10.



Source: AECOM May 4, 2009; NWI, 2008; Zone 7 Water Agency, 2009; USGS NHD; California Resource Agency, 2003.

HYDROLOGIC FEATURES IN THE BART TO LIVERMORE AREA

FIGURE 3.8-2

Affected Water Features.[14] Streams that may be affected by or affect the study area include Tassajara Creek, Collier Canyon, Cottonwood Creek, Arroyo Mocho, Arroyo Las Positas, Arroyo Seco, Altamont Creek, and unnamed tributaries. Other surface water features that may be affected by or affect the study area include the Chain of Lakes and local wetlands, including local drainage features. Figure 3.8-2 shows the location of these water features, as well as others within the area. The affected creeks and unnamed tributaries drain into the Arroyo Mocho, which drains into the Arroyo de la Laguna downstream of the study area.

Arroyo Mocho. The Arroyo Mocho drains approximately 36,000 acres of mixed agriculture, urban, and undeveloped lands starting in Santa Clara County south of Alameda County and flows generally to the northwest. Prior to its confluence with Arroyo las Positas, just downstream of the Chain of Lakes area, the Arroyo Mocho drains approximately 50 square miles of a long, narrow northwest-trending valley with relatively steep upland areas in the eastern portion of the Alameda Creek watershed. Because of the regional Mediterranean climate, flow within the Arroyo Mocho is variable and summer flows are low and often depend upon releases from Zone 7 to the Chain of Lakes system for groundwater recharge. Flows may run dry during the summer.

The lower reach of Arroyo Mocho, between the Alamo Canal and Santa Rita Road, has been subject to much deposition and a resulting reduced channel capacity. Originally, the channel section had a bottom width of about 60 feet; currently, the bottom width is approximately 16 feet with a small, incised channel approximately two to three feet deep and five to 10 feet wide. The reach between Stoneridge Drive and the western edge of the Staples Ranch Specific Plan area in the City of Pleasanton has been widened to 60 feet at the channel bottom and 160 feet from bank to bank. The Arroyo Mocho, between the confluence of Arroyo las Positas and El Charro Road, has also been widened as part of Arroyo Mocho Widening/Arroyo las Positas Realignment Project.

Runoff records indicate that the natural daily flow regime is variable, with a mean daily flow of 6.3 cubic feet per second (cfs) and a median[15] daily flow of 0.4 cfs. High variability in precipitation typically results in high inter-annual natural flow variability as well. The mean annual runoff is about 2.2 inches for the Arroyo Mocho watershed.

The Arroyo Mocho is an important source of groundwater recharge for Zone 7, particularly between Robertson Park in the City of Livermore and through the Chain of Lakes area, because it is part of the Zone 7 Artificial Stream Recharge Program. The portion of Arroyo Mocho flowing through the Chain of Lakes area is typically naturally ephemeral.

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[14] SMMPEIR, Draft MEIR, Chapter 3, prepared for the Zone 7 Water Agency, August 2006.

[15] "Median" refers to the value where 50 percent of values are higher and 50 percent of values are lower, whereas "mean" refers to the average of all values. When data contains extreme values (e.g., a few very high or very low values compared to the rest), the median is often more descriptive of normal/typical conditions because the extreme values can dominate the mean value determination but do not greatly affect the median value.

Through the City of Livermore, the Arroyo Mocho is an urban stream; however, some fairly natural segments contain gravel and cobble stream substrates. Sedimentation, gravel transport, and deposition are considered serious issues along Arroyo Mocho. Gravel deposition at Holmes Street and Stanley Boulevard bridges has resulted in capacity issues at these two locations. Additionally, the Arroyo Mocho has a gravel deposition problem through the Chain of Lakes area that significantly limits the channel capacity.

From the Chain of Lakes, downstream to its confluence with the Arroyo de la Laguna, flood protection is a major concern for the Arroyo Mocho; sedimentation is prevalent along this reach resulting in decreased channel capacity. However, this section of the Arroyo Mocho is not considered integral for water supply or aquifer recharge.

Tassajara Creek. Near the study area, Tassajara Creek is channelized and flows in a southwest direction through the Tassajara Valley, north of the study area. It drains about 27 square miles of the northern hills to its confluence with Arroyo Mocho. North of I-580, Tassajara Creek is a losing stream; in other words, water flows from the creek bed and bank and infiltrates to the surrounding groundwater basin. This estimated loss rates is approximately 1.35 cfs. South of I-580, Tassajara Creek is a gaining stream, with flow from the shallow groundwater aquifer discharging into the stream.

Arroyo Las Positas, Arroyo Seco, Collier Canyon, and Cottonwood Creek. The Arroyo las Positas is a major drainage feature of the Livermore Valley in the northeast portion of the Alameda Creek watershed and drains approximately 80 square miles prior to its confluence with the Arroyo Mocho. Summer flows are a combination of irrigation, urban flows, and agricultural runoff, all of which keep the Arroyo las Positas as a perennial creek.

The Arroyo las Positas begins in the Altamont Hills east of Livermore and flows westward to its confluence with the Arroyo Mocho at El Charro Road. The Arroyo las Positas watershed consists of a broad alluvial plain and gently sloped upland areas drained by a number of tributaries: the Arroyo Seco, Altamont Creek, Collier Creek, and Cottonwood Creek. The watershed is characterized by heavily incised channels through mainly commercial, agricultural, and ranch lands. All channels in this watershed are either flood control channels or natural channels traversing heavily grazed grasslands. The predominant substrate size is fine silts and riparian vegetation is essentially nonexistent. Base flows in these channels are generally low and dependent upon releases from the Lawrence Livermore National Laboratory.

Altamont Creek. Altamont Creek drains about 4,415 acres of primarily residential neighborhoods and undeveloped open space, with gravel access roads and recreational trails at the top of bank in many areas. Flows from Altamont Creek near Altamont Pass travel westward through Livermore and into Arroyo Las Positas near I-580. Mean monthly discharge ranged from 0.09 cfs in November to 6.2 cfs in February.[16]

[16] United States Geological Survey, *USGS Water Data For the Nation*, Station 11176140 Altamont C Nr Livermore, CA, October 1978 through April 1980, http://waterdata.usgs.gov/nwis, accessed June 24, 2009.

Within the Springtown Natural Community Reserve and further upstream, east of Vasco Road, Altamont Creek flows through a narrow, unimproved channel dominated by cattails, rushes, and sedges. There is a high salt concentration in the ground and surface water because of the geology in this area, which is mostly composed of weathered marine shale. Sediment deposition occurs in Altamont Creek and in Arroyo las Positas upstream of the confluence with Altamont Creek. Altamont Creek is characterized by sediment deposition. Maintenance on Altamont Creek in 2004 removed about 10,000 cubic yards of sediment along a 250-foot stretch of the creek immediately upstream of the Bluebell Avenue Bridge and 350 cubic yards immediately upstream of Broadmoor Avenue.

Zone 7 uses Altamont Creek to convey water from the South Bay Aqueduct[17] to Livermore for irrigation purposes, although sometimes water is also released for recharge or to improve the water quality of the water that is recharging along Arroyo las Positas (from Springtown to the confluence of Arroyo Mocho). Because pollutants can be carried by overland flow to Altamont Creek and ultimately the Arroyo las Positas and Arroyo Mocho, water quality can be an issue for the downstream recharge areas. For these reasons, it is a priority of Zone 7 to protect the water quality of the stream, and to maintain the South Bay Aqueduct turnout in the upper reaches of the Altamont Creek.

Chain of Lakes. Artificial lakes are located to the south of the I-580, on the south side of the Arroyo Mocho where the Arroyo Mocho flows east to west. These lakes were formed by conversion of abandoned gravel quarry pits to groundwater recharge basins and are called the "Chain of Lakes." Zone 7 has developed a near-term delivery and groundwater recharge plan using these lakes.

Some of the lakes in the Chain of Lakes are planned to be used primarily for groundwater recharge because the permeable soils of the lakes sides allow for lateral seepage and efficient recharge of groundwater. Other lakes are planned to be used primarily for conveyance and storage; for example, recharge is not feasible at Cope Lake because the silt at the bottom of that lake inhibits significant infiltration of water from Cope Lake into the groundwater table.

Other Water Features. Additional unnamed drainages intersect the study area and a number of natural and man-made water features are also present in the study area and vicinity. Man-made ponds are located within the Las Positas Golf Course (located in the City of Livermore, adjacent to and south of I-580). Wetlands also occur within the study area and small, local drainage features pass through the study area.

Flooding. The Federal Emergency Management Agency (FEMA) has prepared flood maps identifying areas in the study area that would be subject to flooding (Special Flood Hazard Areas). The Special Flood Hazard Areas are rated by FEMA according to risk of flooding and depth of flooding. The various Special Flood Hazard Areas (defined below) in and around the study area are depicted in

[17] The South Bay Aqueduct conveys water from the Sacramento-San Joaquin Delta through over forty miles of pipelines and canals. It begins in north-eastern Alameda County on the California Aqueduct's Bethany Reservoir serving as the forebay. The aqueduct flows along the eastern and southern edges of the Livermore Valley, and then through a series of tunnels to end in the foothills of eastern San Jose, 5 miles (8 km) from downtown San Jose.

Figure 3.8-3. As shown in Figure 3.8-3, portions of the study area are within 100-year flood zones (or floodplains).

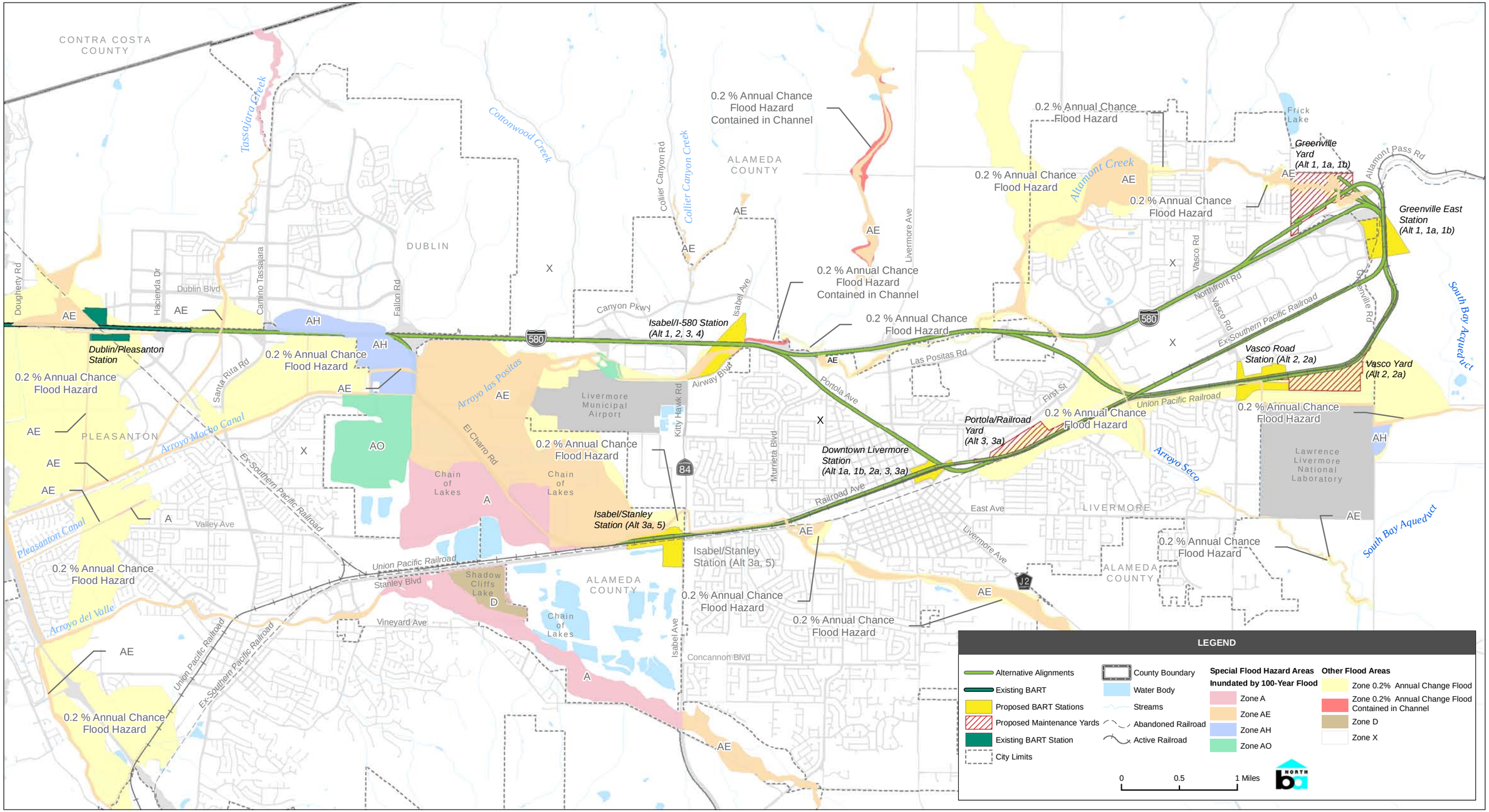
- Zone A – 100-year floodplain with no base flood elevations determined.
- Zone AE – 100-year floodplains, with base flood elevations determined.
- Zone AH – areas that would result in shallow ponding (average depth of one to three feet) during a 100-year flood.
- Zone AO – areas of shallow flow in a 100-year flood, which is usually sheet flow or, in sloping terrain, areas with water elevation between one and three feet.
- Zone X – areas determined to be outside the 0.2% annual chance floodplain. The majority of the study area is classified as FEMA Floodplain Zone X.
- Zone 0.2% Annual Chance flood, area of 1% annual chance flood with an average depths of less than one foot or with drainage areas less than 1 square mile, and areas protected by levees from the 1% annual chance flood.
- Zone D – Areas in which flood hazards are undermined, but possible.

Flood control within the Livermore-Amador Valley area is primarily under the jurisdiction of Zone 7, the City of Livermore, and the City of Pleasanton. Zone 7 maintains improved flood control channels and installs new drainage channels as needed. In the past, flooding has occurred within the Livermore-Amador Valley at several locations, including Arroyo de la Laguna between Arroyo Mocho and Bernal Avenue; Arroyo Mocho between Alamo Canal and Santa Rita Road; Arroyo Mocho along Stanley Boulevard; and at the confluence of Arroyo las Positas and Arroyo Mocho.

Improvements were made to the Arroyo Mocho and Arroyo Las Positas near El Charro Road in 2004; however, a letter of map amendment (LOMA) has not been submitted for these improvements and is not reflected in the FEMA Q3 data. Flood control improvements made in 2004 include completion of Arroyo Mocho channel improvement to a 100-year level of protection from El Charro Road to downstream of the study area. The Arroyo las Positas has also been improved along approximately 1,200 linear feet upstream of El Charro Road, within the City of Livermore, to its confluence with the Arroyo Mocho. These improvements significantly altered the floodplain near El Charro Road both upstream and downstream of El Charro Road.[18]

In July 2006, Schaaf and Wheeler restudied the Arroyo Mocho and Arroyo las Positas because of the updated information and channel improvements not included in the current FEMA study. They determined that the Arroyo Mocho has 100-year capacity upstream of Isabel Avenue. Downstream of Isabel Avenue, within unincorporated Alameda County, the channel is reduced in size and the 100-year

[18] Schaaf and Wheeler Technical Memo, *Staples Ranch Floodplain Analysis*, July 20, 2006.



LEGEND

- Alternative Alignments
- Existing BART
- Proposed BART Stations
- Proposed Maintenance Yards
- Existing BART Station
- City Limits
- County Boundary
- Water Body
- Streams
- Abandoned Railroad
- Active Railroad

Special Flood Hazard Areas Inundated by 100-Year Flood

- Zone A
- Zone AE
- Zone AH
- Zone AO

Other Flood Areas

- Zone 0.2% Annual Change Flood
- Zone 0.2% Annual Change Flood Contained in Channel
- Zone D
- Zone X

0 0.5 1 Miles

Source: AECOM, May 4, 2009; Zone 7 Water Agency, 2008; FEMA Digital Flood Insurance Rate Map Database Alameda County, 2008.

FLOOD AREAS IN THE BART TO LIVERMORE AREA
FIGURE 3.8-3

protection level is not met. In this reach, 2,800 cfs of the total (4,430 cfs) spills out of the channel and flows south along Stanley Boulevard to Shadow Cliffs Lake (an abandoned quarry used as a park). An additional 275 cfs splits out of the channel to the north traveling down the gravel operations road to an area where it ponds behind levees, south of the Arroyo las Positas Realignment. The existing Arroyo Mocho channel in this area has a capacity of 1,350 cfs, assuming that the levees maintain their ability to hold back flood waters.

The Arroyo las Positas has been realigned and improved from Pleasanton to 1,200 feet upstream of El Charro Road. The creek does not have 100-year conveyance (8,570 cfs) upstream of these improvements to Kitty Hawk Road. Many split flows occur throughout this reach because of the undersized channel and crossings. The majority of split flows spill to the south.

Some flows (275 cfs at the 15-year flood, 430 cfs for the 100-year flood, and 630 cfs for the 100-year flood with Arroyo Mocho levees failed in unincorporated Alameda County) spill to the north near the downstream end of the Las Positas Golf Course. This spill travels northwest and weirs over El Charro Road at a low point just south of the I-580 ramps. The flow then travels along low-lying areas and ditches on the north end of the Staples Ranch site. Because of limited topography in the surrounding areas, it is not possible to map this spill in detail; however, the spill will flow over and down I-580 and pond on the north side of the freeway. From there, it will enter the "Line G-3" drainage system, which flows back into the Arroyo Mocho downstream of El Charro Road.

For the newly defined 100-year floodplain conditions, both with and without levee failure, the Arroyo las Positas overtops both its north and south banks east of El Charro Road. The estimated volume and rate of flood flows as they enter the El Charro Specific Plan area is 8,570 cfs. The smaller, northern flows, amounting to 430 cfs, would leave the stream upstream of the fish ladder and flow north across El Charro Road and I-580, before the flows are conveyed to the Line G3-1 flood control channel and back into Arroyo las Positas, west of the El Charro Road. The larger, southern flows leave the stream at three locations: above the adjacent golf course and at two locations within the golf course, with flows of 5,380, 1,700, and 1,060 cfs, respectively.[19]

The Livermore Flood Protection Improvements, as part of the approved El Charro Specific Plan, include features that detain water, such as the detention basin south of the Arroyo las Positas and along the Arroyo Mocho. In particular, these features include improved storage capacity in the area south of the Arroyo las Positas where ponding occurs behind natural and artificial levees, upstream of the confluence of the Arroyo las Positas and the Arroyo Mocho. Additional improvements include a north overbank channel that would reroute flood flow spills from the north bank of the Arroyo las Positas back into the channel and prevent flood flows over El Charro Road. The Livermore Flood Protection Improvements would also reduce the potential rate and amount of runoff from the area up-gradient of El Charro Road and would retain flood flows in the event of a 100-year flood with levee failure along the Arroyo Mocho in unincorporated Alameda County. Schaaf & Wheeler found that the El Charro Specific Plan, with the proposed Livermore Flood Control Improvements, would not increase the peak

[19] City of Livermore, *Draft El Charro Specific Plan EIR,* page 3.8-4.

flow at Bernal Avenue in the City of Pleasanton for a 100-year flood with levee failure on the Arroyo Mocho.[20] Implementation of the Livermore Flood Protection Improvements would also eliminate the spill over El Charro Road during a 100-year flood with levee failure.[21]

A portion of the study area is within the Del Valle Dam failure inundation area (five- to 40-minute time to inundation in event of a dam failure)[22] and the Patterson Dam failure inundation area.[23] Figure 3.8-4 shows the portions of the study area that would be inundated if these dams fail.

Groundwater Hydrology

Groundwater is found in subsurface water-bearing formations. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers. Groundwater basins, which do not necessarily coincide with surface drainage basins, are defined by surface features and/or geological features such as faults, impermeable layers, and natural or artificial divides in the water table surface. The elevation of groundwater varies with the amount of withdrawal and the amount of recharge to the groundwater basin. Groundwater basins may be recharged naturally as precipitation infiltrates and/or artificially with imported or reclaimed water.

The study area is located above the Livermore Valley Groundwater Basin (ID 2-10).[24] Ground surface elevations within the basin range from about 600 feet above msl in the east, near the Altamont Hills, to about 280 feet above msl in the southwest, where Arroyo de la Laguna flows into the Sunol Groundwater Basin. The basin surface area is approximately 69,600 acres and extends from the Altamont Hills and Greenville fault to the east to the Pleasanton Ridge and the Calaveras fault on the west and from the Orinda Upland south to the Livermore Upland. The three major faults, the Livermore, Pleasanton, and Parks faults, prevent lateral groundwater movement. The general groundwater gradient is from east to west then south towards the Arroyo de la Laguna. The basin storage capacity is estimated at about 240,000 to 250,000 acre-feet (AF)[25] and the amount in storage during 1999 was estimated at about 219,000 AF.

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20 City of Livermore, *Draft El Charro Specific Plan EIR*, page 3.8-21.

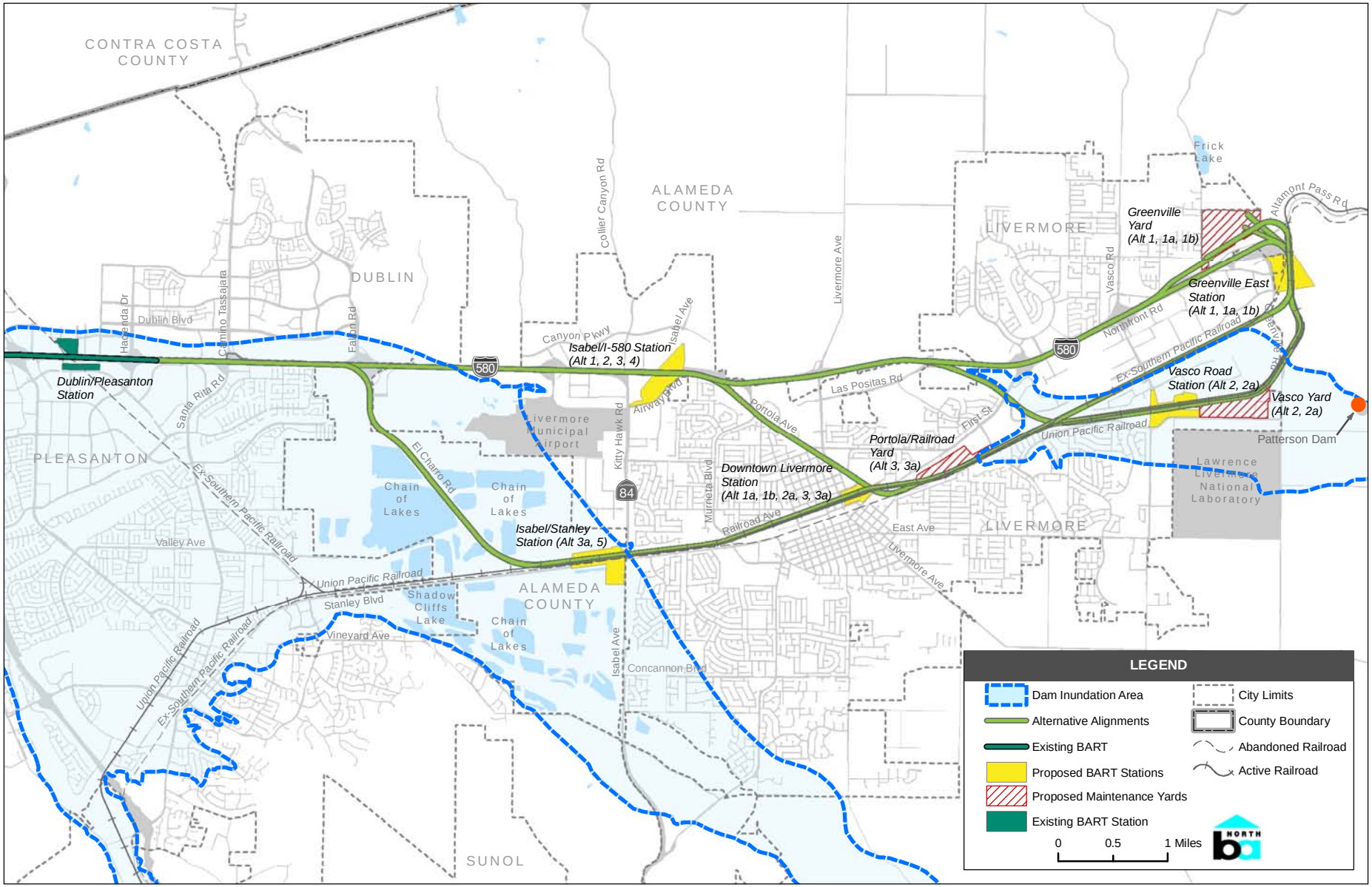
21 Jones and Stokes, *Draft Environmental Impact Report for the El Charro Specific Plan,* prepared for the City of Livermore, January 2007.

22 City of Livermore, *City of Livermore General Plan 2003 – 2025*, Public Safety Element, Figure 10 – 5 Dam Failure Inundation Areas Del Valle Dam, adopted February 9, 2004.

23 Association of Bay Area Governments, Hazard Maps, *ABAG Geographic Information Systems,* Dam Failure Inundation Areas, 2007, http://gis.abag.ca.gov/website/dam_inundation/viewer.htm, accessed March 23, 2009

24 California Department of Water Resources, *California Groundwater Bulletin* 118; San Francisco Hydrologic Region, Livermore Valley Groundwater Basin, www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/2-10.pdf, updated January 20, 2006.

25 Zone 7 Water Agency [UWMP], *Urban Water Management and Water Shortage Contingency Plan* – 2005, 2005, p. 18.



Source: AECOM May 4, 2009; California Office of Emergency Services, 2002.

PATTERSON DAM AND DEL VALLE DAM INUNDATION AREAS IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.8-4

The Livermore Valley Groundwater Basin is divided into a primary, Main Basin, and secondary, Fringe Basins. The Main Basin is composed of Amador, Bernal, Castle, and Mocho II sub-basins. The study area is located within both the Fringe and Main Basins (see Figure 3.8-5). Groundwater generally follows a westerly flow pattern, like the surface streams, along the structural central axis of the valley.[26] Groundwater sources commingle in the Bernal and Amador sub-basin and generally flow towards municipal or gravel mining company groundwater pumping wells.[27] The southeastern region of the Livermore Valley is the most important groundwater recharge area and consists of mainly sand and gravel that was deposited by the ancestral and present Arroyo del Valle and Arroyo Mocho. Groundwater levels in the study area can range from less than 10 feet below ground surface (bgs) in unconfined aquifers to more than 70 feet bgs.[28]

The Main Basin covers an area of over 17,000 acres and has an estimated storage capacity from 240,000 to 250,000 AF.[29] The State Department of Water Resources (DWR) has not identified the Main Basin (DWR Basin No. 2-10) as either a basin in overdraft or a basin expected to be in overdraft.[30] Zone 7 currently manages groundwater levels within the Main Basin of the Livermore-Amador Valley through annual conjunctive use practices so that under non-emergency conditions, including several multi-year droughts, groundwater elevations do not drop below historic low levels.[31]

Groundwater recharge occurs through natural and artificial recharge from rainfall, releases from the South Bay Aqueduct of Lake del Valle, and gravel mining recharge to the Arroyo Mocho and Arroyo del Valle. Average annual recharge to the basin is approximately 19,630 acre-feet annual (AFA): 6,900 from natural recharge; 5,160 from augmented stream recharge; 5,050 from rainfall recharge; 1,520 from applied recharge (primarily through the Chain of Lakes); and 1,000 from surface inflows.[32] Groundwater in the Main Basin is primarily recharged via the streambed of Arroyo Mocho and Arroyo del Valle, as well as from intended diversion into Chain of Lakes, Lake H from the Arroyo Mocho.[33] Recharge from the Arroyo Mocho is about 6,330 AFA with 2,600 from natural recharge and 3,730 from artificial recharge.[34]

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[26] SMMPEIR, Draft EIR Chapter 3, April 2004, prepared for the Zone 7 Water Agency, July 2005, p. 3.1-4.

[27] SMMPEIR, Draft EIR Chapter 3, April 2004, prepared for the Zone 7 Water Agency, July 2005, p. 3.1-4.

[28] Zone 7 Water Agency, *2006 Groundwater Management Program Annual Report*, Figure 3.2-7, 2007.

[29] Zone 7 Water Agency [UWMP], *Urban Water Management and Water Shortage Contingency Plan* – 2005, 2005, p. 18.

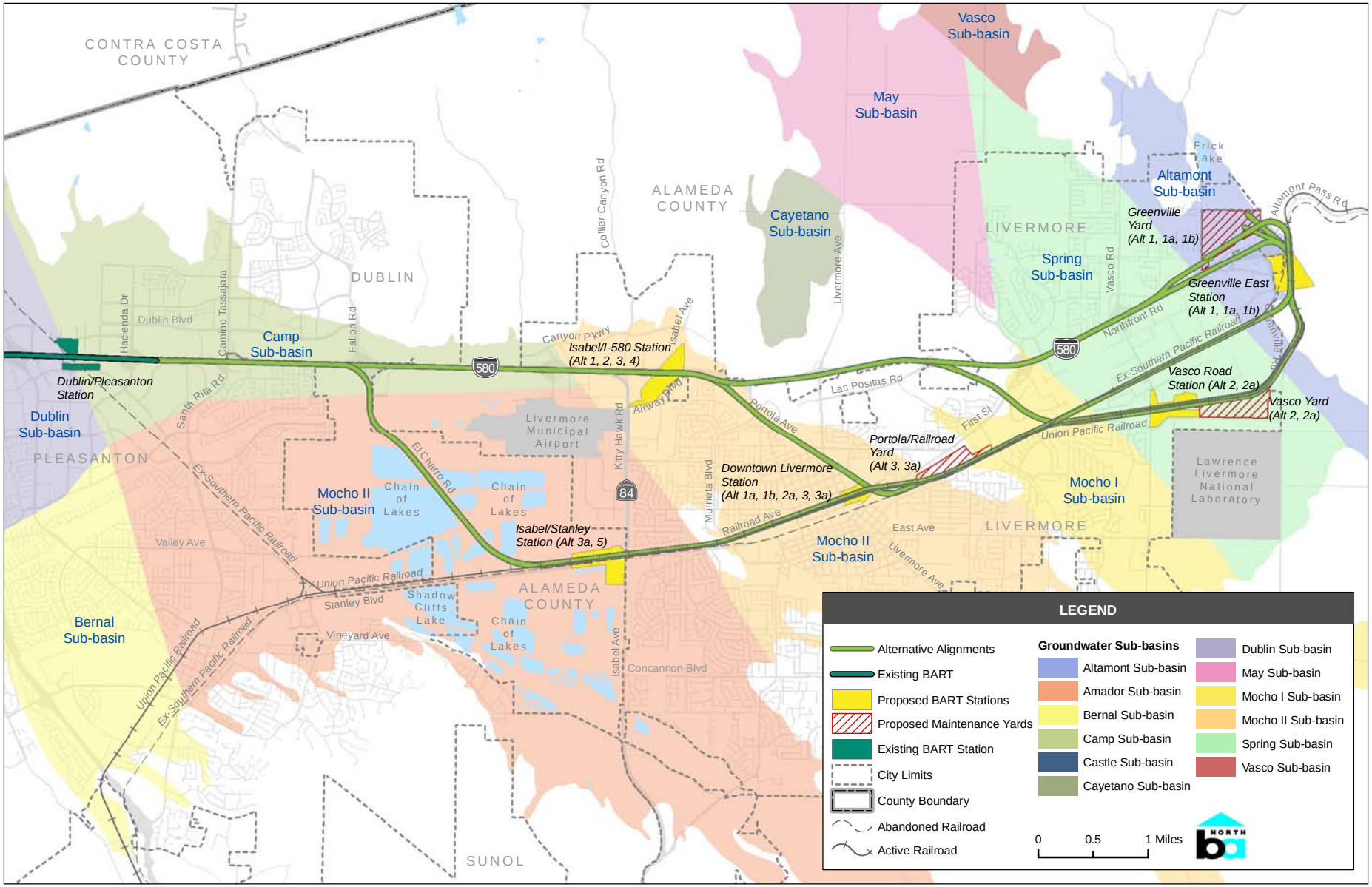
[30] Overdraft is a condition where discharges (extractions) are not balance by inputs (recharge); in other words, more groundwater is extracted compared to the amount being recharged.

[31] Conjunctive use in this setting is the use of groundwater mixed with surface water (including the use of surface water resources to artificially recharge groundwater) to meet water demands and water quality requirements.

[32] Zone 7 Water Agency, *2006 Groundwater Management Program Annual Report*, 2007, Figure 4.2-2.

[33] Environmental Sciences Associates, *Draft Zone 7 Water Agency Well Master Plan EIR*, Chapter 3, April 2004 prepared for the Zone 7 Water Agency.

[34] Zone 7 Water Agency, *Main Basin Groundwater Hydrologic Inventory, 1974-2003*, 2003, Table 1.



Source: AECOM, May 4, 2009, Department of Water Resources, Division of Mines and Geology, 2008.

GROUNDWATER BASINS IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.8-5

Water Quality

Surface Water Quality. Extensive water quality data are not available for the streams and tributaries within the study area; however, water quality is expected to reflect the land uses in the watershed. Pollutants and their concentrations in runoff water vary according to land cover, land use, topography, and the amount of impervious cover, as well as the intensity and frequency of irrigation or rainfall. Land uses surrounding the waterways to which the study area discharges includes open space, urban/industrial, and agricultural uses. Runoff in developed areas may typically contain oil, grease, and metals accumulated in streets, driveways, parking lots, and rooftops, as well as pesticides, herbicides, particulate matter, nutrients, animal waste, and other oxygen-demanding substances from landscaped areas; agricultural land uses typically contribute sediment, pesticides, nutrients, and bacteria; and open space lands typically contribute bacteria, sediment from steep areas, and landscaping materials if landscaped.

Historic measures of surface water quality indicate generally high salinity or hardness, nitrogen, and chloride, and moderately high pH. Table 3.8-2 lists the range of historic water quality measurements in the Arroyo Mocho, Arroyo las Positas, and Tassajara Creek.

Salinity or hardness, measured as total dissolved solids (TDS), within the Arroyo Mocho is considered to range from about 0 to 399 milligrams per liter (mg/L), more than 1000 mg/L for the Arroyo las Positas, and 400 to 499 mg/L for Tassajara Creek.[35] Table 3.8-3 lists measured range of salinity in the Arroyo Mocho and Arroyo las Positas during the 2006 Water Year.

Some water bodies have been given special status under Section 303(d) of the Clean Water Act, which requires each state to identify "impaired" water bodies that will not achieve water quality standards after application of technology-based effluent limits and to develop plans for water quality improvements. For each impairing pollutant, the State must determine the "total maximum daily load" (TMDLs) that the water body can assimilate without violating State water quality standards.

Alameda Creek, Arroyo Mocho, Arroyo de la Laguna, and Arroyo las Positas are all listed as impaired by diazinon (an insecticide) from urban runoff and storm sewers.[36] These drainages ultimately discharge into the Lower San Francisco Bay. The Lower San Francisco Bay is listed as impaired by chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, and mercury from nonpoint sources; by dioxin compounds, furan compounds, and mercury from atmospheric deposition; by exotic species from ballast water; and by polychlorinated biphenyls (PCBs) and dioxin-like PCBs from unknown nonpoint sources.[37] Industrial and municipal point sources, resource extraction, and natural sources are also considered to contribute to mercury degradation of the lower San Francisco Bay.

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[35] Jones and Stokes, *Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin*, Stream Recharge Rates and TDS, 2005, p. 3-9.

[36] San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), *2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs*, approved by the USEPA June 28, 2007.

[37] San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), *2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs*, approved by the USEPA June 28, 2007.

Table 3.8-2
Historic Surface Water Quality within the BART to Livermore Extension Study Area

	Location					
Constituent	**Arroyo Mocho Near Livermore**	**Arroyo Mocho Near Pleasanton**	**Arroyo las Positas at Livermore**	**Arroyo las Positas at El Charro Road near Pleasanton**	**Tassajara Creek Near Pleasanton**	**Altamont Creek Near Livermore**
USGS Gage	1117600	11176200	11176145	11176180	11176300	11176140
Date	Dec 1979 to Aug 1983	Nov 1970 to Jun 1983	Mar 1981 to Jun 1983	Dec 1979 to Jun 1983	Jan 1980 to Jun 1983	Jan 1980 to March 1980
Specific Conductivity (µS/cm)	270 – 1,300	500 – 1,610	1,050 – 3,250	340 – 2,500	345 – 1,300	670 – 4,440
pH (SU)	7.7 – 8.6	7.8 – 8.8	7.0 – 8.4	7.5 – 8.6	7.7 – 8.6	8.3
Nitrate + Nitrite as Nitrogen (mg/L)	0.010 – 1.70	0.15 – 4.40	0.02 – 7.40	0.58 – 6.20	0.04 – 2.60	2.10 – 5.00
Hardness as Calcium Carbonate (mg/L)	120 - 600	190 - 370	37 - 110	59 - 460	73 - 320	100 - 480
Sodium (mg/L)	12 - 63	45 - 110	3.3 – 8.7	49 - 420	41 - 160	140 - 770
Chloride (mg/L)	7.1 - 79	47 - 280	170 - 730	48 - 640	16 - 100	120 – 1,200
Residue Filtered, sum of constituents (dissolved solids) (mg/L)	159 - 734	260 - 671	501 – 2,050	203 – 1,450	243 - 730	478 – 2,510

Source: United States Geological Survey, USGS Water Data For the Nation, http://waterdata.usgs.gov/nwis accessed June 10, 2009 (except 11176140 accessed June 24, 2009).

Notes:
µS = microSiemens
mg/L = milligrams per liter

Table 3.8-3
Recent Salinity in the Arroyo Mocho and Arroyo las Positas

Location	Electrical Conductivity (µS/cm)
Arroyo Mocho	
Near Livermore	320 – 1,050
At Livermore	265 – 680
At Kaiser Bridge	270 – 650
Near Pleasanton	580 – 1,920
Arroyo las Positas	
At Livermore	650 – 2,040
At El Charro Road	620 – 1,920

Source: Zone 7 Water Agency, 2006 Groundwater Management Program Annual Report, Figure 3.3-3, 2007.

Note:
µS = microSiemens

Groundwater Quality. [38] Groundwater quality is highly variable throughout the Basin. Zone 7 actively monitors the quality of water at many of the key stream recharge areas to ensure water quality protection of both surface water and groundwater.

The Main Basin is characterized by relatively good quality groundwater that meets all State and federal drinking water standards with only minimal treatment (chloramination to preserve quality in the distribution system). The Main Basin serves large capacity municipal production wells and is also used to store and distribute high quality imported water through Zone 7's recharge program. The primary groundwater water quality concerns in the Main Basin are high total dissolved solids[39] (TDS or hardness), nitrate, boron, and organic compounds. Groundwater in the Fringe Basins tends to be saltier than the Main Basin. Zone 7 has developed a salt management plan to identify and evaluate all significant salt loading to, and removal from, the groundwater basin.[40] Zone 7 has identified recharge of local streamflow and imported water, subsurface inflow, and irrigation returns as major contributors to increasing TDS concentration. Localized elevated groundwater nitrate levels are associated with livestock operations and septic tank usage in the central and eastern portions of the Livermore Valley.

The northern portion of the Livermore-Amador Valley Groundwater Basin is dominated by a sodium rich water, while much of the western part of the basin near Pleasanton has a magnesium-sodium

[38] Jones and Stokes, *Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin*, 2005.

[39] Total dissolved solids is a measure of water salinity and hardness.

[40] Environmental Sciences Associates, *Draft Zone 7 Water Agency Well Master Plan EIR*, Chapter 3, April 2004 prepared for the Zone 7 Water Agency, p. 3.1-11.

characteristic (i.e., both magnesium and sodium are dominant cations).[41] The area along the eastern portion of the basin, beneath the Livermore area, has magnesium as the predominant cation. In the western Main Basin, groundwater is a calcium-magnesium-bicarbonate water type and has historically been "hard." However, increased salinity in the western Main Basin is associated with several factors but is primarily associated with the saline Fringe Basin shallow groundwater flowing into the Main Basin or into streams that recharge the Main Basin. Increased salinity from irrigation in a semi-arid region is another major issue; salts are left behind as water evaporates or is used by plants and then washed down into groundwater during subsequent rain or irrigation events.

Trace amounts of boron are present in the eastern Fringe Basins (associated with natural marine geologic formations) and with shallow groundwater in the northern Fringe Basins. High boron levels and lower aquifer yields can limit the use of some Fringe Basins for agricultural irrigation.

Local impairments include some areas with boron concentrations exceeding 2 mg/L. Nitrates have also impaired portions of the Main Basin, especially in the east. Nitrate levels between 30 and 65 mg/L have been identified in an area of 670 acres of unincorporated residential and agricultural land in the South Livermore area. Nitrates from in-Basin wastewater disposal historically contributed to this problem (pre-1980).

Releases of fuel hydrocarbons from leaking underground storage tanks and spills of organic solvents at industrial sites have caused minor-to-significant groundwater impacts in specific parts of the region. Chlorinated organic solvent releases to soil and groundwater are also an issue in the region, primarily in fringe basins and in upper aquifers.

TDS in local surface water that serves to recharge the Livermore-Amador Valley Groundwater Basin varies significantly throughout the watershed from approximately 350 mg/L TDS to more than 1,000 mg/L. The highest quality surface water recharging the basin occurs within the Arroyo Mocho and Arroyo del Valle, where the TDS is generally less than 500 mg/L. The poorest quality surface water recharging the basin has a TDS of approximately 1,000 mg/L and occurs within the Arroyo las Positas.

Applicable Policies and Regulations

Clean Water Act (33 U.S.C. Section 1251 et seq.). The purpose of the federal CWA is restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution. The CWA applies to discharges of pollutants into waters of the United States. The State Water Resources Control Board (SWRCB) is the State agency with primary responsibility for implementation of State and federally established regulations relating to hydrology and water quality issues. Typically, all regulatory requirements are implemented by the SWRCB, through the nine different Regional Water Quality Control Boards (RWQCBs) established throughout the State. The CWA operates on the principle that any discharge of pollutants into the nation's waters is prohibited unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool. The following CWA sections are most relevant to this analysis.

[41] A cation is a positively charged ion.

Section 303 Total Maximum Daily Load Program. The State adopts water quality standards to protect beneficial uses of state waters as required by the CWA, Section 303, and the state's Porter-Cologne Water Quality Control Act of 1969. Section 303 of the CWA establishes the TMDL process to guide the application of state water quality standards. To identify candidate water bodies for TMDL analysis, a list of water-quality–limited water bodies is generated. "Water quality-limited" means that the water bodies are not meeting water quality standards because they are impaired by the presence of pollutants, including sediments.

As noted above, the TMDL is the maximum amount of pollution (both point and non-point sources) that a water body can assimilate without violating state water quality standards. Priorities for development of TMDLs are set by the state, based on the severity of the pollution and the beneficial uses of the waters. The United States Environmental Protection Agency's (US EPA) TMDL program provides a process for determining pollution budgets for the nation's most impaired waters. Pollutant loading limits are set and implemented by the SWRCB and the RWQCBs under the State Porter-Cologne Water Quality Control Act, which provides the basis for water quality regulation within California.

Of the water bodies in the study area, Alameda Creek, Arroyo Mocho, Arroyo de la Laguna, and Arroyo Las Positas are all listed as impaired by diazinon (an insecticide) from urban runoff and storm sewers.[42] These drainages ultimately discharge into the Lower San Francisco Bay. The Lower San Francisco Bay is listed as impaired by chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, and mercury from nonpoint sources; by dioxin compounds, furan compounds, and mercury from atmospheric deposition; by exotic species from ballast water; and by polychlorinated biphenyls (PCBs) and dioxin-like PCBs from unknown nonpoint sources.[43] For the Lower San Francisco Bay, a TMDL for mercury was completed in 2008, a TMDL for dioxin and exotic species is underway and is scheduled to be completed by 2019, and for PCBs, a TMDL is waiting approval from the SWRCB and the U.S. EPA.[44]

Section 401 Clean Water Quality Certification. Under the CWA, Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate, or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. All projects that have a federal component and may affect the quality of the State's waters (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Section 401 certification or waiver is under the jurisdiction of the applicable RWQCBs.

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[42] San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), *2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs*, approved by the USEPA June 28, 2007.

[43] San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), *2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs*, approved by the USEPA June 28, 2007.

[44] San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). Total Maximum Daily Loads (TMDLs) and the 303(d) List of Impaired Water Bodies. http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/TMDLs. Accessed September 29, 2009.

Section 402 NPDES Program. Section 402 of the CWA regulates discharges to surface waters through the National Pollution Discharge Elimination System (NPDES) program, administered by the US EPA. In California, the SWRCB is authorized by the EPA to oversee the NPDES program through the RWQCBs. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits.

The NPDES permit system was established in the CWA to regulate point source and certain types of diffuse source discharges. Point sources include a municipal or industrial discharge at a specific location or pipe. Urban stormwater runoff and construction site runoff are diffuse-sources of pollutants, similar to nonpoint sources, but they are regulated under the NPDES permit program because they are conveyed in a discrete conveyance system and discharge at a specific location.

For regulated diffuse source discharges, the NPDES program establishes a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. To meet the goals of the NPDES permit, each local stormwater program and each permittee within a program establishes a Stormwater Management Plan. These plans provide specific local requirements targeted to meet the environmental needs of each watershed, as well as to reflect the political consensus of each community.

Section 404 Permit for Fill Material in Waters and Wetlands. Section 404 of the CWA regulates the discharge of dredged and fill materials into waters of the United States, which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. The Section 404 permit is issued by the U.S. Army Corps of Engineers (USACE). Refer to Section 3.9, Biological Resources, for further discussion.

Porter-Cologne Water Quality Act (Water Code Section 13000 et seq.). The Porter-Cologne Water Quality Control Act was passed in 1969. It established the SWRCB and divided the State into nine regions, each overseen by a RWQCB. The SWRCB is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA, Sections 401, 402, and 303. In general, the SWRCB manages both water rights and Statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions.

NPDES Program (CWA). The following permit program implemented under the CWA and administered by the SWRCB and RWQCBs are most relevant to this analysis.

NPDES Construction General Permit. The SWRCB permits all regulated construction activities under Order No. 2009-0009-DWQ (effective July 1, 2010), which requires that, prior to beginning any construction activities, the permit applicant must obtain coverage under the Construction General Permit by preparing and submitting a Notice of Intent (NOI) to the SWRCB, and preparing and implementing a Storm Water Pollution Prevention Plan (SWPPP), in accordance with the Construction General Permit requirements, for all construction activities disturbing one or more acre of land surface. In addition, 2003 revisions to the original Construction General Permit clarify that all construction activity, including small construction sites that are part of a larger common plan, must obtain coverage under this Construction General Permit.

NPDES Industrial General Permit. The SWRCB and RWQCBs regulate all specified industrial activities, such as maintenance facilities, under the Waste Discharge Requirements (WDR) for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities (SWRCB Order No. 97-03-DQ, NPDES General Permit No. CAS000001). Industrial facility operators must comply with all of the conditions of the Industrial General Permit. Noncompliance constitutes a violation of the CWA and 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.

Caltrans Statewide Permit. The California Department of Transportation (Caltrans) is responsible for the design, construction, management, and maintenance of the State highway system, including freeways, bridges, tunnels, Caltrans' facilities, and related properties. Caltrans' discharges consist of stormwater and non-stormwater discharges from State owned rights-of-way. Stormwater discharges from Caltrans' stormwater systems is regulated under a Statewide permit for all stormwater discharges from Caltrans owned Municipal Separate Storm Sewer Systems (MS4s), maintenance facilities, and construction activities (NPDES Permit for Storm Water Discharges from Caltrans Properties, Facilities, and Activities [Order No. 99-06-DWQ]).

Caltrans Storm Water Management Plan (SWMP). Caltrans' SWMP describes the procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters.

The stormwater conveyance structures that are part of the Caltrans' Statewide system of transportation corridors, facilities, and related appurtenances, are considered an MS4. The SWMP applies to discharges consisting of stormwater and non-stormwater resulting from the following:

- Maintenance and operation of State-owned highways, freeways, and roads;
- Maintenance facilities;
- Other facilities with activities that have the potential for discharging pollutants;
- Permanent discharges from subsurface dewatering;
- Temporary dewatering; and
- Construction activities.

This SWMP describes Caltrans' program and addresses stormwater pollution control related to Caltrans activities, including planning, design, construction, maintenance, and operation of roadways and facilities. The SWMP is designed to include a iterative process of use, evaluation, and modification of best management practices (BMPs) to provide continuing progress toward achieving compliance with stormwater quality requirements. Projects constructed by other agencies on Caltrans property require an encroachment permit. The sponsor must file the NOI and seek coverage under the SWRCB's General Construction Permit before Caltrans will issue an encroachment permit for any construction activity within the Caltrans right-of-way.

California Department of Fish and Game Code (Section 1601–1603 [Streambed Alteration]). Under Sections 1601–1603 of the *Fish and Game Code*, agencies are required to notify the California Department of Fish and Game (CDFG) prior to implementing any project that would divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake. Also, under the Fish and Game Code, the CDFG has jurisdiction over any activity in a creek or river in which there is at any time an existing fish or wildlife resource or from which such resources derive benefit. Projects affecting or potentially affecting such resources must obtain an agreement from CDFG, which usually imposes conditions to protect the environment. Refer to Section 3.9, Biological Resources, for further discussion.

San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan). The Porter-Cologne Act provides for the development and periodic review of Basin Plans that designate beneficial uses of California's water resources and establish narrative and numerical water quality objectives for those waters that are necessary to support the designated beneficial uses. Beneficial uses represent the services and qualities of a water body (i.e., the reasons why the water body is considered valuable). Water quality objectives and designated beneficial uses, together, comprise the relevant water quality standards. Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met. The study area is located within the jurisdiction of the San Francisco Bay Basin (Region 2) Regional Water Quality Control Board (SFBRWQCB).

The Livermore Valley Groundwater Basin designated beneficial uses include municipal and domestic supply; industrial process supply; industrial service supply; and agricultural supply. The Arroyo Mocho, Arroyo las Positas, Tassajara Creek, Arroyo Seco, and the Arroyo de la Laguna have designated beneficial uses of groundwater recharge; fish migration; fish spawning; wildlife habitat; and water contact and non-water contact recreation. They also have potential beneficial uses of cold and warm freshwater habitat.

NPDES Program. The following describes the both the county-wide municipal permit, water discharge requirements, and individual permitting programs that are most relevant to this analysis.

Municipal NPDES Permit. The County of Alameda and its incorporated cities, including the cities of Dublin, Pleasanton, and Livermore form the Alameda Countywide Clean Water Program and are permitted under Phase I for municipal stormwater and urban runoff discharges under NPDES Permit No. CAS0029831 and Order No. R2-2003-0021. Under the NPDES program, Alameda County and its incorporated cities must implement a Stormwater Management Program that addresses six minimum control measures associated with construction and operational activities, including (1) public education and outreach; (2) public participation/involvement; (3) illicit discharge detection and elimination; (4) construction of site stormwater runoff control for sites greater than one acre; (5) post-construction stormwater management in new development and redevelopment; and (6) pollution prevention/good housekeeping for municipal operations. These control measures would typically be addressed by developing BMPs.

A Hydrograph Modification[45] Management Plan was prepared by the Alameda Countywide Clean Water Program in partial fulfillment of requirements in its third five-year municipal stormwater discharge permit. Key provisions of this Hydrograph Modification Plan have been included in the Municipal NPDES Permit (Order No. R2-2007-0025, NPDES Permit No. CAS0029831 Amendment Revising Order No. R2-2003-0021).

Waste Discharge Requirements or Individual NPDES Permit. No general permit is in effect for construction or operational groundwater dewatering in Region 2, unless groundwater dewatering is permanent, requires treatment, and is in excess of 10,000 gallons per day (see below). Therefore, if substantial construction or operational dewatering is required, a permit, from the RWQCB, to discharge waste may be required. If the discharge is directly to a surface water resource, a completed federal NPDES permit application form must be filed with the RWQCB. For other types of discharges, such as those affecting groundwater or in a diffused manner (e.g., erosion from soil disturbance or waste discharges to land), a Report of Waste Discharge (ROWD) must be filed with the RWQCB in order to obtain Waste Discharge Requirements (WDRs). Discharge of small amounts of water from construction dewatering is permitted under the Statewide Construction General Permit.

Permanent Treated Groundwater Dewatering General Waste Discharge Requirement (Treated Groundwater Dewatering WDR). If substantial (more than 10,000 gallons per day) permanent groundwater dewatering is required and the groundwater must be treated prior to discharge, discharges would require coverage under the General Waste Discharge Requirements for Discharge or Reuse of Extracted Brackish Groundwater and Reverse Osmosis Concentrate Resulting from Treatment of Groundwater by Reverse Osmosis and Discharge or Reuse of Extracted and Treated Groundwater Resulting from Structural Dewatering (Order No. R2-2007-0033, NPDES No. CAG912004). In accordance with Discharge Prohibitions, discharges shall not cause pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code and shall not occur at a volume or velocity to cause erosion and/or scouring to the banks or bottoms of receiving waters. Effluent limitations include limitations on residual chlorine (less than 0.08 mg/l), pH (6.5 to 8.5 SU), and toxicity (rainbow trout survival in 96-hour static renewal bioassays). This permit also includes reclamation and land discharge specifications, receiving water limitations, groundwater limitations, and monitoring and reporting requirements. To obtain coverage under this General Permit, the discharger must submit an NOI application package documenting the proposed treatment system and associated operation, maintenance, and monitoring plans. The NOI must include analytical results for influent as identified in this General Permit and documentation supporting selection of proposed treatment system(s) effectiveness at meeting effluent and receiving water limitations.

Flood Control Facilities Encroachment Permit. The Alameda County Flood Control and Water Conservation District (ACFCWCD) consists of 10 active zones, of which Zone 7 covers the eastern portion of Alameda County, which includes the cities of Dublin, Pleasanton, and Livermore. In general, an encroachment permit is required for reviewing and inspecting proposed work of any nature that has the potential to impact any existing Zone 7 flood control or water supply facilities. An

[45] Changes in the timing and volume of runoff from a site are known as "hydrograph modification" or "hydromodification."

encroachment permit must be obtained prior to the beginning of any non-Zone 7 work upon or within a Zone 7 owned or maintained facility or right-of-way.

Other Applicable Regulations. The following are other regulatory considerations that are most relevant to this analysis.

- Local jurisdiction stormwater management programs; and
- BART Facility Standards - Standard Specifications.

Impact Assessment and Mitigation Measures

Standards of Significance

The alternatives would result in significant hydrology or water quality impacts if any of the alternatives would:

- Alter the existing drainage pattern of the site or area in a manner that would cause substantial flooding, erosion, or siltation;
- Substantially degrade groundwater quality or interfere with groundwater recharge, or depletes groundwater resources;
- Create or contribute to runoff that would exceed the drainage and flood control capacity of existing or planned stormwater drainage systems;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows, or otherwise expose people and/or property to water-related hazards, such as flooding; or
- Conflict with applicable legal requirements related to hydrology or water quality, including a violation of state water quality standards or waste discharge requirements.

For each hydrology and water quality impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, HY refers to Hydrology and Water Quality.

Methodology

This section analyzes the direct and indirect impacts related to hydrology and water quality through quantitative analysis, and where necessary, with qualitative analysis. This analysis focuses principally on the BART extension alternatives' potential to alter drainage patterns and the amount or characteristics of site runoff, to cause or contribute to reductions in groundwater resources, and to result in risk of personal injury, loss of life, and damage to property from hydrologic and flooding conditions. Where possible, the analysis is based on a review of available reports, geographic information system (GIS) analysis, and professional judgment.

Surrounding land uses and natural characteristics affect both surface water and groundwater quality. Both point-source[46] and nonpoint-source[47] discharges can contribute contaminants to surface waters. However, stormwater runoff is considered a point-source discharge, even though it is generated over a large diffuse area. Pollutant sources in urban areas typically include parking lots and streets, rooftops, exposed earth at construction sites, and landscaped areas. Pollutant sources in rural/agricultural areas primarily include agricultural fields and operations. No point-source discharges are expected from the BART extension alternatives.

For this analysis, surface waters include improved flood control or drainage channels, canals, intermittent/ephemeral river and stream channels as identified on USGS topographic maps or GIS datasets; permanent river and stream channels; impoundments such as ponds, lakes, and reservoirs; and wetlands. Groundwater includes the Livermore Valley Groundwater Basin.

Operational impacts result from ongoing activities of the BART extension alternatives and the physical impact on drainage patterns and the landscape by project facilities such as the stations, parking structures/lots, support facilities, columns supporting elevated structures, and tunnels. Situations that could potentially lead to an impact include:

- Increases in impervious surfaces as a result of the alternatives, leading to increases in the timing and rate of water runoff, and consequently, flooding or streambank erosion;
- Changes to or interruptions in the local drainage infrastructure as a result of the design, potentially leading to localized or regional drainage impacts (e.g., flooding, loss of groundwater recharge);
- Creation of significant new sources of pollutants (e.g., parking lots and maintenance facilities), leading to new sources of contaminated runoff;
- Location of facilities below the naturally occurring water table, with potential impacts related to flooding of facilities, changes in groundwater quality and/or quantity, and new discharge of groundwater to surface water resources; and
- Location of facilities within a designated floodplain or dam failure inundation area, exposing the alternatives and people to risks related to flooding, as well as subjecting other areas to impacts resulting from changes in the location and or direction of flood flows.

The potential direct impact study area is defined by the alignments and station facilities associated with the alternatives. This methodology also includes an expanded area of analysis where the alignment alternative has a greater potential to affect the environment (e.g., where the alternative includes expansion of the I-580 corridor, in order to accommodate tracks, and station size and location). Potential direct impacts are defined by the area within a 25-foot distance from the alternative footprint, except where the study area has been extended, primarily along the I-580 corridor.

[46] A 'point-source' is a pollutants source discharging at a discrete location.

[47] A 'nonpoint-source' is a pollutant source generated over a large diffuse area and does not discharge at a discrete location or is conveyed to discharge at a discrete location.

Indirect impacts may include such downstream effects as sedimentation, turbidity, impacts to water-dependent species, changes in flow-rate, erosion because of runoff, and ponding because of changes in flood flows. These impacts typically occur outside of the footprint of the alternative. Without project-level detail, it is difficult to identify specific locations for indirect impacts. Therefore, potential indirect impacts for hydrology and water quality are defined by the area within a 100-foot distance from the alternative footprint, except where the study area has been extended.

Potential impacts on hydrology and water resources from subway sections of the alternative alignments were estimated from known information on local groundwater. These impacts were identified and discussed qualitatively.

Qualitative Assessment. A qualitative assessment was used to compare the BART extension alternatives when discussing issues such as runoff rates, sedimentation, or other items that would ultimately require a more detailed analytic approach (i.e., at the project level) than appropriate for a program-level analysis. This also includes a description of the number and name (if available) of the water resources each alternative would cross and therefore potentially impact, as well as the estimated increase in impervious area and proximity of stations and facilities to susceptible water resources. The number and names of water resources were determined using aerial images, topographic maps, GIS data files, and information from City and BART staff. Not all water resources identified have names, and therefore placeholders for unnamed canals or unnamed creeks were used.

The likelihood of groundwater dewatering during operation was assessed based on estimated elevation of the Upper Aquifer of the Livermore Valley Groundwater Basin[48] and profile plans for the BART extension alternatives. Depths greater than 10 feet bgs were considered to have a minimal potential for groundwater dewatering, except for below-ground sections of the alternatives. In these sections, aquifer levels within 10 feet of the anticipated bottom of the subway box were considered to require substantial dewatering.

The amount of new impervious area was estimated from additional width required along the I-580 corridor to support both the BART extension alternatives and HOV lanes in addition to the station/yard areas. The entire station/yard footprint under each alternative was assumed to be impervious for the purposes of this analysis because the site design has not yet been identified.

Quantitative Assessment. For the quantitative assessment, readily available information on stream locations, existing water quality problem areas, flood zones, and general soil information was used to estimate the magnitude of the potential areas of direct and indirect impacts for the BART extension alternatives. The following steps were followed to estimate the potential areas of impact for floodplains and water quality.

[48] Zone 7 Water Agency, *2006 Groundwater Management Program Annual Report*, Figure 4.2-6 Groundwater Gradient Map in Upper Aquifer; May 2006, Livermore-Amador Groundwater Basin, 2007.

- Acreage of Special Flood Hazard Areas, as defined by FEMA on Flood Insurance Rate Maps, in the study area was identified and estimated to evaluate the area of floodplain potentially affected by the alternatives.[49]

- Acreage of surface waters (lakes) and the linear feet of surface waters (rivers and streams) in the study area were estimated, using Zone 7 and USGS National Hydrography Dataset 1:24,000 scale digital line graphs of blueline streams, including ephemeral streams as mapped. The linear feet of surface water was calculated based on the direct and indirect area width of the alternatives crossing of rivers, streams, and canals in the study area.[50]

- Waters with impaired water quality (i.e., waters included on the Section 303(d) CWA list distributed by the State Water Board), in the study area were identified along with the impairment (pollutant/stressor) and an indication of whether the impairment has the potential to be further affected by the proposed BART extension alternatives. State GIS data from 2002 and 2006 TMDL description data were used to determine the location of the impaired segment and the type of pollutants causing the impairment. The 2006 description data was cross-checked with 2002 descriptions in the GIS files to ensure no duplicity or missing information.[51]

- Acreage of wetlands as identified on the National Wetlands Inventory database and updated by field survey by PBS&J biologists.[52]

- Number of down-gradient streams susceptible to hydrograph modification by alterations in the flow regime of the 0- to 10-year storm events.[53]

- Acreage of areas of potential soil erosion in the study area was estimated to evaluate areas potentially affected by the alternatives. The location of the potential erosive conditions was identified as those areas with a combination of erosive soils and high slopes, evaluated as the product of kfact and slopeh (listed in Soil Survey Geographic (SSURGO) Database). Those conditions where kfact multiplied by slope is greater than 3.0 are potentially susceptible to soil erosion, and affected acreage of these areas within the study area was determined. This information was used to estimate potential erosion and sedimentation characteristics of the study area.[54] Figure 3.8-6 depicts the areas within and around the study area that have highly erodible soils.

- Acreage of groundwater was calculated using "Ground Water Basins".[55]

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49 Federal Emergency Management Agency Q3, 1996.

50 Alameda County Zone 7, 2009; U.S. Geological Survey 2008.

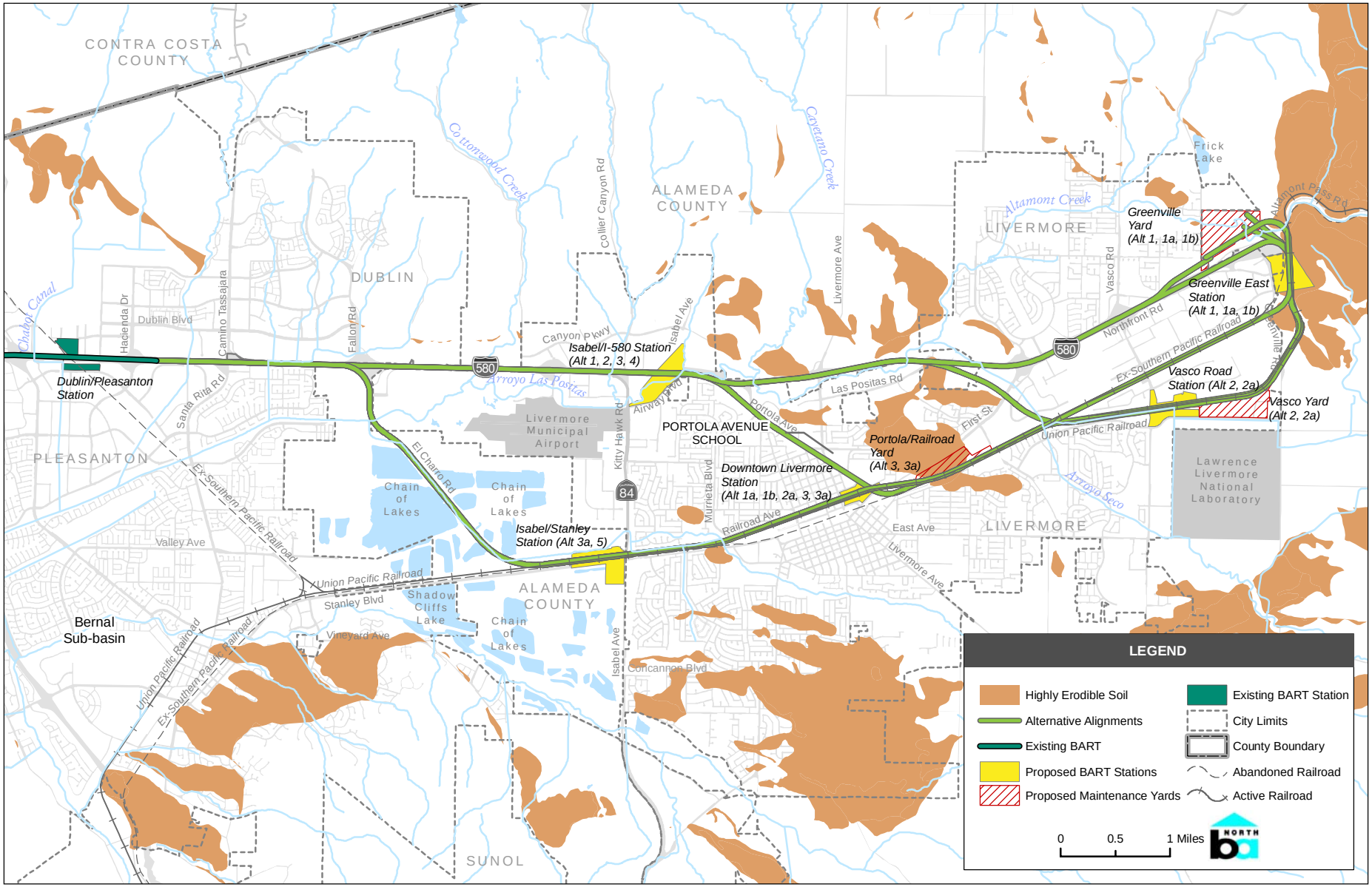
51 State Water Resources Control Board and Regional Water Quality Control Boards, 2007.

52 (U.S. Department of the Interior, Fish and Wildlife Service, National Wetland Inventory, 2006).

53 (Alameda Countywide Clean Water Program Hydrograph Modification Management Plan).

54 (U.S. Department of Agriculture, Natural Resource Conservation Service, 2003).

55 (Department of Water Resources, Division of Mines and Geology, 2008 and the GMP, 2005).



Source: AECOM, May 4, 2009; PBS&J, 2009.

HIGHLY ERODIBLE SOILS IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.8-6

Environmental Analysis

Table 3.8-4 summarizes the impact conclusions for each alternative and indicates whether or not significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that would result during construction are addressed in Section 3.16 of this document. As shown in the table, all BART extension alternatives would experience potentially significant impacts related to drainage patterns, flooding hazards, and storm drain capacity. Through identified mitigation measures, all potentially significant impacts would be ameliorated to less-than-significant levels for all alternatives. An explanation of these conclusions is provided under the subsequent impact discussions.

Based on the above methodology, the direct qualitative impacts, direct quantitative impacts, and indirect quantitative impacts that feed into the conclusions have been determined and are summarized in Tables 3.8-5 through 3.8-7. Table 3.8-5 shows the direct qualitative impacts associated with each alternative and associated stations, except for the No Build Alternative, which would have no associated impacts. As shown in this table, Alternatives 1, 1b, 2a, and 3a would require the most creek/drainage crossings (10 to 13 crossings), and Alternatives 3 and 4 would require the least (five crossings). Alternatives 1, 1a, 1b, and 2 would require the most acres of new impervious surface area (approximately 211 to 310 acres) and Alternatives 4 and 5 would require the least (about 72 to 96 acres).

Table 3.8-6 identifies the direct quantitative impacts associated with each alternative and associated stations, except for the No Build Alternative, which would have no associated impacts. As shown in this table, Alternatives 1, 1a, 1b, and 2a would directly affect the most linear feet of streams (about 10,000 to 12,000 feet), and Alternatives 3, 3a, 4, and 5 would affect the least (about 7,170 to 8,830 feet). Alternatives 1, 1a, and 1b would result in about 54 to 57 acres of direct erosion; Alternatives 3 and 3a would result in about 41 acres of direct erosion; Alternatives 2 and 2a would result in about 6 acres of direct erosion; and Alternative 4 and 5 would not directly result in erosion. Alternatives 1a and 1b would directly encroach into the most floodplain areas (61 to 62 acres) and Alternatives 3 and 4 would directly encroach into the least floodplain areas (about 25 acres). Alternatives 1, 1a, 1b, and 2 would directly affect about 302 acres to 328 acres of groundwater; Alternatives 2a, 3, and 3a would affect between 202 and 293 acres of groundwater; and Alternatives 4 and 5 would affect about 140 acres of groundwater. Alternative 1would affect the largest amount of wetlands (12.1 acres); Alternative 2 would affect 9.8 acres of wetlands; and Alternatives 1a, 1b, 2a, 3, 3a, 4, and 5 would affect between 6.5 acres and 8.5 acres of wetlands.

Table 3.8-4
Hydrology and Water Quality Impact Conclusions for the BART to Livermore Extension Alternatives

	Flooding / Drainage Patterns		Erosion and Siltation		Groundwater Impacts		Flood Hazards		Regulatory Requirements	
Alternative	**Impact**	**Mitigated to Less Than Significant?**	**Impact**	**Mitigated to Less Than Significant?**	**Impact**	**Mitigated to Less Than Significant?**	**Impact**	**Mitigated to Less Than Significant?**	**Impact**	**Mitigated to Less Than Significant?**
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 - Greenville East	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
1a- Downtown-Greenville East via UPRR	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
1b- Downtown-Greenville East via SPRR	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
2 - Las Positas	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
2a- Downtown-Vasco	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
3 - Portola	PS	Yes	LTS	NA	PS	Yes	PS	Yes	LTS	NA
3a - Railroad	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
4 - Isabel/I-580	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA
5 - Quarry	PS	Yes	LTS	NA	LTS	NA	PS	Yes	LTS	NA

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact B = Beneficial NA = Not Applicable

Table 3.8-5
Comparison of Qualitative Hydrology Impacts in the BART to Livermore Extension Study Area

Alternative	Streams Affected[a]	Number of Drainage Crossings			New Impervious Area (acres)
		Total[b]	Aerial	Arroyo Mocho[c]	
1 - Greenville East	TC, CWC, CCC, ALP, ALT, UNK	9 3 additional drainages	0	0	309.5
1a - Downtown-Greenville East via UPRR	TC, UNK, ALP, AM, UNK, ALT	12 1 additional drainage	6	5 (all aerial)	211.3
1b - Downtown-Greenville East via SPRR	TC, UNK, ALP, AM, UNK, ALT	13 1 additional drainage	6	5 (all aerial)	211.3
2 - Las Positas	TC, UNK, CWC, CCC, ALP	8 2 additional drainages (aerial)	2	0	253.9
2a - Downtown-Vasco	TC, UNK, ALP, AM, UNK	11	6	5 (all aerial)	177.1
3 - Portola	TC, UNK, CWC, CCC, ALP	5 (1 undercrossing)	0 (1 undercrossing)	0	178.9
3a - Railroad	TC, UNK, ALP, AM, UNK	10	6	5 (all aerial)	155.0
4 - Isabel/I-580	TC, UNK, CWC, CCC, ALP,	5	0	0	95.5
5 - Quarry	TC, UNK, AM, ALP	8	6	5 (all aerial)	71.6

Source: PBS&J, 2009.

Notes:

a. Where TC = Tassajara Creek, CWC = Cottonwood Creek, CCC = Collier Canyon Creek, UNK = unnamed tributary, ALP = Arroyo las Positas, AM = Arroyo Mocho, and ALT = Altamont Creek

b. Some streams are crossed more than once; additional drainages are not tributaries but recognizable culverts/local drainages passing under the alternative

c. These numbers represent the number of times the Arroyo Mocho is crossed by the alternative.

Table 3.8-6
Comparison of Direct Quantitative Hydrology Impacts for the BART to Livermore Extension Alternatives

Alternative	Streams (linear feet)	Lakes/ Ponds (acres)	Erosion (acres)	Floodplain (acres)	Groundwater (acres)	Section 303(d) Affected Waters	Wetlands (acres)
1 - Greenville East	11,393	0	54.4	44.9	328.0	1	12.1
1a - Downtown-Greenville East via UPRR	12,001	0	54.3	61.9	312.4	2	8.5
1b - Downtown-Greenville East via SPRR	12,004	0	57.2	61.3	308.3	2	8.5
2 - Las Positas	9,150	0	5.5	30.0	302.0	1	9.8
2a - Downtown-Vasco	10,017	0	5.8	47.5	292.6	2	6.5
3 - Portola	7,173	0	41.0	25.3	214.4	1	7.7
3a - Railroad	8,832	2.17	40.6	52.0	202.7	2	6.7
4 - Isabel/I-580	7,173	0	0	25.3	132.2	2	7.7
5 - Quarry	8,636	2.17	0	51.1	128.3	2	6.6

Source: PBS&J, 2009.
Notes:
Direct quantitative hydrology impacts are defined by the area within a 25-foot distance from the alternative footprint (including alignments and station facilities associated with the alternative) except where the study area has been extended, primarily along the I-580 corridor.

Table 3.8-7
Comparison of Indirect Quantitative Hydrology Impacts for the BART to Livermore Extension Alternatives

Alternative	Streams (linear feet)	Lakes/ Ponds (acres)	Erosion (acres)	Floodplain (acres)	Groundwater (acres)	Section 303(d) Affected Waters	Wetlands (acres)
1 - Greenville East	16,385	0	72.1	68.7	516.8	1	20.2
1a - Downtown-Greenville East via UPRR	20,501	0.75	74.6	133.1	546.7	2	17.6
1b - Downtown-Greenville East via SPRR	19,610	0.75	80.7	130.3	536.4	2	17.2
2 - Las Positas	17,011	0	12.1	55.0	473.5	1	16.9
2a - Downtown-Vasco	20,967	0.75	14.8	118.6	507.4	2	16.0
3 - Portola	9,358	0	49.1	45.1	382.6	1	8.7
3a - Railroad	17,369	3.14	48.8	123.2	366.4	2	17.7
4 - Isabel/I-580	9,358	0	0	45.1	238.2	2	8.7
5 - Quarry	15,454	3.14	0	119.0	236.5	2	16.5

Source: PBS&J, 2009.
Notes:
Indirect quantitative hydrology impacts may refers to downstream effects such as sedimentation, turbidity, impacts to water-dependent species, changes in flow-rate, erosion because of runoff, and ponding because of changes in flood flows. Potential indirect impacts for hydrology and water quality are defined by the area within a 100-foot distance from the alternative footprint, except where the study area has been extended.

Table 3.8-7 identifies the indirect quantitative impacts associated with each alternative and associated stations, except for the No Build Alternative, which would have no associated impacts. As shown in this table, Alternatives 1a, 1b, and 2a would indirectly affect the most linear feet of streams (about 19,600 feet to 20,500 feet), and Alternatives 3 and 4 affect the least (about 9,400 feet). Alternatives 1, 1a, and 1b would result in about 72 to 81 acres of indirect erosion; Alternatives 3 and 3a would result in about 49 acres of indirect erosion; Alternatives 2 and 2a would result in about 12 to 15 acres of indirect erosion; and Alternative 4 and 5 would have no indirect erosion. Alternatives 1a and 1b would indirectly affect most floodplain areas (130 to 133 acres) and Alternatives 3 and 4 would indirectly affect the least floodplain areas (about 45 acres). Alternatives 1, 1a, 1b, and 2a would indirectly affect between 507 acres to 547 acres of groundwater; Alternative 2 would indirectly affect about 474 acres of groundwater; Alternatives 3 and 3a would indirectly affect 366 to 383 acres of groundwater; and Alternatives 4 and 5 would indirectly affect the least amount of groundwater (between 236 and 239 acres). Alternative 1 would indirectly affect the largest amount of wetlands (20.2 acres); Alternatives 1a, 1b, and 3a would indirectly affect between 17.2 and 17.7 acres of wetlands; Alternatives 2, 2a, and 5 would indirectly affect between 16.0 and 16.9 acres of wetlands; and Alternatives 3 and 4 would indirectly affect 8.7 acres of wetlands.

HY-1 Flooding

Operation of all the BART extension alternatives could alter drainage patterns, require overcrossings of several tributaries, create cut and fill areas for implementation of aerial or subgrade structures, increase the amount of impervious surfaces, and be implemented on or near highly erodible soils. These factors could result in flooding within the study area, a potentially significant impact.

Increased impervious surfaces could increase the amount of runoff flowing into local creeks and drainages or the storm drain system, which may ultimately discharge to local creeks and drainages, depending upon the local soil conditions and drainage improvements. Increased rate and duration of runoff could result in downstream flooding.

Ultimately, surface drainage from all BART extension alternatives flows to the Arroyo Mocho and Arroyo de la Laguna. The Arroyo de la Laguna originates at the confluence of Alamo Canal and Arroyo Mocho. The channel from Bernal Avenue south to Alameda Creek is characterized by a natural stream channel with varying channel widths, depths, and slopes. Back flow from an unimproved channel downstream of Bernal Avenue reduces the flood flow carrying capacity of this reach of the Arroyo de la Laguna. Because flood flow carrying capacity is reduced in this reach of the Arroyo de la Laguna, increased runoff from the alternatives could contribute to flooding within this system.

The BART extension alternatives would increase the amount of impervious surfaces along I-580 and at station/yard locations. Increased impervious surface area could cause or contribute to off-site flooding in the local storm drain system, creeks, and channels. Except for aerial structures and subways, at-grade tracks would be constructed in crushed rock ballast with

a subsurface drainage system. Although the trackwork would not increase the amount of impervious surfaces and therefore, the rate and/or duration of stormwater runoff, the subsurface drainage system could more efficiently convey percolating rainfall to the storm drain system and local creeks or channels resulting in a higher rate and amount of rainfall reaching the local drainage system, streams, and channels.

Furthermore, expanded or new, non-aerial structures that might be required to cross creeks and local drainages could contribute to fill of these drainage features and impede or restrict flows and flood storage capacity. Fill of wetlands would also reduce flood storage capacities. Restricted flows and reduced flood storage capacity could cause or contribute to downstream flooding.

Along the I-580 corridor, pavement in the median would be removed and replaced with the crushed-rock ballasted-track with a subsurface drainage system. This would require widening of the I-580 corridor in several locations to continue to support all existing traffic lanes and the HOV lanes in each direction. Because this would involve work within the Caltrans right-of-way and modifications to Caltrans structures, compliance with the Caltrans Statewide Permit would be required for activities within the I-580 right-of-way. Caltrans would require a Hydraulics and Hydrology Report to ensure that stream crossings do not substantially increase the water surface elevation (flooding potential) within these drainage features. Additionally, a Location Hydraulics Study and Floodplain Encroachment Summary would be required to ensure that flood storage and floodplain functions are not adversely affected.

If permanent groundwater dewatering is required to prevent on-site flooding (e.g., in subway sections), these discharges to the local storm drain system could cause or contribute to downstream flooding. Any permanent groundwater dewatering would require an individual WDR/NPDES Permit with limitations on discharge flow rates. However, these flow rates may not adequately address potential increases in system peak flows or duration and potential downstream flooding effects.

Therefore, the potential for significant flooding impacts depends primarily upon the amount of new impervious surfaces created, the adequacy of creek/drainage feature crossings to convey flows, the amount of wetlands filled, the conveyance characteristics of the track subgrade drainage system, and whether permanent groundwater dewatering would be required. Also, local soil conditions and future drainage improvements that could be in place would affect the flow rate analysis and would be part of a more detailed project-specific analysis after a BART extension alternative has been selected.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Operational effects of these projects due to flooding within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there

would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new hydrology or water quality impacts.

Alternative 1 – Greenville East. Table 3.8-5 indicates that an estimated 310 acres of new impervious surface area would be required to accommodate this alternative. This includes implementation of the two associated stations, maintenance yard, and widening of I-580 to accommodate this alternative in the I-580 right-of-way. Although station and maintenance yard new impervious surfaces are 'worst case' scenarios (because the entire footprint area is conservatively assumed to be paved), new impervious surface area associated with this alternative is nonetheless expected to substantially increase the amount of runoff from the alternative. Nine non-aerial creek crossings and three other local drainage crossings would be expanded/created that could create fill and/or otherwise impede flow conveyance within drainage features. Subgrade drainage of the track system, as required by BART, could more efficiently convey flow from the track areas to the local storm drain system (piped flow compared to overland flow that has a chance to attenuate or infiltrate), increasing the peak storm flow rates and causing of contributing to downstream flooding.

About 12.1 acres of wetlands (see Table 3.8-6) would be directly impacted and 20.2 acres of wetlands (see Table 3.8-7) would be indirectly impacted. This loss of flood storage capacity, alone, would not likely result in substantial flood effects, but would contribute to overall adverse flooding conditions.

The potential for reduced flood storage capacity, restricted drainage feature flow conveyance, higher efficiency track drainage system, and increased impervious area could all have a substantial effect on off-site flooding. No on-site flooding would be expected with implementation of BART Facility Standards and it is not expected that permanent groundwater dewatering would be required.

Increased impervious surfaces and higher efficiency track drainage system could increase the amount of stormwater runoff to the storm drain system and local creeks. Although the HM Standard, as described in the Hydromodification Management Plan (HMP) prepared by the Alameda County Clean Water Program,[56]would require that flows are maintained for low and moderate storm events (10 percent of the 2-year storm event up to the 10-year storm event) for discharge to most creeks within the study area, there is no standard for discharges to the local storm drain system and for storm events above the 10-year storm event. Consequently, the storm drain system capacity could be exceeded for large storm events (greater than the 10-year storm event) and cause or contribute to flooding in the storm drain system. Also, as noted above, existing constraints in the Arroyo de la Laguna at Bernal Avenue render any increases in flood flows potentially significant. Because it is not yet known where the site drainage would discharge under this alternative, the capacity of existing systems, the total amount of

[56] Alameda County Public Works Agency. Alameda County Clean Water Program. Hydrograph Modification Management Plan. May 15, 2005.

runoff, detention features that may be incorporated, and other drainage conditions, the increased flows on storm drain facilities would be potentially significant.

Creek and drainage crossings would be designed to adequately convey flood flow from the Caltrans right–of-way and runoff from stations and the maintenance yard, so that this alternative would not cause or contribute to substantial up- or down-stream flooding. In addition, widening of the I-580 corridor would conform to Caltrans protocols for conveyance of flood flows.

Wetland mitigation, as required by a CWA 404 Permit or by the RWQCB, would not necessarily restore the local floodplain storage capacity. Impacts associated with reduced floodplain storage would therefore be potentially significant.

Alternative 1a – Downtown-Greenville East via UPRR. Table 3.8-5 indicates that an estimated 211 acres of new impervious surface area would be required to accommodate this alternative. This alternative includes implementation of the two stations and a maintenance yard.

Compared to Alternative 1, fewer non-aerial creek crossings (six) and other local drainage crossings (one) would be expanded/created, features that would require fill and/or otherwise impede flow conveyance within affected drainage features. Similar to Alternative 1, subgrade drainage of the track system, as required by BART, could more efficiently convey flow from the track areas to the local storm drain system (piped flow compared to overland flow that has a chance to attenuate), increasing the peak storm flow rates and causing of contributing to downstream flooding.

About 8.5 acres of wetlands (see Table 3.8-6) would be directly impacted and approximately 17.6 acres of wetlands (see Table 3.8-7) would be indirectly impacted. This loss of flood storage capacity would contribute to overall adverse flooding conditions.

As with Alternative 1, the potential for reduced flood storage capacity, restricted drainage feature flow conveyance, higher efficiency track drainage system, and increased impervious area could all have a substantial effect on off-site flooding. As noted above, existing constraints in the Arroyo de la Laguna at Bernal Avenue mean that any increases in flood flows would be substantial. No on-site flooding would be expected with implementation of the BART Facility Standards and it is not expected that permanent groundwater dewatering would be required.

As noted for Alternative 1, creek and drainage crossings would be designed to adequately convey flood flow from the Caltrans right-of-way and runoff from stations and the maintenance yard, so that this alternative would not cause or contribute to substantial up- or down-stream flooding.

As under Alternative 1, wetland mitigation, as required by a CWA 404 Permit or by the RWQCB, would not necessarily restore the local floodplain storage capacity. Impacts associated with reduced floodplain storage would therefore be potentially significant.

Alternative 1b – Downtown-Greenville East via SPRR. Potential flooding impacts under this alternative would be the same as for Alternative 1a, except one more creek crossing would occur. Impacts would be potentially significant.

Alternative 2 – Las Positas. Potential flooding impacts under this alternative would be similar to those described under Alternative 1, except that three fewer non-aerial creek crossings would be required, one less local drainage crossings would be required, less new impervious surface area would be created, and less direct and indirect impacts to wetlands would occur for this alternative. While the impacts would be less than described for Alternative 1, they would remain potentially significant.

Alternative 2a – Downtown-Vasco. Potential flooding impacts under this alternative would be similar to those described under Alternative 1a, except one less creek crossing and no local drainage crossing would be required for this alternative, less direct and less indirect impacts to wetlands would occur, and substantially less new impervious surface area would be created. Although Alternative 2a would have far fewer potential flooding impacts than Alternative 1, the impacts for this alternative would still be potentially significant.

Alternative 3 – Portola. Table 3.8-5 indicates that an estimated 179 acres of new impervious surface area would be required to accommodate this alternative. Specifically, Alternative 3 would require fewer non-aerial creek crossings (eight) and no other local drainage crossings would be expanded/created that would create fill and/or otherwise impede flow conveyance within drainage features. Similar to Alternative 1, the subgrade drainage of the track system, as required by BART, could more efficiently convey flow from the track areas to the local storm drain system (piped flow compared to overland flow that has a chance to attenuate), increasing the peak storm flow rates and contributing to downstream flooding.

About 7.7 wetlands (see Table 3.8-6) would be directly impacted and about 8.7 acres of wetlands (see Table 3.8-5) would be indirectly impacted. Loss of wetlands for this alternative could contribute to a substantial loss of flood storage capacity and overall adverse flooding conditions.

The potential for reduced flood storage capacity in creeks and drainages, restricted drainage feature flow conveyance, higher efficiency track drainage system, and increased impervious area, compared to existing conditions, could all have a substantial effect on off-site flooding. As noted above, existing constraints in the Arroyo de la Laguna at Bernal Avenue render any increases in flood flows a substantial effect. No on-site flooding would be expected with implementation of BART Facility Standards.

Like the previous alternatives, under Alternative 3, creek and drainage crossings would be designed to adequately convey flood flow from the Caltrans right-of-way and runoff from

stations and the maintenance yard, so that this alternative would not cause or contribute to substantial up- or down-stream flooding.

Furthermore, Alternative 3 would cross under the Arroyo las Positas and proceed below grade from just after the Isabel/I-580 Station to the Downtown Livermore Station. Groundwater levels in the upper aquifer in this area are expected to occur within 0- to 30- feet of the bottom of the subway box. Consequently, permanent groundwater dewatering or floodproofing would be required. If permanent groundwater dewatering is implemented, discharges could cause or contribute to downstream flooding in the storm drain system, and ultimately, in the Arroyo de la Laguna. Discharge restrictions in the individual WDR/NPDES Permit would not necessarily account for downstream flooding impacts. Therefore, a potentially significant impact could occur.

Alternative 3a – Railroad. Potential flooding impacts under this alternative would be the similar to those identified under Alternative 1a, except two fewer creek crossings and no local drainage crossing would be required for this alternative, less direct impacts and slightly greater indirect impacts to wetlands would occur, and substantially less new impervious surface area would be created. Flooding impacts under Alternative 3a would be potentially significant.

Alternative 4 – Isabel/I-580. Potential flooding impacts under this alternative would be similar to those identified for Alternative 1, except that four less creek crossings and no local drainage crossings would be required, about 7.7 acres of wetlands would be directly impacted and about 8.7 acres would be indirectly impacted, and substantially less new impervious surface area would be created. Even though the flooding impacts would be substantially less than the other alternatives, the impacts of Alternative 4, compared to existing conditions, would be potentially significant.

Alternative 5 – Quarry. Potential flooding impacts under this alternative would be similar to those described for Alternative 1a, except that four less creek crossings and no local drainage crossing would be required, substantially less new impervious surfaces would be created, and slightly less direct and indirect impacts to wetlands would occur. Potential flooding impacts would nonetheless be potentially significant.

MITIGATION MEASURES. Mitigation Measure HY-3.1 under all alternatives and Mitigation Measure HY-3.2 under Alternative 3 would ensure that potential discharges do not cause or contribute to flooding and would reduce impacts to less-than-significant levels. (LTS)

HY-1.1 *Engineer Storm Drain System to Accommodate Design Flows*. BART shall prepare a Hydraulic and Hydrology Study for the entire project to determine runoff rates and durations for the existing and proposed drainage system discharging into any local drainage system or natural drainage feature. BART shall submit the Hydraulic and Hydrology Study to Caltrans, the cities of Livermore and Pleasanton, Zone 7, and ACCWP for review. The jurisdictional agencies' engineering staff shall review the project drainage design. BART shall evaluate the

comments and any proposed revisions for potential incorporation into the project design, as appropriate.

HY-1.2 Limit Permanent Groundwater Dewatering Operations (Alternative 3). If permanent groundwater dewatering is required, BART shall include in the Hydraulic and Hydrology Study required by Mitigation Measure HY-1.1 an assessment of the groundwater dewatering discharge effects on the downstream receiving storm drain system and receiving waters. Based on this Hydraulic and Hydrology Study, a Dewatering Operations and Management Plan (DOMP) shall be prepared to limit dewatering discharges such that dewatering shall not cause or contribute to downstream flooding of the storm drain system and creeks, for up to the 100-year storm event. This DOMP shall include the maximum allowable discharge rate, maximum allowable discharge rates and volumes for dry season and wet season, allowable discharge rates for storm events, and weather forecasting procedures to prevent excess discharges during storm events. The DOMP shall also include information pertaining to the required dewatering rates to ensure operational safety of this alternative during high water table/storm event conditions. If necessary, detention/storage features shall be evaluated and may be incorporated into the design and implemented to allow for dewatering during high water table/storm event conditions and to prevent discharges that could cause or contribute to downstream flooding. Both the Hydraulic and Hydrology Study and the DOMP shall be submitted to Zone 7 for review and approval prior to the beginning of construction.

HY-2 Erosion and Siltation During Operations

Operation of the BART extension alternatives could alter drainage patterns, require overcrossings of several tributaries, create cut and fill areas for implementation of aerial or subgrade structures, increase the amount of impervious surfaces, and be implemented on or near highly erodible soils. These factors could result in erosion and siltation. The potential for the BART extension alternatives to cause or contribute to long-term erosion and siltation depends upon the amount of fill/unstable slopes; increases in impervious surface area, and therefore, increases in stormwater runoff to susceptible creeks/drainages; and the amount of highly erodible soils impacted.

Increased impervious surfaces could increase the amount of runoff flowing into local creeks and drainages or the storm drain system, which may ultimately discharge to hydrograph modification susceptible creeks. Increased rate and duration of runoff could result in bed or bank erosion in susceptible drainage features.

During operation of the BART extension alternatives, any exposed surfaces and steep, unstable slopes would be susceptible to erosion and off-site sediment transport. Additionally, if stormwater runoff to susceptible creeks is increased, it could cause or contribute to off-site bed and bank erosion. Portions of creeks within the study area are already constrained by

accumulated sediment and additional contributions of sediment to these creeks from the BART extension alternatives would be potentially significant. Non-aerial crossings of creeks and channels would also disturb beds and banks, potentially remove riparian vegetation, and destabilize creeks rendering them susceptible to erosion.

Compliance with the Construction General Permit, the Municipal NPDES Permit, and the associated Alameda Countywide Clean Water Program require implementation of permanent erosion and sediment controls. Where new impervious surface area would be created and drainage is to a susceptible creek or channel, the Hydromodification Management (HM) Standard which requires on-site, regional, or in-stream flow controls to ensure that stormwater runoff from the alternative footprint to the susceptible creeks do not cause or contribute to downstream bed or bank erosion, would apply. The Hydromodification Management Standard is described in the Hydrograph Modification Management Plan prepared by the Alameda Countywide Clean Water Program in partial fulfillment of requirements in its third five-year municipal stormwater discharge permit. Key provisions of this Hydrograph Modification Plan have been included in the Municipal NPDES Permit (Order No. R2-2007-0025, NPDES Permit No. CAS0029831 Amendment Revising Order No. R2-2003-0021).[57] Thus, the HM Standard would prevent substantial creek bed and bank erosion by the higher force flows. BART Facility Standards for slope stability ensure that cut and fill areas would be adequately stabilized to prevent substantial erosion and off-site sediment transport. Additionally, Section 01 71 13 (Mobilization, 1.09 – Demobilization) and Section 31 11 00 (Clearing and Grubbing, 1.06 - Jobsite Conditions) of the BART Facility Standards require restoration of the construction area after completion of construction activities. BART Facility Standards Section 32 84 00 (Planting Irrigation) and Section 32 90 00 (Planting) ensures adequate establishment of permanent vegetative cover to protect surfaces from erosion.

Work within creeks, as required for implementation of new or expanded creek crossings, would require compliance with a CWA 404 Permit, CWA Section 401 Water Quality Certification, and a Streambed Alteration Agreement. These permits/requirements would include post-construction BMPs to permanently protect/restore creeks during and following construction impacts. Compliance with these regulations would minimize destabilization of creek beds and banks and ensure adequate protection is implemented following construction activities.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Operational effects of these projects due to erosion and siltation within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new erosion or siltation impacts.

[57] Alameda County Public Works Agency. Alameda County Clean Water Program. Hydrograph Modification Management Plan. May 15, 2005

All BART Extension Alternatives. During operation of the BART extension alternatives, highly erodible soils would be directly and indirectly impacted (see Tables 3.8-6 and Table 3.8-7, respectively). The alternatives would also expose soil surfaces throughout the study area and an engineered fill area would be required (e.g., to elevate tracks to the Greenville East Station for Alternatives 1, 1a, and 1b). However, compliance with existing regulations and requirements (Construction General Permit, Municipal NPDES Permit, Caltrans oversight, City and County Codes and Ordinances for watercourse protection and grading and erosion) and BART Facility Standards would result in disturbed areas being revegetated or otherwise permanently protected from erosion. Fill slopes would be constructed to ensure stability and be protected from erosion following construction activities. Implementation of water quality BMPs, as required by the Municipal NPDES Permit, would also reduce the potential for off-site erosion and off-site transport of sediment by implementation of erosion and sediment controls. Therefore, disturbed surfaces and engineered fill areas would not be expected to cause or contribute to erosion and siltation during operation of any BART extension alternative.

Each of the alternatives would create substantial amounts of new impervious surface area contributing to greater stormwater runoff and directly and indirectly impact (see Tables 3.8-6 and 3.5-7), which could cause or contribute to erosion and siltation in stream and channels. Existing BART Facility Standards, compliance with regulatory requirements, and implementation of the HM Standard would ensure that potential effects are not substantial and impacts of increased stormwater runoff would be less than significant.

HY-3 Groundwater Quality, Recharge, and Depletion of Groundwater Resources

The potential for reductions in groundwater recharge during operation primarily depends on the amount of new impervious surface area created. An increase in the amount of impervious surface area with implementation of the BART extension alternatives could reduce the recharge potential within the Livermore-Amador Valley Groundwater Basin, and consequently, reduce groundwater supplies. Normal year groundwater recharge of the Main Basin by direct precipitation is only about 3,700 acre-feet per year, or about 18.7 of total recharge.[58] As noted previously in the "Existing Conditions," the Main Basin (the main water supply basin) encompasses an area of about 17,000 acres and recharge is primarily from stream recharge via the Arroyo Mocho and Arroyo del Valle, as well as recharge from the Chain of Lakes. Inflows from the Fringe Basins are only about 1,000 acre-feet per year (AFY) (five percent). The maximum increase in impervious area for the entire study area for each alternative would be less than two percent of the Main Basin. However, the study area overlays both the Main Basin and Fringe Basins; therefore, not all of the new impervious area would impede recharge of the Main Basin water supply aquifer. The worst case Main Basin recharge impedance by the BART extension alternatives would be about 67 AFY. Additionally, the new impervious area associated with the BART extension alternatives would contribute to runoff that is

[58] Zone 7 Water Agency. *Main Basin Groundwater Hydrologic Inventory, 1974-2003,* Table 1 Groundwater Supply and Utilization Main Basin Hydrologic Inventory Acre-Feet 2003 Water Year, March 12, 2004.

eventually discharged to local streams and creeks. Because groundwater recharge is primarily from stream beds, the entire 67 AFY would not be lost from groundwater recharge.

The major source of pollution in stormwater runoff from the BART extension alternatives, which could infiltrate to groundwater, would be contaminants that have accumulated on rooftops and other impervious surfaces, such as parking lots, pedestrian walkways, aerial guideways, and off-site road improvements. Pollutants associated with the maintenance facilities could be transported to surface waters during storm events or otherwise enter the storm drain system either intentionally or accidentally. Pollutants associated with the operational phase of the BART extension alternatives would include nutrients and pesticides (if landscaping is incorporated into the alignment corridor), oil and grease, metals, solvents (e.g., degreasing chemicals), paints, and other pollutants associated with the maintenance facility.

Implementation of stormwater quality BMPs, as required by the Municipal Stormwater NPDES Permit and Industrial General Permit, would substantially reduce the amount of pollutants in stormwater runoff from the BART extension alternatives. Additionally, as noted above, a 10-foot separation from the groundwater table presumptively poses no substantial risk to groundwater quality. The entire built out area that could infiltrate polluted stormwater would be more than 10 feet above the upper groundwater basin aquifer. Therefore, with existing regulatory requirements, potential degradation of groundwater quality during operation would be less than significant.

Only Alternative 3 would result in a potentially significant impact related to permanent dewatering from new pervious area; however, this impact would be reduced to less than significant with mitigation. A more detailed description of these groundwater impacts is provided for each of the alternatives below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Construction and operational effects of these projects on groundwater within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on groundwater resources.

Alternative 1 – Greenville East. This alternative would directly impact 328 acres of the groundwater basin (Table 3.8-6) and indirectly impact 517 acres (Table 3.8-7). Also, about 310 acres of new impervious surface area would be created. No permanent groundwater dewatering is expected. As noted above, existing regulatory requirements would include implementation of stormwater quality BMPs to prevent substantial degradation of groundwater quality by pollutants in stormwater runoff or percolating rainfall. Groundwater below this alternative footprint is more than 10 feet bgs (10-foot separation), which presumptively poses no risk for groundwater pollution. Additionally, BART Facility Standards would prevent

rainfall and stormwater run-on into excavations, which might be closer to the groundwater table than the 10-foot separation during construction. New impervious surface area created by this alternative would not be substantial in comparison to the total surface recharge area in the groundwater basin, and the Livermore Valley Groundwater Basin is primarily recharged through streams and the Chain of Lakes as opposed to direct percolation of precipitation. Therefore, groundwater impacts would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Potential groundwater impacts associated with this alternative would be similar to Alternative 1, except there would be less direct and more indirect groundwater basin area impacted and substantially less new impervious surface area (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations and the BART Facility Standards would ensure that this impact would be less than significant.

Alternative 1b – Downtown-Greenville East via SPRR. Potential groundwater impacts associated with this alternative would be similar to Alternative 1a, except there would be less direct and indirect groundwater basin area impacted (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations and BART Facility Standards would ensure that this impact would be less than significant.

Alternative 2 – Las Positas. Potential groundwater impacts associated with this alternative would be similar to Alternative 1, except there would be less direct and indirect groundwater basin area impacted and substantially less new impervious surface area (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations would ensure that this impact would be less than significant.

Alternative 2a – Downtown-Vasco. Potential groundwater impacts associated with this alternative would be similar to Alternative 1a, except there would be substantially less new impervious surface area and less direct and indirect groundwater basin area impacted (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations and BART Facility Standards would ensure that this impact would be less than significant.

Alternative 3 – Portola. Potential groundwater impacts associated with this alternative would be similar to Alternative 1, except there would be substantially less direct and indirect groundwater basin area impacted, substantially less new impervious surface area (see Tables 3.8-6 and 3.8-7). Permanent groundwater dewatering could be implemented for the below-grade portion from just past the Isabel/I-580 Station to the Vasco Road Station. As with Alternative 1, existing regulations and BART Facility Standards would ensure that groundwater recharge and groundwater quality impacts remains less than significant; however, reduced groundwater supplies by dewatering operations would be potentially significant.

Alternative 3a – Railroad. Potential groundwater impacts associated with this alternative would be similar to Alternative 1, except there would be substantially less direct and indirect groundwater basin area impacted and substantially less new impervious surface area (see

Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations would ensure that this impact would be less than significant.

Alternative 4 – Isabel/I-580. Potential groundwater impacts associated with this alternative would be similar to Alternative 1a, except there would be substantially less direct and indirect groundwater basin area impacted and substantially less new impervious surface area (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations and BART Facility Standards would ensure that this impact would be less than significant.

Alternative 5 – Quarry. Potential groundwater impacts associated with this alternative would be similar to Alternative 1a, except there would be substantially less direct and indirect groundwater basin area impacted and substantially less new impervious surface area (see Tables 3.8-6 and 3.8-7). As with Alternative 1, existing regulations and BART Facility Standards would ensure that this impact would be less than significant.

MITIGATION MEASURES. During operation of Alternative 3, permanent groundwater dewatering for subgrade subway sections could be implemented and contribute to depletion of groundwater resources. Implementation of Mitigation Measure HY-1.2, described above, would limit permanent groundwater dewatering and would reduce potentially significant groundwater impacts of Alternative 3 to less-than-significant levels. (LTS)

HY-4 Encroachment into Flood Hazard Areas and Flood Flow Redirection

Portions of the BART extension alternatives are located in a flood hazard zone and dam failure inundation areas, as depicted on Figure 3.8-3 and Figure 3.8-4. As discussed in the "Existing Conditions" above, portions of the FEMA Special Flood Hazard Areas (SFHA), identified on Figure 3.8-3, have been effectively removed from the floodplain, but the map revision process has not yet been completed. Additionally, implementation of the Livermore Flood Protection Improvements would remove additional portions of the study area from flood hazard areas.

No proposed stations or maintenance yards are located within a FEMA-defined Special Flood Hazard Area.[59] The study area is not located within a floodway; therefore, aerial structures associated with the BART extension alternatives would not be expected to impede or redirect flood flows. A portion of the Isabel/Stanley Station and a portion of the Greenville maintenance yard are located within an area subject to flooding during a 500-year flood event (0.2 percent chance of occurring in any given year). (Impact HY-1 addresses the potential impact associated with the BART extension alternatives creek crossings that could impede or redirect flood flows.)

The study area is located within the inundation zone from failure of the Del Valle Dam and Patterson Reservoir Dam. Both dams are under the jurisdiction of the DWR, Division of Safety of Dams. Existing dams under DWR jurisdiction are periodically inspected to ensure

[59] An area subject to flooding during a 100-year flood event or with one percent chance of occurring in any given year.

adequate maintenance and to direct the owner to correct any deficiencies found. To comply with the California Water Code and the California Code of Regulations, DWR is required to retain a consulting board to review (1) the adequacy of the design of any dam or reservoir DWR proposes to construct; and (2) the safety of the completed construction, including the terms and conditions for the Certificate of Approval. These provisions require DWR to retain a board of three consultants to meet at least once every five years to review the operational performance of DWR-owned dams, and more often when consulting on new dams. The board of consultants independently reviews and assesses safety conditions of State Water Project (SWP) dams. Regular inspections and required maintenance of the dams substantially reduce the potential for catastrophic failure. The Patterson Reservoir has about 100 acre-feet of storage and the Del Valle Lake averages about 44,000 acre-feet of storage.

The Del Valle Dam failure inundation study, conducted in 1974, was likely performed using the 'worst-case' situation; the situation where the dam failed from top to bottom when the reservoir was at capacity. A full reservoir could only occur during the 500-year storm event because the Del Valle Dam reservoir system was designed for up to the 500-year storm event[60] (0.2 percent chance of occurring in any given year). If the 500-year storm event occurs, all the down-gradient areas, including the City of Pleasanton and portions of the City of Livermore, would be flooded because the flood channel conveyance capacities within the region are for the 100-year storm event or smaller. Additionally, the maximum capacity of the Del Valle Dam reservoir is 77,106 acre-feet, but its operating capacity is typically about 50 percent or less of the maximum capacity[61] in order maintain flood control storage capacity. Furthermore, the Del Valle Dam is fairly new (1969), has never spilled (exceeded storage capacity), and was designed with a wide base for a dam of its size;[62] therefore, it is unlikely to fail to its base. Consequently, potential for flooding of the BART extension alternatives from dam failure inundation is remote and impacts are less than significant.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects due to flood hazards and flood flow redirection within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no impacts related to encroachment into flood hazard areas or redirection of flood flows.

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60 David Lunn, Zone 7 Senior Water Engineer, Personal Communication, January 23, 2008.

61 California Department of Water Resources. Bulletin 132: Management of the California State Water Project, Chapter 8 Water Supply. p. 109; and David Lunn, Zone 7 Senior Water Engineer, Personal Communication with PBS&J, January 23, 2008.

62 Jon H. Wright, Area 2 Engineer, Division of Safety of Dams. Personal Communication with PBS&J, January 23, 2008

All BART Extension Alternatives. Potential flood hazards associated with the BART extension alternatives include direct and indirect floodplain impacts floodplain impacts (see Table 3.8-6 and Table 3.8-7, respectively). While the amount of encroachment into floodplains vary (less for those alternatives that use an aerial alignment through the flood hazard area along El Charro Road, for example), all of the BART extension alternative would result in potentially significant impacts. Direct encroachment is anticipated to be between 25 to 62 acres. However, some improvements may have physically removed areas from the floodplain that are not yet recorded, and planned improvements may remove other areas from the floodplain. Nonetheless, floodplain encroachment may increase the flood height because of physical barriers and may present a risk to human health and safety resulting in potentially significant impacts.

MITIGATION MEASURES. The mitigation strategies described below would substantially lessen or avoid floodplain encroachment impacts, and reduce impacts to less than significant. (LTS)

HY-4.1 *Design Facilities to Avoid/Reduce Flood Hazards*. BART shall determine the actual extent of flooding and flood elevations within the selected alternative footprint using the latest FEMA maps and available Hydraulic and Hydrology Studies. If necessary, BART shall conduct additional Hydraulic and Hydrology Studies in accordance with FEMA requirements to determine the actual extent of flooding and flood elevations in comparison to track and station/yard elevations. Based on the floodplain elevations, BART shall evaluate and implement methods of reducing the footprint of essential facilities in floodplains to the extent feasible. Options to be considered include elevating the track segments and other structures and utilities in the floodplains above the flood elevation, or anchoring and floodproofing. Where floodplain fill/disturbance occurs, the floodplain functions shall be restored to be equivalent to its prior function to the extent feasible.

HY-5 Violation of Legal Requirements, Water Quality Standards, or Waste Discharge Requirements

The BART extension alternatives would be subject to waste discharge requirements including the Municipal Stormwater NPDES Permit, Industrial General Permit, and potentially an individual WDR or the Treated Groundwater Dewatering General WDR, which may be required for permanent groundwater dewatering activities, and the Master Water Recycling Permit (RWQCB Order No. 93-159) and associated Salt Management Plan,[63] if recycled water is used. Additionally, because the BART extension alternatives would also occur within the Caltrans right-of-way, oversight by Caltrans would be required within these areas and compliance with conditions of the Caltrans Statewide Permit would be required. Discharges from an alternative would be subject to the water quality standards as set forth in the Basin Plan, including any adopted TMDLs.

[63] The Salt Management Plan was prepared for compliance with the Master Water Recycling Permit and approved by the SFBRWQCB in 2004.

The major source of pollution in stormwater runoff from the BART extension alternatives would be contaminants that have accumulated on rooftops and other impervious surfaces, such as parking lots, pedestrian walkways, aerial corridors, and off-site road improvements, prior to connecting to the storm drain system. Pollutants associated with the maintenance facilities could also be transported to surface waters during storm events or otherwise enter the storm drain system either intentionally or accidentally. Filling of wetlands would also contribute to degradation of surface water quality.

Pollutants associated with the operation of the BART extension alternatives would include nutrients and pesticides (if landscaping is incorporated into the alignment corridor), oil and grease, metals, solvents (e.g., degreasing chemicals), paints, gross pollutants (e.g., trash and debris) including bacteria, and other pollutants associated with the maintenance facilities. Operation of the BART train cars along the alignment would not be expected to cause or contribute to substantial additional pollutant sources because the vehicles would be powered by electricity, and would generate only a small increase in oil, grease, and metals that would likely be less than the amounts generated by individual vehicles to support the same number of passengers. Operation of the stations could contribute oils and grease from leaking vehicles, accumulated pollutants deposited on the impervious surfaces, and gross debris (e.g., trash and litter).

Nutrients that may be present in post-construction stormwater include nitrogen and phosphorous from fertilizers applied to landscaping, from atmospheric deposition, and from the use of recycled water, if recycled water is used. Excess nutrients can impact water quality by promoting excessive and/or a rapid growth of aquatic vegetation, which reduces water clarity and results in oxygen depletion. Pesticides can also enter stormwater after application on landscaped areas of the proposed BART extension alternatives. Pesticides are generally toxic to aquatic organisms and can bioaccumulate in larger species such as birds and fish. Oil and grease can enter stormwater from vehicle leaks, traffic, and maintenance activities. Detergents and other chemicals associated with maintenance activities could also spill or be deposited on impervious surfaces and available for transport in stormwater runoff. Metals may enter stormwater as surfaces corrode, decay, or leach. Potential gross pollutants associated with operational activities include clippings associated with landscape maintenance, street/parking lot litter, and pathogens (bacteria). Pathogens (from pets, wildlife, and human activities) can impact water contact recreation and non-contact water recreation.

Both the Arroyo Mocho and Arroyo las Positas within the study area have been listed (Section 303(d) list) as impaired by urban pesticides and a TMDL is in effect. Discharges of pesticides to these creeks would result in a potentially significant impact. The proximity of alternative features to these creeks and use of pesticides during construction would affect the potential for violation of the TMDL or other regulatory requirements.

BART Facility Standards include restrictions and requirements for herbicide and nutrient applications, as well as watering conditions and plant stock (Section 32 90 00 Planting). These standards would prevent substantial stormwater quality pollution during plant establishment for

site restoration and revegetation of disturbed areas and landscaped areas. Additionally, irrigation systems must be implemented and controlled to provide adequate irrigation without excessive application that could leach to groundwater and without resulting in overspray or runoff to surface water (BART Facility Standards Section 32 84 00 Planting Irrigation). Consequently, effects of landscape management on violation of water quality standards would not be substantial.

The Fringe Basins already experience an excessively high salt content and the Main Basin salinity must be protected in accordance with the Salt Management Plan. Use of recycled water could increase salt loading to the Main Basin and cause or contribute to groundwater quality degradation, depending upon the amount of recycled water used, application management, and final quality of the recycled water. Zone 7 would ensure that recycled water use would be implemented in accordance with the Salt Management Plan, which was approved by the SFBRWQCB as in compliance with the Master Water Recycling Permit. The Master Water Recycling Permit and associated Salt Management Plan is considered protective of groundwater quality by the SFBRWQCB. Therefore, there would be no violation of this WDR or water quality standards.

Operation of maintenance facilities would require coverage under the General Industrial Permit, which includes requirements for preparation and implementation of a SWPPP, containment of hazardous materials, spill prevention and control, and monitoring and reporting requirements to ensure that stormwater quality is protected and this WDR is not being violated.

Additionally, pursuant to the Alameda Countywide Clean Water Program (ACCWP), the BART extension alternatives would be required to implement and maintain post-construction BMPs to reduce pollutants in stormwater runoff. These would include both source control and treatment BMPs. The Encroachment Permit, issued by Caltrans and required for implementation of the I-580 portion of the alternatives, would require post-construction stormwater quality BMPs for all drainage from portions of the BART extension alternatives within the I-580 corridor. Additionally, Zone 7 manages stormwater conveyances and flood channels within the region and requires that activities within these channels, including discharges of stormwater, obtain an encroachment permit.

The SFBRWQCB has identified the ACCWP as in compliance with the Municipal Stormwater NPDES Permit and the permit requirements are considered protective of water quality. Continued monitoring by the ACCWP and SFBRWQCB, in addition to the CWA Section 305(b) process for assessing water quality impairment,[64] would ensure that TMDLs are effective or modified, as appropriate, and future impairments are identified and minimized. Therefore, through compliance with the Construction General Permit, Industrial General Permit, and Muncipal Stormwater NPDES Permit, the BART extension alternatives would not violate surface water quality standards.

[64] CWA Act Section 305(b) requires assessment of water quality every two years to identify water features not meeting current water quality standards and identifying those for which a TMDL would be required.

The potential for BART extension alternatives to violate WDRs or water quality standards would depend upon the amount of impervious surface created (accumulation and runoff of pollutants), the proximity to surface water features and impaired water bodies, and the amount of wetlands filled.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including modification of I-580 to accommodate high occupancy vehicle lanes. Water quality standards and waste discharge Impacts of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no development under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts that could cause a violation of an applicable water quality standard.

Alternative 1 – Greenville East. Table 3.8-5 indicates that an estimated 310 acres of new impervious surface area would be required to accommodate this alternative. New impervious surface area associated with this alternative is expected to substantially increase the amount of runoff from the alternative and amount of pollutants in stormwater runoff. Additionally, this alternative directly impacts the Arroyo las Positas, which is listed as impaired by urban pesticides and for which a TMDL is in effect (see Table 3.8-6). This alternative would also include nine creek crossings, four of which are crossings of the impaired Arroyo las Positas (see Table 3.8-5). The Isabel/I-580 Station is near the Arroyo las Positas and discharges from this area could more readily contribute pollutants, including urban pesticides, to this surface water. The Greenville maintenance yard is located near Altamont Creek.

As mentioned above, BART would comply with requirements of the Construction General Permit, Municipal Stormwater NPDES Permit, Industrial General Permit, and potentially an individual WDR, if required for construction dewatering. The Treated Groundwater Dewatering General WDR would not be applicable because no permanent treated groundwater dewatering is expected because no deep structures are proposed. Compliance with WDRs would reduce potential impacts associated with increased pollutants in stormwater runoff from impervious surfaces. Therefore, the alternatives would be consistent with applicable legal requirements related to hydrology or water quality and would not cause a violation of state water quality standards.

About 12.1 acres of wetlands (see Table 3.8-6) would be directly impacted and 20.2 acres of wetlands (see Table 3.8-7) would be indirectly impacted. Wetland mitigation, as required by a CWA 404 Permit or by the SFBRWQCB, would reduce impacts to wetlands to less-than-significant levels.

Alternative 1a – Downtown-Greenville East via UPRR. Table 3.8-5 indicates that an estimated 211.3 acres of new impervious surface area would be required to accommodate this alternative, which is substantially less than Alternative 1. Nonetheless, new impervious surface area associated with this alternative is expected to substantially increase the amount of runoff

from the alternative footprint and amount of pollutants in stormwater runoff. Additionally, this alternative directly impacts the Arroyo las Positas and Arroyo Mocho, both of which is listed as impaired by urban pesticides and for which a TMDL is in effect (see Table 3.8-6). This alternative would also include 12 creek crossings, six of which are crossings of the impaired Arroyo Mocho and two of which are crossings of the impaired Arroyo las Positas. The Greenville Yard is near Altamont Creek and the Isabel/Stanley Station is near an unnamed tributary to the Arroyo Mocho. Discharges from these areas could more readily contribute pollutants, including urban pesticides, to these surface waters. Additionally, this alternative passes between the Chain of Lakes (quarry ponds) and would indirectly affect approximately 0.75 acres (see Table 3.8-7). However, as mentioned above, BART compliance with applicable permit requirements would reduce potential impacts associated with increased pollutants in stormwater runoff from impervious surfaces to less than significant.

About 8.5 acres of wetlands (see Table 3.8-6) would be directly impacted and approximately 17.6 acres of wetlands (see Table 3.8-7) would be indirectly impacted, which is substantially greater than losses for Alternative 1. Wetland mitigation, as required by a CWA 404 Permit or by the RWQCB, would reduce impacts to wetlands to less-than-significant levels.

Alternative 1b – Downtown-Greenville East via SPRR. Potential impacts under this alternative would be the same as for Alternative 1a, except there would be one more creek crossing, and slightly less indirect impacts to wetlands would occur. Therefore, impacts under this alternative would be less than significant, for the reasons cited in the discussion of Alternative 1.

Alternative 2 – Las Positas. Potential impacts under this alternative would be similar to those identified for Alternative 1, except there would be one less creek crossing, only the Isabel/I-580 Station would be in close proximity to a surface water body, substantially less new impervious surface area would be created, and substantially less direct and indirect impacts to wetlands would occur for this alternative. Therefore, impacts under this alternative would also be less than significant, for the reasons cited in the discussion of Alternative 1.

Alternative 2a – Downtown-Vasco. Potential impacts for this alternative would be similar to those identified for Alternative 1a, except there would be one less creek crossing, only the Isabel/Stanley Station would be in close proximity to a surface water body, less direct and indirect impacts to wetlands would occur, and less new impervious surface area would be created. Impacts would be less than significant, for the reasons cited in the discussion of Alternative 1.

Alternative 3 – Portola. Potential impacts for this alternative would be similar to those described under Alternative 1, except there would be four less creek crossings, only the Isabel/I-580 Station would be in close proximity to a surface water body, substantially less new impervious surface area would be created, and substantially less direct and indirect wetland impacts would occur.

Permanent groundwater dewatering or floodproofing would likely be required. If permanent groundwater dewatering is required, discharge restrictions in the individual WDR/NPDES Permit would include discharge limitations (quantity and quality of discharge) and monitoring and reporting requirements. If substantial permanent treated groundwater dewatering (more than 10,000 gallons per day) is required, the Treated Groundwater Dewatering General WDR, which includes discharge limitations and monitoring and reporting requirements, would apply. Compliance with these requirements would prevent significant impacts from exceedance of water quality standards.

Alternative 3a – Railroad. Potential impacts under this alternative would be similar to those described under Alternative 1a, except there would be two fewer creek crossings, only the Isabel/Stanley Station would be in close proximity to a surface water body, less direct impacts and slightly more indirect impacts to wetland would occur, substantially more direct and indirect impacts to the Chain of Lakes would occur, and substantially less new impervious surface area would be created. Thus, impacts under this alternative would be less than significant, for the reasons cited in the discussion of Alternative 1.

Alternative 4 – Isabel/I-580. Potential construction flooding impacts under this alternative would be similar to those identified for Alternative 1, except there would be four less creek crossings, only the Isabel/I-580 Station would be in close proximity to a surface water body, substantially less direct and indirect wetlands impacts would occur, and substantially less new impervious surface area would be created. Therefore, impacts would also be less than significant, for the reasons cited in the discussion of Alternative 1.

Alternative 5 – Quarry. Potential construction flooding impacts under this alternative would be similar to those described for Alternative 1a, except there would be one less creek crossings, only the Isabel/Stanley Station would be in close proximity to a surface water body, substantially less new impervious surfaces would be created, substantially more direct and indirect impacts to the Chain of Lakes would occur, and less direct and indirect impacts to wetlands would occur. Impacts would remain less than significant, for the reasons cited in the discussion of Alternative 1.

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in traversing new or different flood hazard areas, crossing additional waterways, or substantially altering groundwater flows or water quality beyond what is already presented above. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the hydrological and water quality analysis or conclusions presented earlier in this section.

Cumulative Analysis

The context for the analysis of cumulative surface water quality and hydrology impacts includes future growth and development within the Upper Alameda Creek Watershed for surface water and the Livermore-Amador Valley Groundwater Basin for groundwater impacts.

Exposure to flood hazards and dam inundation result from specific sites being located within a flood hazard zone or dam inundation zone; the impact of a project being within a flood hazards zone or dam inundation zone is site-specific and does not cumulate with impacts from other projects. As such, flood inundation or dam inundation is not addressed under this cumulative discussion.

HY-CU-6 Cumulative Flooding and Storm Drainage System Capacity Impacts

The Zone 7 manages stormwater conveyances and flood channels within the region and requires that activities within these channels, including discharges of stormwater, obtain an encroachment permit. A Stream Management Master Plan (SMMP) has been developed to target and manage improvements within the drainage system for flood control, as well as for other beneficial properties. As the SMMP and other flood control projects are implemented, conveyance capacity of the local drainage system would be improved. Until then, floodplain and floodway development is also regulated by FEMA with requirements for maintenance of flood flow conveyance and floodplain storage.

For all development within the watershed, if discharges are to susceptible surface waters, post-project runoff rate and duration cannot exceed existing conditions; development must be in accordance with the HM Standard. The majority creeks within the Upper Alameda Creek watershed are considered susceptible to hydrograph modification; the HM Standard would apply to the majority of development within the watershed. Implementation of the HM Standard would reduce the potential for increased runoff for up to the 10-year storm event. For storm events greater than the 10-year storm event, water quickly saturates even pervious soils rendering them effectively impervious. Therefore, cumulative development within this watershed would not substantially increase peak flow rates or duration of flow for storm events larger than the 10-year storm event.

Alterations in drainage patterns within the watershed could convey stormwater runoff more effectively to downstream drains, channels, or creeks such that their capacity is exceeded and flooding occurs. Additionally, placement of fill material within the watershed could cause or contribute to flood flow conveyance constraints and contribute to up- (constrictions) and down-stream (loss of storage capacity) flooding. The environmental review process would identify project-specific impacts on stormwater runoff that could cause or contribute to potential flood effects and develop appropriate mitigation. Existing regulatory requirements and floodplain management would ensure that potential cumulative impacts associated with flooding and storm drainage system capacity would be less than significant.

HY-CU-7 Cumulative Erosion and Sedimentation

Cumulative redevelopment and new development within the Alameda Creek watershed would disturb the land surface and could increase impervious surfaces within the watershed. These activities would be potential sources of erosion, sediment transport to, and siltation of surface waters.

For all development projects within the Upper Alameda Creek watershed, regulatory requirements would ensure that water quality is not compromised during operational activities. The ACCWP would require stormwater quality BMPs to protect groundwater and surface water from potential operational impacts. Increases in the rate or duration of runoff and discharges of groundwater dewatering water to erosion susceptible streams and creeks within the watershed would require controls to prevent off-site erosion and siltation in accordance with the HM Standard. Cumulative erosion and siltation impacts would be less than significant.

HY-CU-8 Cumulative Groundwater Impacts

Currently, Zone 7 manages the Main Basin so that under non-emergency conditions, including several multi-year droughts, groundwater elevations do not drop below historic low levels through annual conjunctive use practices. Groundwater recharge occurs through natural and artificial recharge from rainfall, releases from the South Bay Aqueduct of Lake Del Valle, and gravel mining recharge to the Arroyo Mocho and Arroyo Del Valle, but the majority of recharge is through artificial recharge and recharge through stream channels.

The existing Zone 7 Groundwater Management Plan includes development of the Chain of Lakes for future groundwater potential recharge on the order of 37,000 AFY. Consequently, potential increases in impervious surface from future growth and development, that would likely increase surface runoff (and thereby, reduce direct groundwater recharge through percolation of rainfall), would have a minimal impact on groundwater recharge. Reduced recharge from rainfall percolation would not be substantial, runoff waters would continue to recharge the underlying groundwater basin as they travel through the streams and channels, and artificial recharge would be substantial and minimize potential natural recharge losses.

Also, cumulative development would be subject to the applicable urban water management plan for water supplies and major development would require a water supply assessment to ensure that adequate water supplies are available without depleting water resources. These mechanisms, in addition to Zone 7's management of the groundwater basin resources, would ensure that groundwater supplies are not substantially depleted and that the local groundwater table is not substantially lowered. As such, cumulative impacts on groundwater recharge, groundwater supplies, and a lower of the groundwater table would be less than significant.

HY-CU-9 Cumulative Compliance with Water Quality Standards and Other Water Quality Requirements

Cumulative projects within Alameda County are subject to requirements of the ACCWP and associated Municipal NPDES Permit, Hydromodification Management Plan (HMP), and SWMP; Statewide Industrial General Permit, and Treated Groundwater Dewatering General WDR, if substantial treated groundwater dewatering (more than 10,000 gallons per day) is required for structures. These waste WDRs require implementation of stormwater quality BMPs and discharge volume and rate controls.

In accordance with the ACCWP and Provision C.3 of the Municipal NPDES Permits, all new and re-development that replaces or creates 10,000 square feet of impervious surface would be required to also implement post-construction stormwater quality BMPs to minimize the potential for pollutants in stormwater runoff and degradation of receiving water quality. The WQMP identifies appropriate structural and non-structural BMPs, design criteria, and performance goals. The Alameda County HMP incorporates the HM Standard, which requires implementation of hydromodification management controls to reduce stormwater runoff to pre-existing conditions levels for up to and including the 10-year storm event, where applicable, in accordance with the Municipal NPDES Permit.

In accordance with the Industrial General Permit, a SWPPP must be prepared and implemented to minimize the potential for industrial pollutants in stormwater runoff from industrial areas. Monitoring and reporting requirements ensure compliance with the Industrial General Permit conditions and that pollutants in stormwater runoff are not substantial.

In accordance with the Treated Groundwater Dewatering General WDR, effluent and receiving water limitations must be met to minimize potential effects on water quality. Preparation of an NOI application would ensure appropriate groundwater treatment practices are implemented. Monitoring and reporting requirements would identify if pollutant concentration triggers are exceeded, which would require further investigation to ensure adequate protection of water quality and potential effects of groundwater dewatering would not be substantial.

The County of Alameda and local municipalities include requirements for compliance with the NPDES permits in County and Municipal Codes and Ordinances. Additionally, development projects would have to undergo the environmental review process, which would illuminate any site- or project-specific potential impacts. These regulations would ensure cumulative compliance with legal requirements, and impacts would be less than significant.

All of these programs have been designed and implemented to be protective of water quality. Implementation of TMDLs for pollutants listed as contributing to impairment of water resources would further protect water resources from water quality degradation.

Continued monitoring of receiving waters by the SFBRWQCB and ACCWP ensure that these programs remain effective and protective of water quality. Therefore, potential future growth and development impacts on cumulative degradation of water quality through discharge of pollutants to surface or groundwater would be less than significant.

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3.9 BIOLOGICAL RESOURCES

Introduction

This section addresses the biological resources within the study area, and the potential for the BART extension alternatives to disturb sensitive biological species or habitats. In particular, the section provides a description of the project area habitats; a listing of special-status plant and wildlife species that could potentially occur in the area; and federal, state, and regional regulations related to plant and wildlife species and the regulatory agencies that enforce these regulations and a programmatic assessment of the project's impact to biological resources. The study area for biological resources is defined as those areas where any permanent feature is proposed and includes a 500-foot buffer from the centerline of the proposed BART tracks, yards, and station areas (see Figure 3.9-1). The 500-foot buffer was defined to ensure that resources directly adjacent to the BART extension alternatives were also included in this assessment. In addition, special-status species sightings identified outside the study area were mapped to address potential indirect effects on these sensitive resources.

Information contained in this section is based on review of existing documentation, including:

- City of Dublin General Plan[1]
- City of Dublin, Eastern Dublin Specific Plan
- City of Livermore, City of Livermore General Plan, 2003-2025[2]
- City of Livermore, Downtown Specific Plan
- City of Livermore, El Charro Specific Plan Final EIR [3]
- Pleasanton General Plan 2005-2025
- City of Pleasanton, Stoneridge Drive Specific Plan/Staples Ranch Final EIR[4]
- Caltrans, Environmental Assessment/Initial Study I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive[5]
- U.S. Fish and Wildlife Service, Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon[6]

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1 City of Dublin, *City of Dublin General Plan*, November 2008.

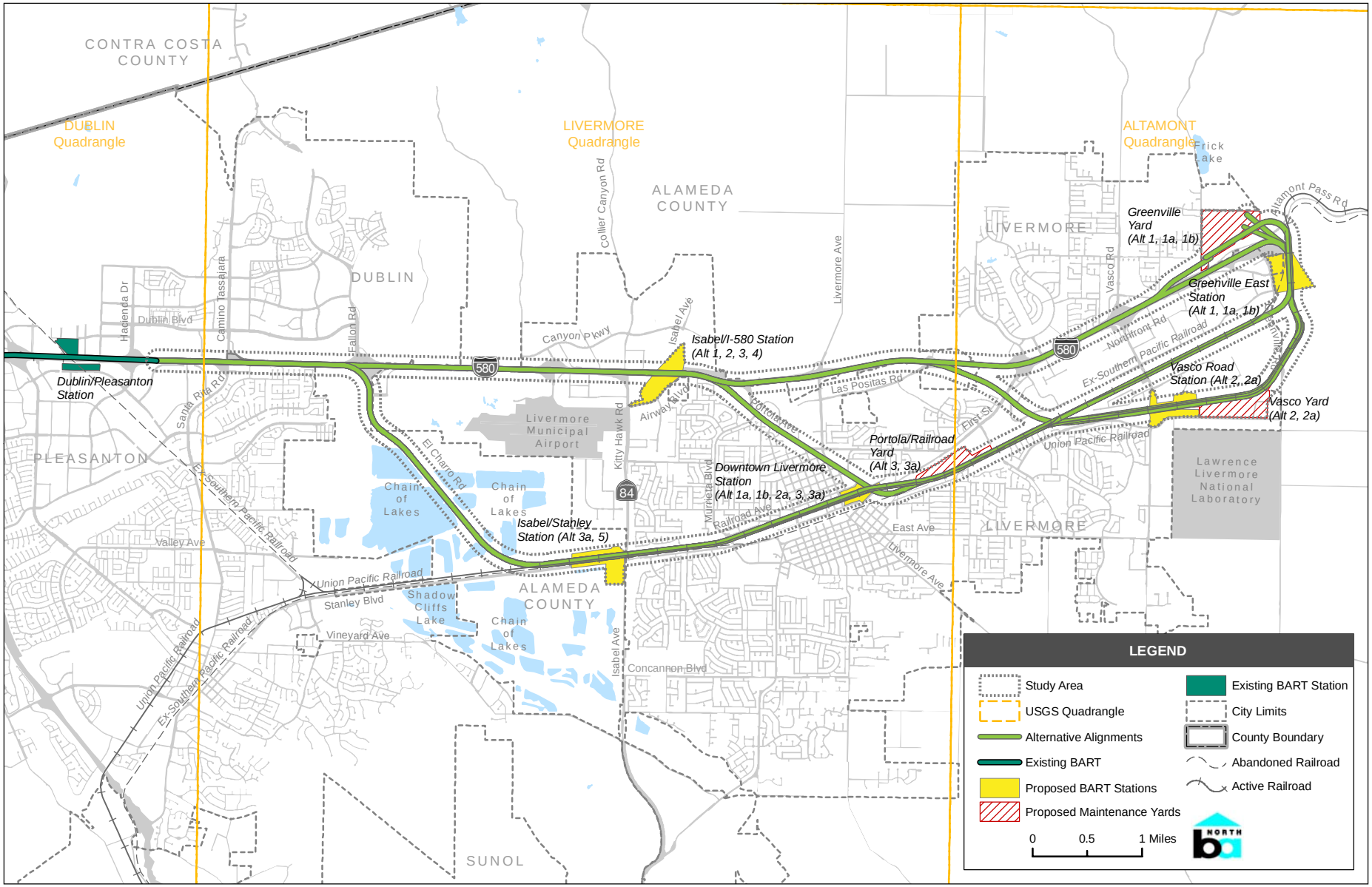
2 City of Livermore, *City of Livermore General Plan*, 2003-2025, Adopted February 9, 2004.

3 City of Livermore, *Final EIR for the El Charro Specific Plan*, April 2007.

4 City of Pleasanton, *Stoneridge Drive Specific Plan/Staples Ranch Final EIR*, August 2008.

5 Caltrans, *Environmental Assessment/Initial Study I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive*, 2006.

6 U.S. Fish and Wildlife Service, *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon,* Portland, Oregon, 2005, xxvi+ 606 pages.



Source: AECOM, May 4, 2009; PBS&J, 2009.

BART TO LIVERMORE BIOLOGICAL STUDY AREA

FIGURE 3.9-1

- U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants; Final Rule[7]
- Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database[8]
- U.S. Fish and Wildlife Service, Species List of Federal Endangered and Threatened Species[9]
- California Native Plant Society, Electronic Inventory of Rare and Endangered Vascular Plants of California[10]

One comment letter was received in response to the NOP regarding impacts to biological resources within the quarry area. This section addresses those concerns.

Existing Conditions

Regional Overview and Survey Methods

The study area lies within the Dublin, Livermore, and Altamont U.S. Geological Survey (USGS) 7.5 minute Quadrangles. The BART extension alternatives typically follow and parallel existing roads and railroad rights-of-way through the cities of Dublin, Pleasanton, and Livermore (see Figure 3.9-1).

Topographically, the study area starts at an elevation of approximately 340 feet above mean sea level (msl) at its western terminus in the Dublin/Pleasanton Station, and ends approximately at 740 feet above msl at its eastern terminus at the proposed Greenville East Station. The overall slope and aspect of the study area falls in an east to west direction.

All of the extension alternatives cross highly urbanized landscapes in the cities of Dublin, Pleasanton, and Livermore. The study area encompasses Interstate 580 (I-580); sand and gravel extractive operations; and residential, commercial, and industrial areas. Agricultural, ornamental, and ruderal habitats are the most common habitat types north of I-580 in the undeveloped areas. South of I-580, urban or semi-rural areas predominate and include agricultural areas (vineyards), wetlands, and open space. Approved and planned urban development in the cities has already reduced much of the remaining open space in the western portion of the study area.

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7 U.S. Fish and Wildlife Service, *Federal Register Final Rule; Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants*. Federal Register 71(28):7118-7316. 2006.

8 Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database, October 2008.

9 U.S. Fish and Wildlife Service, Species List of Federal Endangered and Threatened Species, www.fws.gov/sacramento/es/spp_lists/auto_list.cfm, accessed October 24, 2008.

10 California Native Plant Society, Electronic Inventory of Rare and Endangered Vascular Plants of California, http://cnps.web.aplus.net/ cgi-bin/inv/inventory.cgi, accessed October 24, 2008.

The BART extension alternatives cross several waters of the U.S., including Tassajara Creek, Arroyo Mocho, Cottonwood Creek, and Arroyo las Positas and its tributaries. All of these watercourses, except Arroyo las Positas, have been historically channelized and culverted to some extent beneath I-580.[11]

Reconnaissance-level surveys were conducted by PBS&J biologists on October 29, 2008 and January 23, 2009. Prior to these surveys queries of the California Department of Fish and Game California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) Online Electronic Inventory of Rare and Endangered Vascular Plants of California (CNPSEI), and the United States Fish and Wildlife Service (USFWS) Online Species List of Federal Endangered and Threatened Species were performed to identify known biological resources within the study area.

The reconnaissance-level biological surveys consisted of driving or walking meandering transects through accessible representative vegetation or plant communities that occur within an approximate 500-foot buffer centered on the extension alternative alignments to assess their suitability for native plant and animal species. Particular attention was given to areas that appeared to provide the most suitable habitat for special-status species expected to occur in the region (especially seasonal wetlands, stream corridors, and isolated grassland remnants).

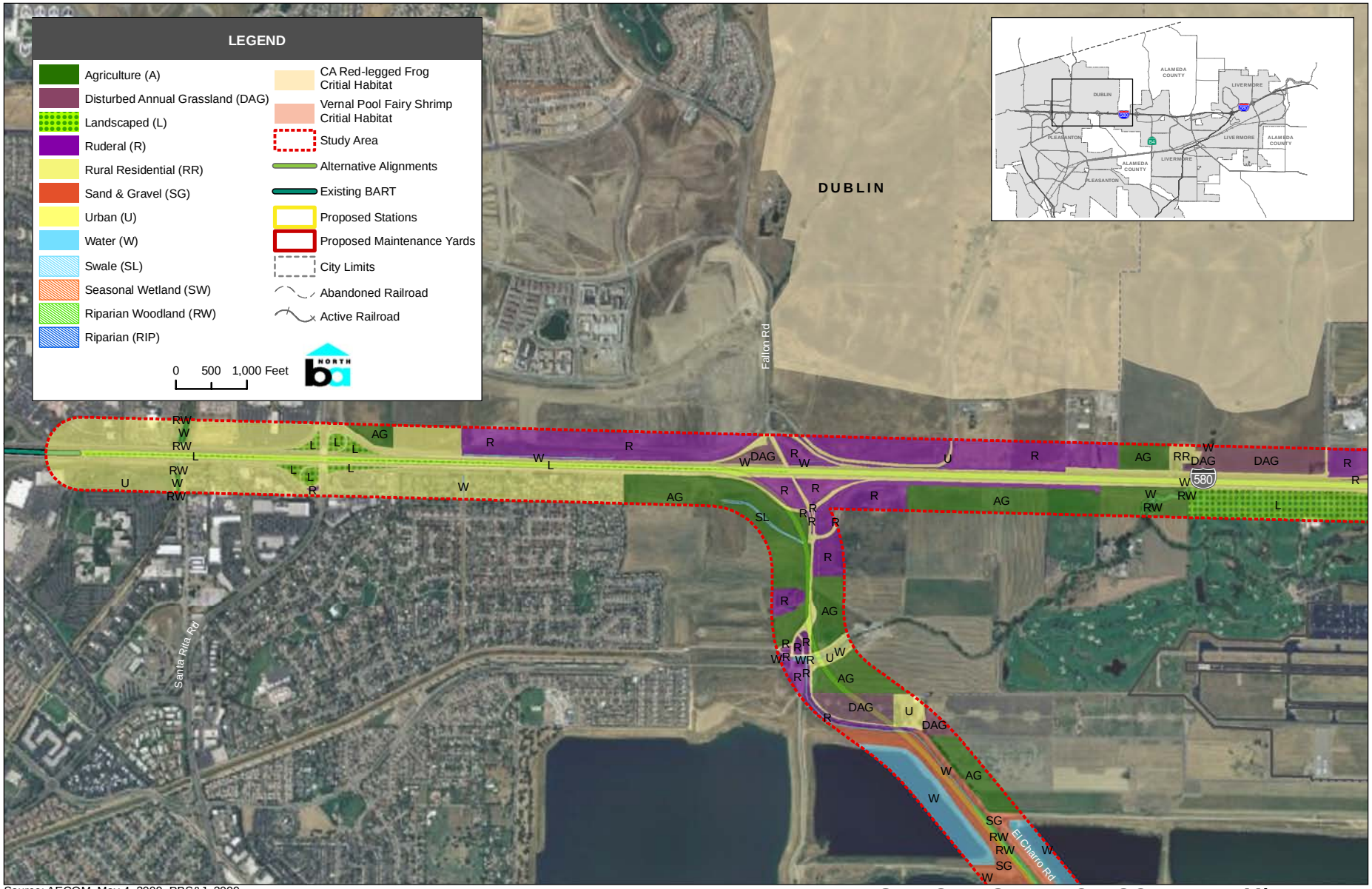
Plant Communities

Six plant communities occur within the study area: urban, agricultural, grassland, riparian areas, wetland, and open water. The plant communities were classified based on existing plant community descriptions described in the Preliminary Descriptions of the Terrestrial Natural Communities of California.[12] The six plant communities and the plant and wildlife species likely to occur in them are described below. Figures 3.9-2a through 3.9-2f depict habitats within the study area.

Urban. The urban plant community, which is the predominant plant community in the study area, does not generally provide habitat for native plants. However, there are many wildlife species that use urban areas for foraging, roosting, and/or nesting. These species include native animals that have adapted well to living close to humans, such as Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), Pacific treefrog (*Pseudacris regilla*), western fence lizard (*Sceleroporus occidentalis*), and barn swallow (*Hirundo rustica*), as well as non-native species, such as bullfrog (*Rana catesbiana*), house sparrow (*Passer domesticus*), and European starling (*Sturnus vulgaris*). In addition, a few protected species live in urban developed areas, such as burrowing owl (*Athene cunicularia*) and some species of bats such as the Mexican free-tailed bat (*Tadarida brasiliensis*).

[11] Caltrans, *Environmental Assessment/Initial Study I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive*, 2006.

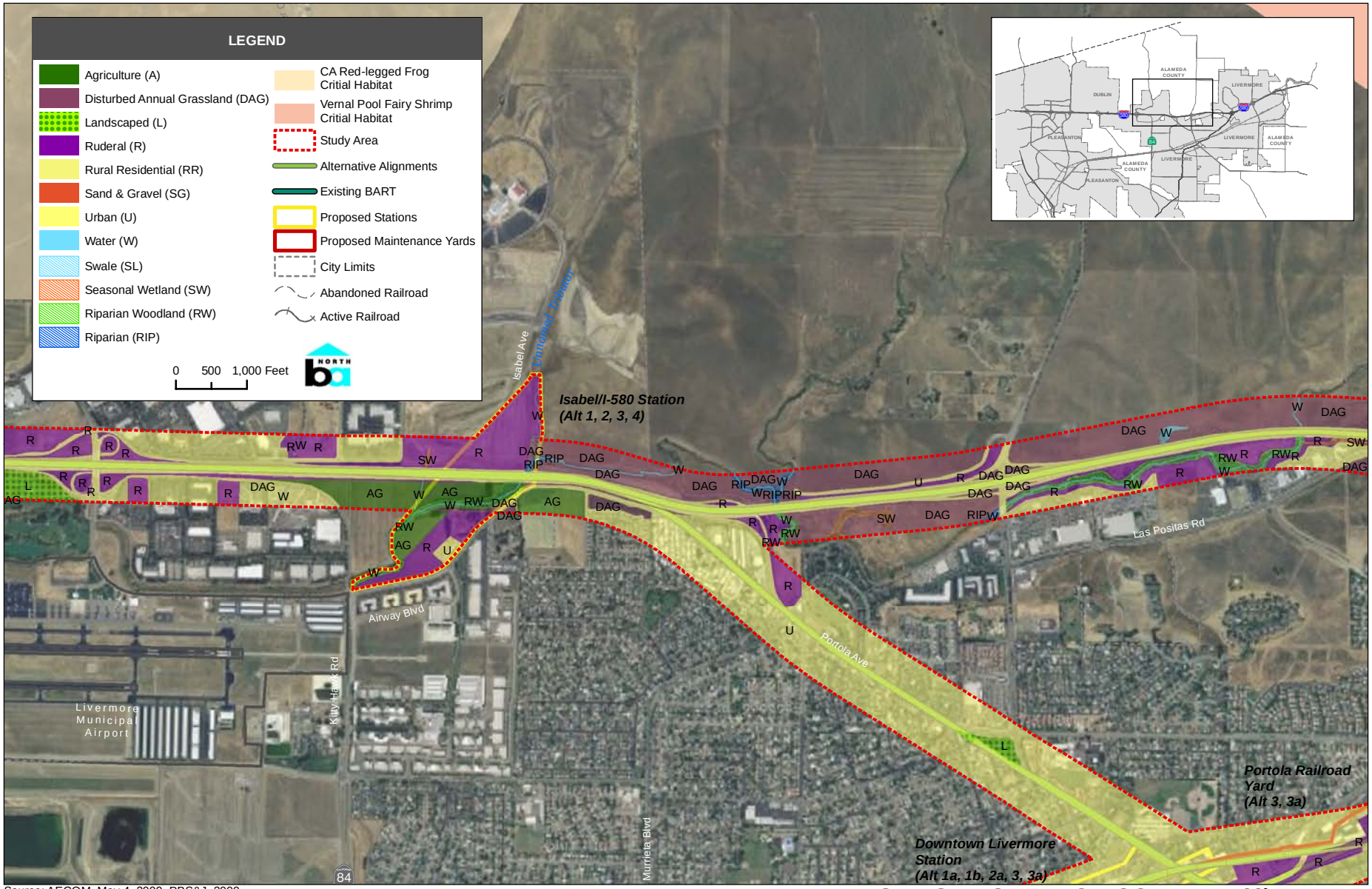
[12] Holland, R.F. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. California Department of Fish and Game, Sacramento, California, 1986.



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

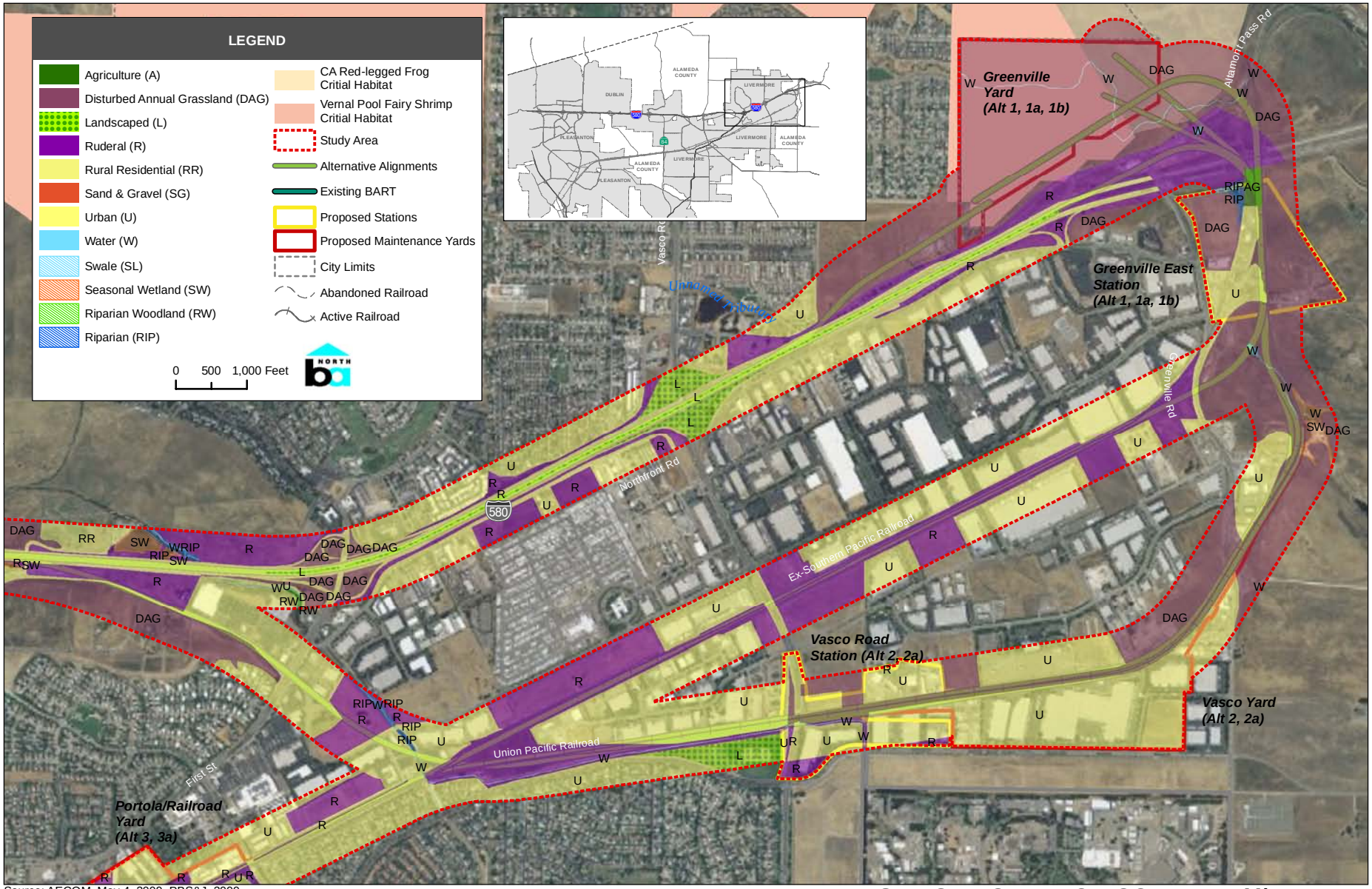
FIGURE 3.9-2a



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

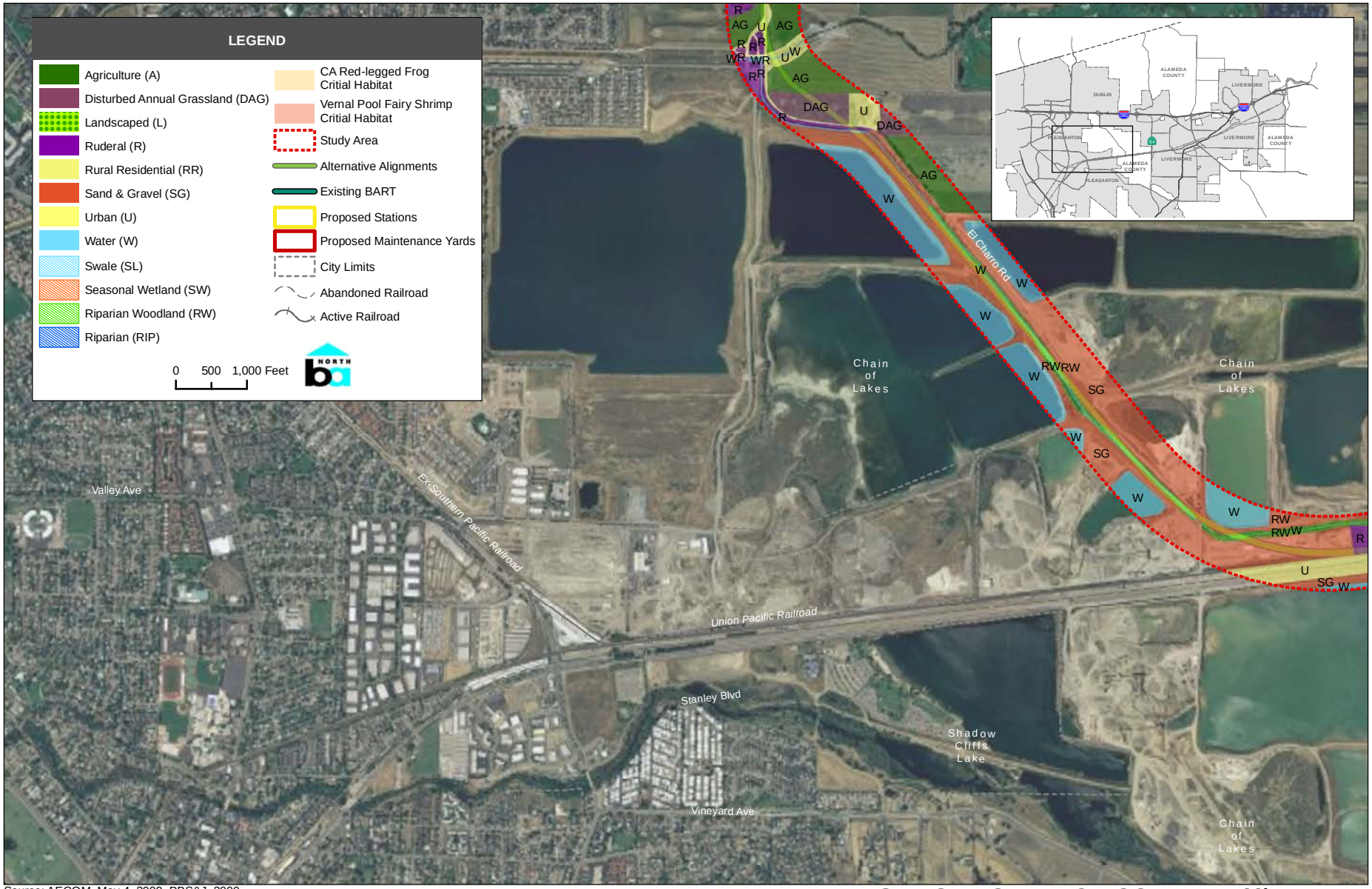
FIGURE 3.9-2b



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

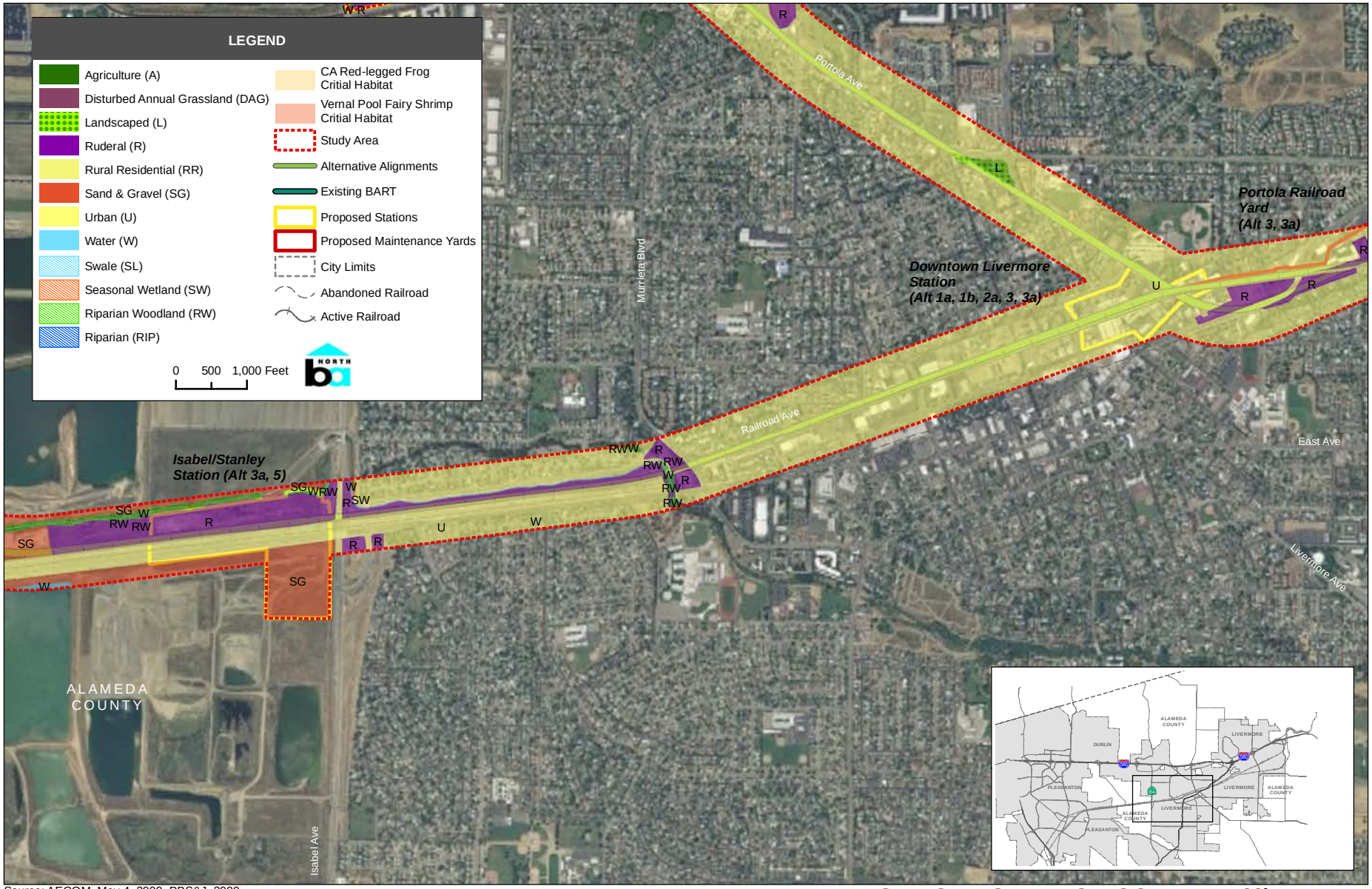
FIGURE 3.9-2c



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

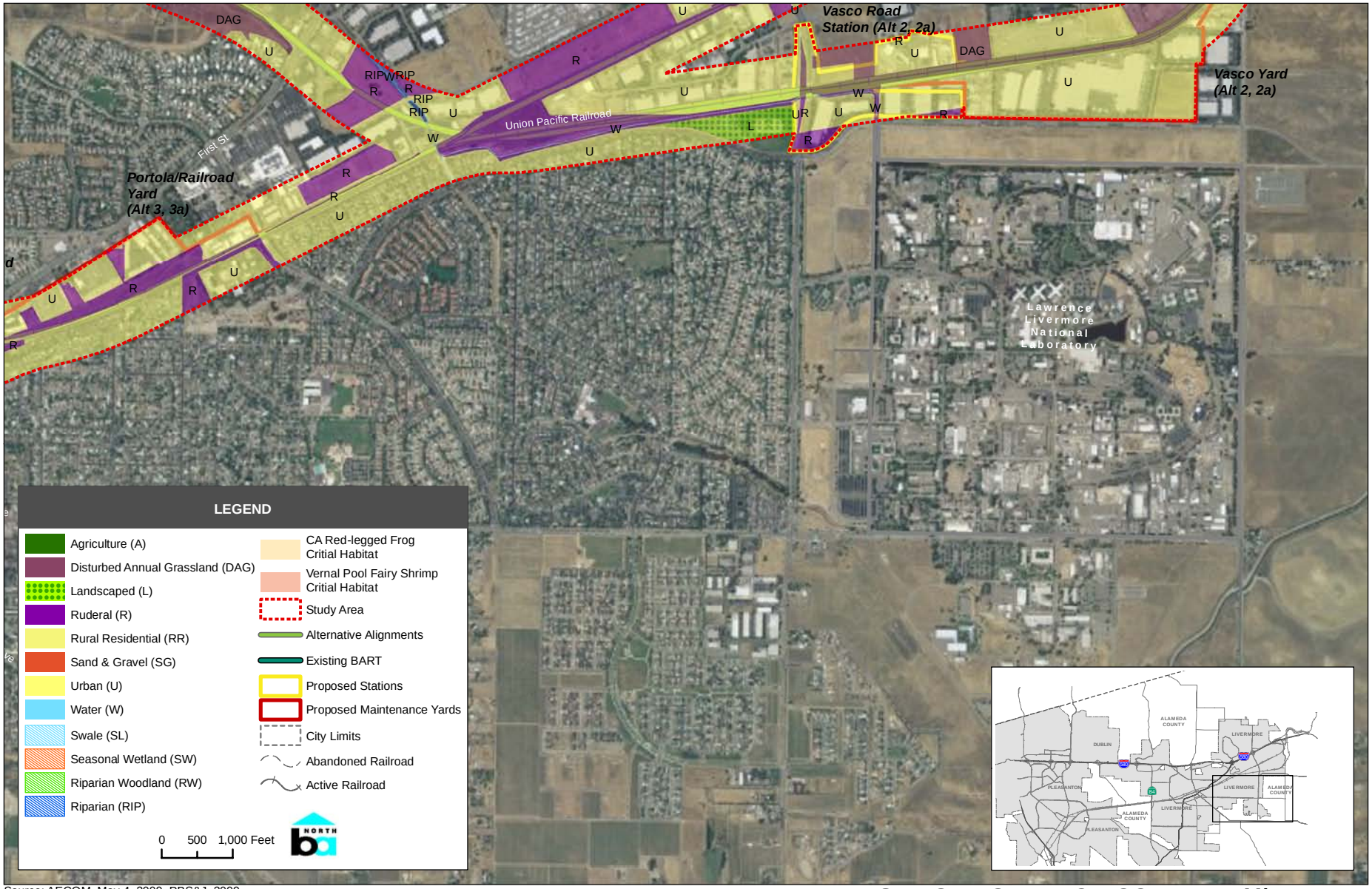
FIGURE 3.9-2d



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.9-2e



Source: AECOM, May 4, 2009, PBS&J, 2009.

EXISTING VEGETATION COMMUNITY/HABITAT IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.9-2f

Agricultural. Agricultural uses are found within the study area in the undeveloped portions of Alameda County. This habitat is found on the north and south sides of I-580, and on undeveloped lands along the northern portion of El Charro Road. Depending on the type and intensity of agriculture, farmland varies in the degree to which it supports native plant and animal species. Intensively farmed lands do not typically support native plant communities. However, wildlife species, particularly migrating waterfowl and raptors, can use these fields for foraging and/or roosting. The edges of agricultural fields, where disturbance is minimized, may provide opportunities for burrowing animals, such as California ground squirrel (*Spermophilus beecheyi*) and burrowing owls. In addition, agricultural areas often contain readily available water through irrigation ditches and stock ponds that are not heavily disturbed. These water sources often support various species of reptiles and amphibians.

Grazing lands typically support the greatest diversity of species within agricultural areas, since the land is not as intensively managed and altered compared to agricultural fields. Wildlife that may use grazing lands in the study area include California ground squirrel, black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), western rattlesnake (*Crotalus viridis*), horned lark (*Eremophila alpestris*), black-tailed jackrabbit (*Lepus californicus*), and many bird species, including birds of prey, such as red-tailed hawks (*Buteo jamaicensis*) and golden eagles (*Aquila chrysaetos*).

Alternatives that cross this habitat type along I-580 include Alternatives 1, 2, 3, and 4. Grassland habitat is also found within the footprint of the proposed Isabel/I-580 Station.

Grassland. Disturbed annual grassland habitat exists within the study area and is the most common vegetation type in the vicinity of Livermore. It is generally found in areas that have been grazed or in abandoned agricultural fields. Species that usually dominate disturbed annual grasslands are mustards (*Brassica* sp.), filaree (*Erodium* sp.), and annual introduced grasses such as wild oats (*Avena fatua*) and fescue (*Vulpia myuros*). Disturbed annual grassland can be found along all of the alternatives, and also within the proposed Isabel/I-580 and Greenville East Stations, and the Greenville Yard. The other alternatives do not cross this habitat type.

Riparian. Riparian vegetation refers to the vegetation occurring along streams and riverbanks. Riparian areas provide important breeding and foraging habitat for many amphibians, reptiles, birds, and mammals, and comprise one of the most biologically-diverse habitats in the region. Riparian vegetation used to be found along most perennial and intermittent streams in the Livermore Valley area. However, this vegetation type has become rare due to disturbance by agriculture, development, and the past filling or channelization of small streams. There are two kinds of riparian vegetation in the study area: riparian scrub and riparian woodland. Riparian scrub is dense, brushy, and dominated by willows (*Salix* sp.). Riparian woodland has more large trees, fewer willows, and slightly more understory than riparian scrub.

There are several arroyos in the Livermore Valley area that still support riparian habitat. Arroyo Mocho, in the vicinity of El Charro Road and Stanley Boulevard, supports some mature riparian

woodland with Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and alder (*Alnus* sp.*)*. Other arroyos, such as Arroyo las Positas and Arroyo Seco, have, in the past, been largely modified for flood control purposes and impacted by grazing. As a result, riparian vegetation is sparse and has been replaced in some areas by aquatic vegetation like cattails and rushes as well as exotic species from the surrounding grasslands and urban areas.[13] Riparian vegetation is currently found within Arroyo las Positas, and north and south of I-580 on Cottonwood Creek. Alternatives that cross this habitat type along I-580 include Alternatives 1, 2, 3, and 4. Riparian vegetation in Arroyo las Positas is also found within the footprint of the proposed Isabel/I-580 Station. Alternatives 1a, 1b, 2a, 3a, and 5 would cross this habitat type at Arroyo Mocho within the El Charro Road area. Riparian vegetation in Arroyo Mocho is also found within the footprint of the proposed Isabel/Stanley Station.

Wetland. Wetlands are natural communities that depend on year-round or seasonally-dependable sources of water. The Livermore and Pleasanton general area supports several different types of wetlands: freshwater marsh, freshwater seep, northern claypan vernal pool, and alkali meadow/alkali sink scrub. While a wetland delineation has not been conducted for the study area, potential wetland habitat is shown on Figures 3.9-2a through 3.9-2f. Potential wetlands may be located along undeveloped portions north and south of I-580, and within the footprint of the Greenville East Station and Greenville Yard. Wetlands could potentially be found along Alternatives 1, 1a, 1b, 2, 3, and 4.

Valley freshwater marshes occur in areas that are wet year-round and are typically associated with ponds (natural or man-made), the shallow edges of lakes, and large pools in riparian areas. Marshes typically support cattails (*Typha* sp.), sedges (*Carex* sp.), rushes (*Juncus* sp.), willows (*Salix* sp.), and bulrushes (*Scirpus* sp.), and provide habitat for species such as mallard (*Anas platyrhynchos*), western pond turtle (*Actinemys marmorata*), and muskrat (*Ondatra zibethica*).

Freshwater seeps may be found in grasslands or meadows or associated with freshwater marshes. They have permanently wet or moist soil as a result of the water table being near the surface and typically contain sedges and rushes.

Vernal pools are seasonal wetlands that occur in grasslands and support a unique group of plants. They are formed in slight depressions over bedrock or hardpan soils that allow water to pool during the winter and spring rains. Since vernal pools are a unique habitat and tend to be isolated from each other, they often support species that are endemic (i.e., restricted) to vernal pools or even to pools in that particular region. As a result of this endemism and the dramatic decline of vernal pools due to agriculture and development, vernal pools are listed as a Significant Natural Community by the California Department of Fish and Game (CDFG) and many vernal pool dependent plants and animals are special-status species protected by the State or federal government.

Open Water. Permanent open water bodies are mostly restricted to the existing and former sand and gravel pits between the cities of Pleasanton and Livermore (Chain of Lakes), such as the lake within

[13] City of Livermore, *City of Livermore General Plan*, Open Space and Conservation Element, adopted February 9, 2004. Amended June 2009.

the Shadow Cliffs Regional Recreation Area. Other open water habitats may exist as small natural or man-made ponds and reservoirs. Although open water does not provide habitat for many plant species, it is important for many wildlife and fish species, such as western pond turtle, bullfrogs, bluegill (*Lepomis macrochirus*), and bass (*Micropterus sp*.). There is a pond on the north side of I-580, just east of Livermore Avenue. Other permanent open water bodies can be found on both sides of El Charro Road at the Chain of Lakes.

Special-Status Species

The potential occurrence of special-status plant and animal species within the study area has been determined through review of the following references and habitat information collected during field surveys:

- PBS&J, BART to Livermore Extension Biological Resources Database Queries Report. July 1, 2009. Includes:
  - CDFG CNDDB queried for the Dublin, Livermore, and Altamont 7.5 minute USGS topographic quadrangles. These quadrangles encompass the study area (see Figure 3.9-1).
  - USFWS Online Species List of Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Dublin, Livermore, and Altamont 7.5 minute USGS topographic quadrangles.
  - CNPSEI for the Dublin, Livermore, and Altamont 7.5 minute USGS topographic quadrangles.
- Lake, Diane, California Native Plant Society CNPS East Bay Chapter, Rare, Unusual and Significant Plant of Alameda and Contra Costa Counties, March 1, 2004.
- City of Pleasanton, Draft Pleasanton General Plan 2005 – 2025, Conservation and Open Space Element, Public Hearing Draft, September 19, 2008.
- City of Livermore, City of Livermore General Plan 2003 – 2025, Open Space and Conservation Element, adopted February 9, 2004. Amended June, 2009.
- City of Pleasanton, Stoneridge Drive Specific Plan/Staples Ranch Final EIR, August 2008.
- City of Livermore, Draft Environmental Impact Report for El Charro Specific Plan, Chapter 3.4 Biological Resources, January 2007.
- City of Livermore, Final Environmental Impact Report for El Charro Specific Plan, April 2007.
- Caltrans, EA/IS 1-580 Eastbound HOV Lane Project Environmental Impact Report, 2006.
- Caltrans, EA/IS I-580 Westbound HOV Lane Project Environmental Impact Report, 2009.
- USFWS, Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon, 2005, xxvi + 606 pages.

- USFWS, Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants; Final Rule, 50 CFR Part 17, 2006.
- Leidy, R.A., G.S. Becker, B.N. Harvey, Historical distribution and current status of steelhead/rainbow trout (Oncorhynchus mykiss) in streams of the San Francisco Estuary, California, Center for Ecosystem Management and Restoration, Oakland, CA, 2005.

For the purposes of this report, special-status species include:

- species listed, proposed, or candidate for listing as Threatened or Endangered by the USFWS pursuant to the federal Endangered Species Act (FESA) of 1969, as amended;
- species listed as Rare, Threatened, or Endangered by the CDFG pursuant to the California Endangered Species Act (CESA) of 1970, as amended;
- species designated as Fully Protected under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code;
- species designated by the CDFG as California Species of Concern;
- plant species listed as Category 1B and 2[14] by the CNPS; and
- species not currently protected by statute or regulation, but considered rare, threatened or endangered under California Environmental Quality Act (CEQA).

Recorded occurrences of special-status species are shown on Figure 3.9-3. Table 3.9-1 summarizes the special-status species that potentially occur within the study area.

According to the CNDDB, USFWS, and CNPS queries, a total of 46 special-status species and two rare natural communities[15] and USFWS-designated critical habitat[16] for California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), and vernal pool fairy shrimp (*Branchinecta lynchi*) are known to occur in the Dublin, Livermore, and Altamont 7.5 minute topographic quadrangles. Information gathered during the site visits and data on range, habitat requirements, and known localities was used to refine the species list and determine which species were

[14] Recent modifications to the CNPS Ranking System include the addition of a new Threat Code extension to listed species (e.g., List 1B.1, List 2.2 etc.). A Threat Code extension of .1 signifies that a species is seriously endangered in California; .2 is fairly endangered in California; and .3 is not very endangered in California.

[15] Rare natural communities are those communities that are of highly limited distribution and are recognized in the CNDDB List of California Terrestrial Natural Communities. These communities may or may not contain rare, threatened, or endangered species.

[16] Critical habitat: The ESA requires USFWS and NMFS to designate critical habitat for any listed threatened or endangered species. Critical habitat is a specific geographical area, or areas essential for the conservation of a threatened or endangered species that may require special management consideration or protection. Although critical habitat may be designated on private property or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

CNDDB Occurences

1. Alameda whipsnake
2. American badger
3. American peregrine falcon
4. California horned lark
5. California linderiella
6. California red-legged frog
7. California tiger salamander
8. Congdon's tarplant
9. Hospital Canyon larkspur
10. Livermore tarplant
11. Mt. Diablo buckwheat
12. San Joaquin kit fox
13. San Joaquin spearscale
14. San Joaquin whipsnake
15. Sycamore Alluvial Woodland
16. Townsend's big-eared bat
17. Valley Sink Scrub
18. Yuma myotis
19. Alkali milk-vetch
20. Bent-flowered fiddleneck
21. Big-scale balsamroot
22. Brittlescale
23. Burrowing owl
24. Caper-fruited tropidocarpum
25. Curved-foot hygrotus diving beetle
26. Diamond-petaled California poppy
27. Ferruginous hawk
28. Golden eagle
29. Hairless popcorn-flower
30. Heartscale
31. Hispid bird's-beak
32. Hoary bat
33. Longhorn fairy shrimp
34. Northern harrier
35. Pallid bat
36. Palmate-bracted bird's-beak
37. Prairie falcon
38. Round-leaved filaree
39. Saline clover
40. Southwestern pond turtle
41. Stinkbells
42. Tricolored blackbird
43. Vernal pool fairy shrimp
44. Western pond turtle
45. Western spadefoot
46. White-tailed kite

Note:
The nearest Swainson's hawk nest to the BART extension alternatives is located approximately 9.5-miles to the east. Figure 3.9-4 shows the location of recorded Swainson's hawk nests in reference to the project.

SAN RAMON
DUBLIN
PLEASANTON
HAYWARD
SUNOL
LIVERMORE
CONTRA COSTA COUNTY
ALAMEDA COUNTY
5 Miles
1 Mile
Livermore Municipal Airport
Lawrence Livermore National Laboratory
Pleasanton Ridge Regional Park
Pleasanton Ridge Regional Park
Sycamore Grove Park
Lake del Valle State Recreation Area
680
580
84

LEGEND

- Alternative Alignments
- Existing BART
- Existing BART Station
- Poposed Stations
- Proposed Maintenance Yards
- City Limits
- County Boundary
- CNDDB Occurence
- CA Red-legged Frog Critial Habitat
- Vernal Pool Fairy Shrimp Critial Habitat
- Park
- Water Body

0 0.5 1 2 3 Miles

Source: CDFG, CNDDB, June 2009.

SENSITIVE SPECIES OCCURRENCES IN THE TRI-VALLEY AREA

FIGURE 3.9-3

Table 3.9-1
Special-status Plant and Wildlife Species[1] Potentially Occurring Within the BART to Livermore Extension Study Area

Common Name	Scientific Name	Status[2]	Habitat and Seasonal Distribution in California[3]	Likelihood of Occurrence Within the Study Area[4]
Wildlife				
Invertebrates				
Vernal pool fairy shrimp	*Branchinecta lynchi*	**Fed:** FT **CA:** none **Other:** CNDDB: G3/S2	**General**: endemic to the grasslands of the Central Valley, Central Coast mountains and South Coast mountains, in rain-filled pools. **Micro**: inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**Moderate:** A number of occurrences have been reported in the northeast Livermore area within vernal pools and grassland swales. Suitable habitat (potential wetland areas) is located in undeveloped parcels north of I-580 and within the proposed Greenville Yard. This species could be found along Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and within the proposed Isabel/I-580 Station, Vasco Yard tailtracks, and Greenville Yard.
Curved-foot hygrotus diving beetle	*Hygrotus curvipes*	**Fed:** none **CA:** none **Other:** CNDDB: G1/S1	**General**: mineralized pools, stock ponds, ponds, or pools in intermittent streams. Distribution is bounded by the Outer Coast Ranges and San Joaquin Delta, in eastern Contra Costa and Alameda Counties.	**Moderate:** Observations of this species are concentrated in the northeast portion of the study area. This species could be found along Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and within the proposed Isabel/I-580 Station, Vasco Yard tailtracks, and Greenville Yard.
California linderiella	*Linderiella occidentalis*	**Fed:** none **CA:** none **Other:** CNDDB: G3/S2	**General**: seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions. **Micro**: water in the pools has very low alkalinity and conductivity.	**Moderate:** Occurrences have been reported north of I-580. This species could be found along Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and within the proposed Isabel/I-580 Station, Vasco Yard tailtracks, and Greenville Yard.
Fish				
Central California coastal steelhead Distinct Population Segment (DPS)	*Oncorhynchus mykiss*	**Fed:** FT (NMFS) **CA:** none **Other:** none	This DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers.	**Moderate:** Restoration efforts to bring steelhead into the Alameda Creek Watershed have been ongoing; some recorded occurrences of spawning steelhead have been reported to NMFS and CDFG. Leidy et al, 2005 show that Arroyo Mocho contains a population of Steelhead. Construction of Alternatives 1a, 1b, 2a, 3a, and 5 and the Isabel/Stanley Station could impact Arroyo Mocho.

Table 3.9-1
Special-status Plant and Wildlife Species[1] Potentially Occurring Within the BART to Livermore Extension Study Area

Common Name	Scientific Name	Status[2]	Habitat and Seasonal Distribution in California[3]	Likelihood of Occurrence Within the Study Area[4]
		Reptiles		
Western pond turtle	*Actinemys marmorata*	**Fed:** none **CA:** SSC **Other:** CNDDB: G3/S3	**General**: a thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. **Micro**: need basking sites and suitable (sandy banks or grassy open fields) upland habitat for egg-laying.	**Present:** Several observations have been reported to the CNDDB within the arroyos in the study area. All the extension alternatives have the potential to impact this species.
		Amphibians		
California tiger salamander (central population)	*Ambystoma californiense*	**Fed**: FT **CA**: SSC **Other**: CNDDB: G2/S2	**General**: Central Valley DPS listed as threatened. Santa Barbara & Sonoma counties DPS listed as endangered. **Micro**: need underground refuges, especially ground squirrel burrows and vernal pools or other seasonal water sources for breeding.	**Present:** Occurrences have been recorded in the study area. Potentially suitable habitat is located north of I-580 and in the eastern part of Livermore. CTS could occur along Alternatives 1, 1a, 1b, 2, 2a, 3a, and 5.
California red-legged frog	*Rana draytonii*	**Fed**: FT **CA**: SSC **Other**: CNDDB: G4/S2	**General**: lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. **Micro**: requires 11-20 weeks of permanent water for larval development. Must have access to aestivation habitat.	**Present:** Occurrences have been recorded in the survey area. Potential habitat for CRLF is located north of I-580 and in the eastern part of Livermore. CRLF could occur along all of the alternatives.
		Birds		
Tricolored blackbird	*Agelaius tricolor*	**Fed:** none **CA:** SSC **Other:** CNDDB: G2/S2	**General**: highly colonial species, most numerous in central valley and vicinity. Largely endemic to California. **Micro**: requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony.	**Present:** Two active colonies reported throughout the Chain of Lakes area. Alternatives that could impact this species include Alternatives 1a, 1b, 2a, 3a, and 5, since they would cross the Chain of Lakes area.
Western burrowing owl	*Athene cunicularia*	**Fed:** none **CA:** SSC **Other:** CNDDB: G4/S2	**General**: open, dry, annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. **Micro**: subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	**Present:** Recent observations of burrowing owls have been reported to the CNDDB throughout the study area. All the extension alternatives have the potential to affect this species, since suitable habitat exists throughout the study area.

Table 3.9-1
Special-status Plant and Wildlife Species[1] Potentially Occurring Within the BART to Livermore Extension Study Area

Common Name	Scientific Name	Status[2]	Habitat and Seasonal Distribution in California[3]	Likelihood of Occurrence Within the Study Area[4]
Swainson's hawk	*Buteo swainsoni*	**Fed:** none **CA:** ST **Other** CNDDB: G5/S2	**General**: breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch. **Micro**: requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Present:** No active Swainson's hawk nests are located within the study area, but Alternatives 1, 1a, and 1b have the potential to impact foraging habitat at the proposed Greenville Yard, which is located within 10 miles of an active nest.
Northern harrier	*Circus cyaneus*	**Fed:** none **CA:** SSC **Other:** CNDDB: G5/S3	**General**: coastal salt and fresh-water marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. **Micro**: nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	**Moderate:** Although no recorded occurrences have been reported to the CNDDB, suitable nesting habitat exists north of I-580; along Alternatives 1 1a, 1b, 2, 3, 4; and around the proposed Isabel/I-580 Station and the Greenville Yard.
White-tailed kite	*Elanus leucurus*	**Fed:** none **CA:** SFP **Other:** CNDDB: G5/S3	**General**: rolling foothills and valley margins with scattered oaks, and river bottomlands or marshes next to deciduous woodland. **Micro**: open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Moderate:** Although no recorded occurrences have been reported to the CNDDB, suitable nesting and foraging habitat exists within the study area. Suitable nesting habitat occurs along all alternatives and within the footprint of the proposed Isabel/I-580, Isabel/Stanley, Greenville East, and Vasco Road Stations.
Loggerhead shrike	*Lanius ludovicianus*	**Fed:** none **CA:** SSC **Other:** none	**General:** breeds mainly in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground. **Micro:** require tall shrubs or trees (also use fences or power lines) for hunting perches, territorial advertisement, and pair maintenance; open areas with short grasses, forbs, or bare ground for hunting.	**Present:** Species was observed on January 23, 2009 north of I-580 near El Charro Road and near the proposed Isabel/I-580 Station. This species is likely to occur near all of the alternatives because suitable habitat is found throughout the study area.
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	**Fed:** none **CA:** SSC **Other:** none	**General:** breeds almost exclusively in marshes with tall emergent vegetation, such as tules, or cattails, generally in open areas and edges over relatively deep water. **Micro:** deepwater marshes, particularly those with water depth of at least 30 cm (12 inches).	**Moderate:** CDFG California Bird Species of Special Concern includes eastern Alameda County as historical breeding range. This species could occur along Alternatives 1a, 1b, 2a, 3a, and 5.

Table 3.9-1
Special-status Plant and Wildlife Species[1] Potentially Occurring Within the BART to Livermore Extension Study Area

Common Name	Scientific Name	Status[2]	Habitat and Seasonal Distribution in California[3]	Likelihood of Occurrence Within the Study Area[4]
		Mammals		
Pallid bat	*Antrozous pallidus*	**Fed:** none **CA:** SSC **Other:** CNDDB: G5/S3	**General**: deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. **Micro**: roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Moderate:** CNDDB reports observation of this bat species within the Livermore area. ECORP Consulting conducted surveys for bats along I-580 for the I-580 HOV Expansion Project and found several bat roosts, although no pallid bats were observed. This species could roost in highway structures such as box culverts or bridge structures. All alternatives have some suitable roosting habitat.
		Plants		
Heartscale	*Atriplex cordulata*	**Fed:** none **CA:** none **Other:** CNDDB: G2/S2.2 CNPS: 1B.2	**General**: chenopod scrub, meadows and seeps, valley and foothill grassland, sandy; saline or alkaline. **Micro**: Found at elevations between 0 – 1230 ft. Blooming Apr-Oct.	**Moderate:** CNDDB and CNPS have recorded occurrences of this species within the Springtown area. This species could occur in disturbed annual grassland habitat along all of the alternatives; at the proposed Isabel/I-580 Station; and at the proposed Greenville Yard.
Brittlescale	*Atriplex depressa*	**Fed:** none **CA:** none **Other:** CNDDB: G2/S2.2 CNPS: 1B.2	**General**: chenopod scrub, meadows, seeps, playas, valley and foothill grassland, vernal pools, clay; alkaline habitats. **Micro**: found at elevations ranging from 0 – 1050 ft. Blooming Apr-Oct.	**Present:** CNDDB and CNPS have recorded occurrences of this species within the Greenville Road area, where the Greenville East Station is proposed. This species could occur in disturbed annual grassland habitat along all of the alternatives; at the proposed Isabel/I-580 Station; at the proposed Greenville East Station; and at the proposed Greenville Yard.
San Joaquin spearscale	*Atriplex joaquiniana*	**Fed:** none **CA:** none **Other:** CNDDB: G2/S2.1 CNPS: 1B.2	**General**: chenopod scrub, alkali meadow, and valley and foothill grassland. **Micro**: in seasonal alkali wetlands or alkali sink scrub with *Distichlis*, *Spicata*, *Frankenia*, etc. 0 – 984 ft. Blooming Apr-Oct.	**Present:** CNDDB and CNPS have recorded occurrences of this species around El Charro Road area. This plant could occur in the disturbed annual grassland habitat, along all the alternatives, and within the proposed Isabel/I-580 Station and the Greenville Yard.

Table 3.9-1
Special-status Plant and Wildlife Species[1] Potentially Occurring Within the BART to Livermore Extension Study Area

Common Name	Scientific Name	Status[2]	Habitat and Seasonal Distribution in California[3]	Likelihood of Occurrence Within the Study Area[4]
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	**Fed:** none **CA:** none **Other:** CNDDB: G4/S3.2 CNPS: 1B.2	**General**: valley and foothill grassland. **Micro**: alkaline soils; sometimes described as heavy white clay. 0 -750 ft. Blooming May-Nov.	**Moderate:** CNDDB contains recorded occurrences of this species north of I-580, just east of El Charro Road. This plant could occur in the disturbed annual grassland habitat, along all the alternatives, and within the proposed Isabel/I-580 Station and the Greenville Yard.
Hispid bird's-beak	*Cordylanthus mollis* ssp. *hispidus*	**Fed:** none **CA:** none **Other:** CNDDB: G2/S2.1 CNPS: 1B.1	**General**: meadows and seeps, playas, valley and foothill grassland, alkaline habitats. **Micro**: found at elevations ranging from 1 – 500 ft. Blooming Jun-Sep.	**Moderate:** CNPS and CNDDB have recorded occurrences of this species within the Springtown area of Livermore. This plant could occur in the disturbed annual grassland habitat, along all the alternatives, and within the proposed Isabel/I-580 Station and the Greenville Yard.
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	**Fed:** FE **CA:** SE **Other:** CNDDB: G1/S1.1 CNPS: 1B.1	**General**: chenopod scrub, Valley and foothill grassland, alkaline habitats. **Micro**: found at elevations ranging from 164 – 1295 ft. Blooming May-Oct	**Moderate:** CNPS and CNDDB have recorded occurrences of this species within the Springtown area of Livermore. This plant could occur in the disturbed annual grassland habitat, along all the alternatives, and within the proposed Isabel/I-580 Station and the Greenville Yard.
Livermore tarplant	*Deinandra bacigalupii*	**Fed:** none **CA:** none **Other:** CNDDB: G1/S1.2 CNPS: 1B.2	**General**: meadows and seeps. **Micro**: alkaline soils; found at elevations ranging from 492 – 607 ft. Blooming Jun-Oct	**Present:** CNPS and CNDDB have recorded occurrences of this species within the Greenville East Station area. This species could occur along all of the alternatives, at the proposed Isabel/I-580 and Greenville East Stations; and the Greenville Yard.
Saline clover	*Trifolium depauperatum* var. *hydrophilum*	**Fed:** none **CA:** none **Other:** CNDDB: G5/S2.2 CNPS: 1B.2	**General**: marshes and swamps, valley and foothill grassland, and vernal pools. **Micro**: mesic, alkaline sites. 0-984 feet. Blooming Apr-Jun.	**Moderate:** The CNDDB and CNPS have recorded occurrences of this species north of I-580, west of El Charro Blvd area. This plant could occur in the disturbed annual grassland habitat, along all the alternatives, and within the proposed Isabel/I-580 Station, and the Greenville Yard.
Critical Habitats				
Vernal pool fairy shrimp critical habitat	n/a	**Fed:** critical habitat **CA:** none **Other:** none	n/a	**Present:** Alternative 1, 1a and 1b would impact critical habitat in the vicinity of the Greenville Yard. The proposed Greenville East Station would be located outside of the designated critical habitat.

Table 3.9-1
Special-status Plant and Wildlife Species1 Potentially Occurring Within the BART to Livermore Extension Study Area

Notes:

1. Special-status Plant and Wildlife Species: Plant and Wildlife that were included in this table have a ranking of G3/S3.3 and/or CNPS 2.3, or higher, and were either observed within the study area by a PBS&J biologist, or contained within the query of the: 1) CNDDB (October 2008); 2) USFWS Endangered Species List (October 2008); and/or 3) CNPS Online Inventory (October 2008).

2. *Status:*

   Federal

FE	Federally listed as "Endangered"
FT	Federally listed as "Threatened"
(NMFS)	Species under jurisdiction of the National Marine Fisheries Service
	Critical Habitat USFWS had designated critical habitat for the species within the study area

   State

SE	State listed as "Endangered"
ST	State listed as "Threatened"
SFP	State designated "Fully Protected" or "Protected"
SSC	State designated "Species of Special Concern"

   Other

   CNPS:

B.1	Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California
B.2	Plants rare, threatened, or endangered in California and elsewhere, fairly threatened in California

   CNDDB:

   Global

G1	Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres.
G2	6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3	21-100 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4	Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5	Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

   State

S1	Less than 6 EOs OR less than 1,000 individuals OR less than 2,000 acres
S1.1	very threatened
S1.2	threatened
S2	6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres
S2.1	very threatened
S2.2	threatened
S3	21-100 EOs or 3,000-10,000 individuals OR 10,000-50,000 acres
S3.1	very threatened
S3.2	threatened

3. Unless otherwise noted, "Habitat and Seasonal Distribution in California" is derived from the "General" and "Micro" habitat requirements provided by the CNDDB (February 2009). Blooming period for plant species is derived from the CNPS Online Inventory. Note, moss life forms do not include a blooming period. (October 2008).

4. Likelihood of occurrence evaluations:
   A rating of "present" indicates that the species has been observed in the study area.
   A rating of "moderate" indicates that it is not known if the species is present, but suitable habitat exists in the study area.

likely to occur based on the plant communities (i.e., habitat types) within the study area. Species with a moderate or higher likelihood of occurrence are included in Table 3.9-1. Based on the database queries and the site surveys, 23 sensitive or special-status species could have a moderate or higher likelihood of occurrence in the study area. These include three invertebrates, one fish, one reptile, two amphibians, six birds, one mammal, and nine plant species. No rare natural communities occur within the study area. USFWS-designated critical habitat for California tiger salamander and California red-legged frog is located approximately 0.6 miles north of the Airway Boulevard interchange. Given that this habitat is located well outside of the study area and would not be affected by the BART extension alternatives, it is not discussed further. USFWS-designated critical habitat for vernal pool fairy shrimp is located north of the intersection of Laughlin and Northfront Roads. Figure 3.9-3 shows recorded CNDDB occurrences within a five-mile radius of the study area.

Lack of suitable habitat (e.g., chaparral, sand dunes, oak woodland or savanna), suitable soil substrates (e.g., serpentine, alkaline, sandy soils), and/or suitable elevation clines for known occurrences of special-status plant and animal species generated by the CNDDB, USFWS, and CNPS queries were dismissed, and are not discussed further in this section.

Species Accounts

Life histories of special-status plant and animal species generated by the CNDDB, USFWS, and CNPS lists that have a moderate or higher likelihood of occurring in the study area are described below. Table 3.9-2 shows where in the study area these species are likely to occur.

Vernal pool fairy shrimp (*Branchinecta lynchi*). Vernal pool fairy shrimp are federally listed as threatened. Vernal pool fairy shrimp occur in vernal pools and seasonal wetlands. They may inhabit seasonal wetland habitats found in the study area; there are known CNDDB occurrences for this species within one-half mile of Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and could be present within the footprint of the proposed Isabel/I-580 Station, Greenville Yard, and Vasco Yard tailtracks.

Curved-foot hygrotus diving beetle (*Hygrotus curvipes*). The curved-foot hygrotus diving beetle is not a state or federally listed or species of concern, but is included on the CDFG Special Animals list. This aquatic invertebrate beetle occurs in small seasonal pools and wetlands and small pools left in dry creek beds. It is also typically associated with alkaline tolerant vegetation. Occurrences of this species are known from the northeast portion of the BART extension alternatives and suitable habitat occurs in wetlands, drainages, and arroyos in the study area. This species could occur along Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and within the footprint of the proposed Isabel/I-580 Station, Greenville Yard and Vasco Yard tailtracks.

Table 3.9-2
Likely Presence of Special-Status Plant and Wildlife Species within the BART to Livermore Extension Study Area

Common Name/ Scientific Name	Alignment Alternative (Stations and Yards Excluded)									Stations					Yards		
	1	1a	1b	2	2a	3	3a	4	5	Isabel/ I-580	Isabel/ Stanley	Downtown Livermore Station	Greenville East Station	Vasco Road Station	Portola/ Railroad Yard	Vasco Yard	Greenville Yard
Vernal pool fairy shrimp *Branchinecta lynchi*	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	X	X
Curved-foot hygrotus diving beetle *Hygrotus curvipes*	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	X	X
California linderiella *Linderiella occidentalis*	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	X	X
Central California coastal steelhead Distinct Population Segment (DPS) *Oncorhynchus mykiss*	-	X	X	-	X	-	X	-	X	-	-	X	-	-	-	-	-
Western pond turtle *Actinemys marmorata*	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
California tiger salamander (central population) *Ambystoma californiense*	X	X	X	X	X	-	X	-	X	X	-	-	-	-	-	-	X
California red-legged frog *Rana draytonii*	X	X	X	X	X	X	X	X	X	X	-	-	-	X	-	-	X
Tricolored blackbird *Agelaius tricolor*	-	X	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-
Western burrowing owl *Athene cunicularia*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	X
Swainson's hawk *Buteo swainsoni*	X	X	X	-	-	-	-	-	-	-	-	-	X	-	-	-	X
Northern harrier *Circus cyaneus*	X	-	-	X	-	X	-	X	X	-	-	-	X	-	-	-	
White-tailed kite *Elanus leucurus*	X	X	X	X	X	X	X	X	X	X	-	-	X	-	-	-	X
Loggerhead shrike *Lanius ludovicianus*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	X
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	-	X	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-

Table 3.9-2
Likely Presence of Special-Status Plant and Wildlife Species within the BART to Livermore Extension Study Area

Common Name/ Scientific Name	Alignment Alternative (Stations and Yards Excluded)									Stations					Yards		
	1	1a	1b	2	2a	3	3a	4	5	Isabel/ I-580	Isabel/ Stanley	Downtown Livermore Station	Greenville East Station	Vasco Road Station	Portola/ Railroad Yard	Vasco Yard	Greenville Yard
Pallid bat *Antrozous pallidus*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Heartscale *Atriplex cordulata*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Brittlescale *Atriplex depressa*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
San Joaquin spearscale *Atriplex joaquiniana*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Palmate-bracted bird's-beak *Cordylanthus palmatus*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Livermore tarplant *Cordylanthus palmatus*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X
Saline clover *Trifolium depauperatum* var. *hydrophilum*	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	X	X

Source: PBS&J, 2009.

Notes:

X = potentially present

- = low likelihood of presence

California linderiella (*Linderiella occidentalis*). California linderiella is not state or federally listed or species of concern, but is included on the CDFG Special Animals list. This small fairy shrimp occurs in vernal pools and other seasonal wetlands. Their life history is very similar to that of the vernal pool fairy shrimp, but this species is more widespread. California linderiella commonly occur in Alameda County and may inhabit seasonal wetland habitats found along Alternatives 1, 1a, 1b, 2, 2a, 3, 4, and within the footprint of the proposed Isabel/I-580 Station, Greenville Yard, and Vasco Yard tailtracks.

Central California coast steelhead (*Oncorhynchus mykiss*). The central California coast population of steelhead (CCCS) is a federally threatened species. Critical habitat has been designated for this species but not within the study area. Adult steelhead spend two to three years in the open ocean before returning to their natal streams to spawn. Juveniles spend one to two years in freshwater before migrating to the ocean. Landlocked CCCS are known to occur in Alameda Creek and its tributary, Arroyo Mocho. The only creek in the study area that could support steelhead is Arroyo Mocho. Dams on Alameda Creek currently block the passage of steelhead into and away from the study area. However, restoration efforts within the Alameda Creek watershed would help restore habitat for this species. Several dams have been or are planned for removal and fish ladders will be built (the last fish ladder would be built in 2011 or 2012) in the upcoming years. Currently, CCCS have been found in Arroyo Mocho which is close to or crossed by Alternatives 1a, 1b, 2a, 3a, and 5. Although the proposed Isabel/Stanley Station's northern boundary is along the Arroyo Mocho, construction of the station would not place any fill in the Arroyo Mocho and the station design would incorporate setbacks to avoid direct effects. Indirect effects on Arroyo Mocho could include increase run-off from construction activities and, once constructed, from impervious surfaces, such as parking lots, access roads.

Western pond turtle (*Actinemys marmorata*). The western pond turtle (WPT) is a California Special Concern species. This aquatic turtle ranges throughout much of the state, from the Sierra Nevada foothills to the coast, and in coastal drainages from the Oregon border to the Mexican border. They typically inhabit ponds, slow-moving streams and rivers, irrigation ditches, and reservoirs with abundant emergent and/or riparian vegetation. The turtle requires adjacent (i.e., within 200 to 400 meters of water) uplands for nesting and egg laying, typically in soils with high clay or silt component on unshaded, south-facing slopes. In colder climates, they may spend the winters hibernating in these upland habitats. There are known CNDDB occurrences for this species within one-half mile of the study area and perennial drainages and other aquatic habitats along all the BART extension alternatives provide potential habitat for this species.

California tiger salamander (*Ambystoma californiense*). The California tiger salamander (CTS) is federally listed as threatened and a California candidate species. CTS is most commonly found in annual grassland habitat, but also occurs in grassy understory of open valley-foothill hardwood habitats. The species occurs from near Petaluma, Sonoma County, east through the Central Valley to Yolo and Sacramento counties and south to Tulare County, and from the vicinity of San Francisco Bay south at least to Santa Barbara County. Adults spend most of the year in subterranean refugia, especially burrows of California ground squirrels, and occasionally man-made structures. The primary

cause of decline of CTS populations is the loss and fragmentation of habitat from human activities and the encroachment of nonnative predators. All of the estimated seven genetic populations of this species have been significantly reduced because of urban and agricultural development, land conversion, and other human-caused factors. There are known CNDDB occurrences for this species within three miles of the BART extension alternatives. USFWS protocol requires that known CTS locations be evaluated within three miles of a project. Potentially suitable habitat is located north of I-580 and in the eastern part of Livermore; thus, CTS could occur in the vicinity of Alternatives 1, 1a, 1b, 2, 2a, 3a, and 5.

California red-legged frog (*Rana draytonii*). The California red-legged frog (CRLF) is federally listed as threatened and is a California Special Concern species. This large brown to reddish-brown frog historically occurred over much of the state from the Sierra Nevada foothills to the Coast and from Mendocino County to the Mexican border. CRLF typically inhabit ponds, slow-moving creeks, and streams with deep pools that are lined with dense emergent marsh or shrubby riparian vegetation. Submerged root masses and undercut banks are important habitat features for this species. However, this species is capable of inhabiting a wide variety of perennial aquatic habitats as long as there is sufficient cover and bullfrogs or non-native predatory fish are not present. CRLF is known to survive in ephemeral streams, although only if deep pools with vegetative cover persist through the dry season. Factors that have contributed to the decline of CRLF include destruction of riparian habitat from development, agriculture, flood control practices, or the introduction of exotic predators such as bullfrogs, crayfish, and a variety of non-native fish. USFWS-designated critical habitat for the CRLF is located approximately 0.6 miles north of the Airway Boulevard interchange. Given that this habitat is located well outside the study area, impacts on CRLF critical habitat is not discussed further in this document. There are known CNDDB occurrences for this species within one mile of the footprints for the BART extension alternatives. USFWS protocol requires that occurrences be evaluated within one mile of a project. Potential habitat for CRLF is located north of I-580 and in the eastern part of Livermore, thus CRLF could occur within the footprints of all of the alternatives. Additionally, it is possible that high flow events could bring frogs downstream from upstream habitat into all of the arroyos and creeks along the study area.

Tricolored blackbird (*Agelaius tricolor*). The tricolored blackbird is a California Special Concern species and is endemic to the Central and coastal valleys of California. They are highly gregarious, forming large flocks in both breeding and non-breeding seasons. Nests are built near or over water and occasionally in agricultural fields. Recently, tricolored blackbirds have displayed increased tendencies toward nesting in patches of blackberry, willows, mustard, thistles, nettles, and even grasses. Two colonies are reported in the CNDDB within the Chain of Lakes area and within Arroyo Del Valle (south of the Chain of Lakes area). Wetland habitat associated with the Chain of Lakes occurs along Alternatives 1a, 1b, 2a, 3a, and 5 may provide suitable habitat for this species. Although Arroyo Mocho runs through the proposed Isabel/Stanley Station, the present habitat is not suitable for the tricolored blackbird.

Western burrowing owl (*Athene cunicularia*). The western burrowing owl is a California Special Concern species. Burrowing owls are year-long residents in generally flat, open dry grasslands, pastures, deserts, and shrub lands, and in grass, forbs and open shrub stages of pinyon-juniper and

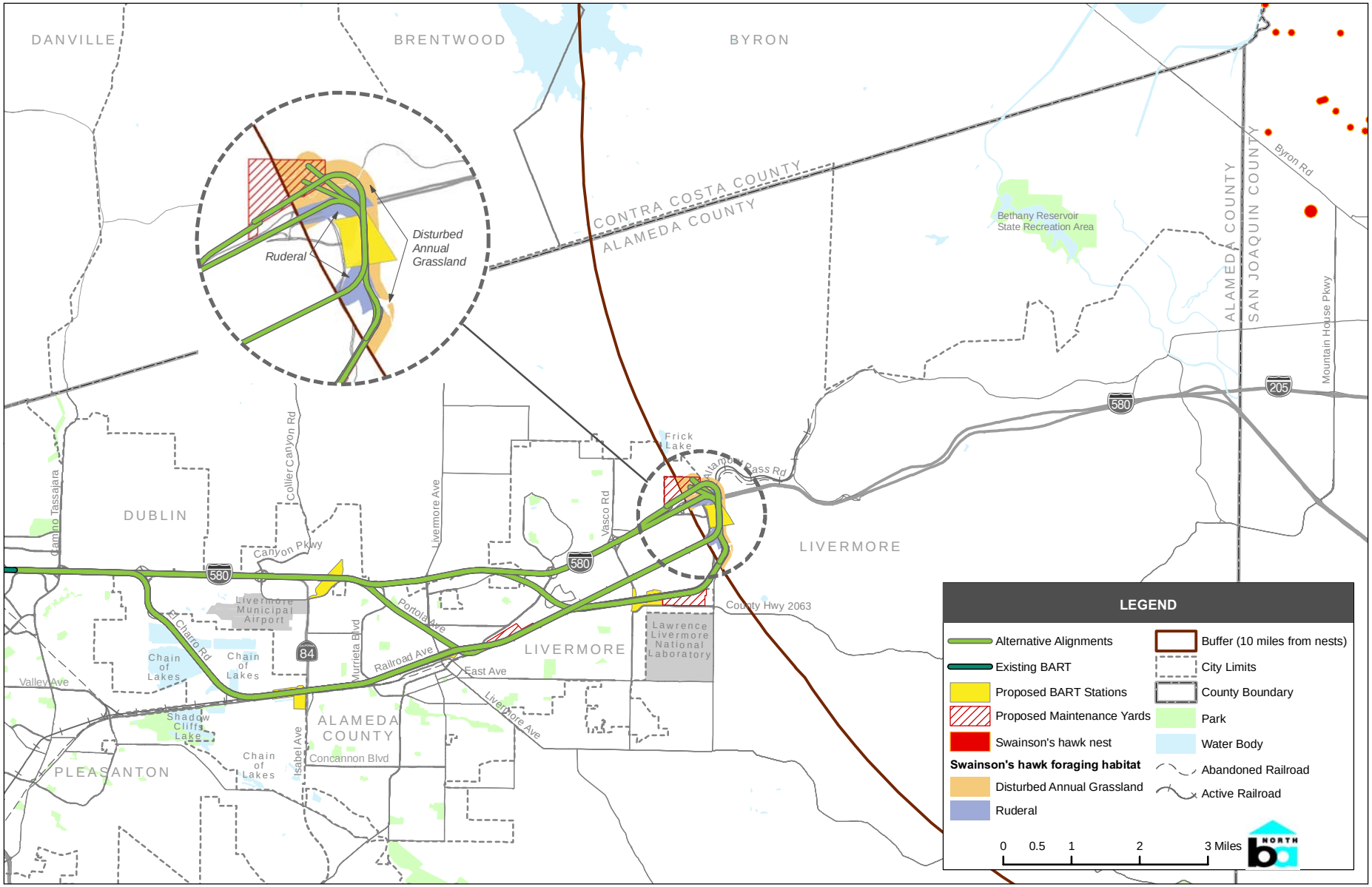
ponderosa pine habitats. They use communal ground squirrel and other small mammal burrow colonies for nesting and cover, as well as artificial structures such as roadside embankments, levees, berms, and have been observed within railroad right-of-ways. They prefer open, dry, nearly level grassland or prairie habitat and can exhibit high site fidelity, often reusing burrows year after year.

Occupancy of suitable burrowing owl habitat can be verified at a site by observation of a pair of burrowing owls during their breeding season (March to August) or, alternatively, by the presence of molted feathers, cast pellets, prey remains (rodents, small reptiles, and large insects), eggshell fragments, or excrement (guano or must), near or at a burrow. There are known CNDDB occurrences for this species within 500 feet of the footprints for the BART extension alternative alignments. However, since suitable habitat exists throughout the study area, this species could occur within any of the footprints for the BART extension alternatives.

Swainson's hawk (*Buteo swainsoni*). The Swainson's hawk is state listed as threatened. They are found during the breeding season throughout the Central Valley where suitable nesting and foraging habitat is available. Swainson's hawks often nest within or peripheral to riparian areas, adjacent to suitable foraging habitat as well as in single or stands of trees in agricultural fields. They are open country birds that forage in large, open grasslands and agricultural fields, especially after the fields have been disced or harvested. Swainson's hawks can forage as much as 10 miles from the nest. A nest has been recorded approximately 9.5 miles east of the Greenville Yard (Figure 3.9-4). Swainson's hawks are not known to nest in the Livermore area; however, they can use the grassland, north of I-580 as foraging habitat. Suitable grassland foraging habitat occurs within the footprint of the Greenville Yard that would be use by Alternatives 1, 1a, and 1b.

Northern harrier (*Circus cuaneus*). The northern harrier is a California Species of Special Concern, and it is also protected under the Migratory Birth Treaty Act (MBTA). Northern harriers breed and forage in a variety of open (treeless) habitats (freshwater marsh, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands including those with vernal pools, weed fields, ungrazed or lightly grazed pastures) that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting, plucking, and lookout perches such as shrubs or fence posts. Harriers nest on the ground, mostly within patches of dense, often tall, vegetation in undisturbed areas. Harriers feed on a broad variety of small- to medium-size vertebrates, primarily rodents and passerines (small birds). The primary threats to breeding harriers are loss and degradation of nesting and foraging habitat.[17] Potentially suitable habitat could exist within the grassland habitat north of I-580. Northern harrier nests could be found within the grassland areas along Alternatives 1, 1a, 1b, 2, 3, and 4; and within the proposed Isabel/I-580 Station and Greenville Yard footprints.

[17] Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. *Studies of Western Birds 1*. Western Field Ornithologists, Camarillo, California and California Department of Fish and Game, Sacramento.



Source: CDFG, June 2009; AECOM 2009; PBS&J 2009.

SWAINSON'S HAWK NEST OCCURRENCES IN THE BART TO LIVERMORE VICINITY

FIGURE 3.9-4

White-tailed kite (*Elanus leucurus*). The white-tailed kite is a state "fully protected" raptor. It breeds between February and October and feeds on rodents, small reptiles, and large insects in fresh emergent wetlands, annual grasslands, pastures, and ruderal vegetation. Unlike other raptors, kites often roost and occasionally nest communally; therefore, disturbance of a relatively small roost or nesting area could affect a large number of birds. Suitable foraging habitat occurs within the study area. At least five white-tailed kites were observed foraging over grassland habitat, north of I-580 and the Greenville Yard area, within the study area during the field survey visits. Suitable nesting habitat can be found in the riparian area of El Charro Road, the Isabel/I-580 and Isabel/Stanley Stations, and potentially within the Vasco Road Station area. Suitable nesting habitat exists along all of the BART extension alternatives, since all the alternatives travel through along I-580 or El Charro Road.

Loggerhead shrike (*Lanius ludovicianus*). The loggerhead shrike is a California Species of Special Concern and it is also protected under the MBTA. The loggerhead shrike prefers open country with short vegetation: pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands. They feed primarily on insects or small rodents in grasslands adjacent to woodland areas. During the breeding season the loggerhead shrike might nest near isolated trees or large shrubs with thorns, when trees or shrubs are lacking, birds will also build in brush piles, tumbleweeds or "hardwood debris."[18] This species was seen within the grassland habitat north of I-580 and El Charro Road and again within the existing Vasco Road Station area. This species could be found along any of the BART extension alternatives, since suitable nesting and foraging habitat is present throughout the study area.

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*). The Yellow-headed blackbird is a California Species of Special Concern, and it is also protected under the MBTA. This species breeds almost exclusively in marshes with tall emergent vegetation, such as tules (*Scirpus* spp.) or cattails (*Typha* spp.), generally in areas with relatively deep water. The overall diet of the yellow-headed blackbird is seeds and, to a minor extent, insects. During breeding, however, adults forage primarily on insects and feed young almost entirely aquatic insects such as damselflies. Eastern Alameda County is listed as historical breeding range for this species. Habitat loss – primarily wetland drainage for irrigation, flood control, or water diversion – is the main threat to this species.[19] The Chain of Lakes area provides suitable nesting habitat for the Yellow-headed blackbird. As a result, this species could occur along Alternatives 1a, 1b, 2a, 3a and 5 which pass the Chain of Lakes area.

Pallid bat (*Antrozous pallidus*). The pallid bat is a California Species of Special Concern. The pallid bat is common in arid regions with rocky outcroppings, particularly near water. This gregarious species usually roosts in small colonies of 20 or more individuals in rock crevices and buildings, but

[18] Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). In Birds of North America, No. 231 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.'

[19] Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. *Studies of Western Birds 1*. Western Field Ornithologists, Camarillo, California and California Department of Fish and Game, Sacramento.

occasionally roosts in caves, mines, rock piles, highway structures (i.e., box culverts, overpasses) and tree cavities. They chiefly feed on large prey that is taken on the ground or, perhaps less frequently, in flight within a few meters of the ground or from the surfaces of vegetation. Prey items include scorpions, crickets, centipedes, ground beetles, grasshoppers, cicadas, and katydids, as well as lizards and rodents. ECORP Consulting conducted bat surveys for the I-580 HOV Lanes Expansion Project and found several bat colonies but no pallid bats were identified. This bat could occur along any of the BART extension alternatives, because suitable roosting habitat exists nearby.

Heartscale (*Atriplex cordulata*). Heartscale is a CNPS List 1B.2 species. It is a member of the goosefoot (*Chenopodiaceae*) family that occurs in saline or alkaline habitats, including chenopod scrub, meadows and seeps, and valley and foothill grasslands. The flowering period of this species is April to October, and occurs at elevations ranging from 1 to 1,230 feet. This species is threatened by grazing, development, and agriculture. Potentially suitable grassland habitat for this species is located along all of the alternatives and within the proposed Isabel/I-580 Station area and Greenville Yard footprints.

Brittlescale (*Atriplex depressa*). Brittlescale is a CNPS List 1B.2 species. It is a member of the goosefoot (*Chenopodiaceae*) family that occurs in chenopod scrub, meadows and seeps, alkaline/clay vernal pools, and alkaline valley and foothill grasslands. The flowering period of this species is May to October, and occurs at elevations ranging from 1 to 1050 feet. This species is threatened by grazing, development, and agriculture. This species has been recorded within the Greenville Road area, potentially within the proposed Greenville East Station area. Potentially suitable grassland habitat for this species is located along all of the alternatives, and within the proposed Isabel/I-580 Station, Greenville East Station, and Greenville Yard footprints.

San Joaquin spearscale (*Atriplex joaquiniana*). San Joaquin spearscale is a federal species of concern and CNPS List 1B.2 species. It is a member of the goosefoot (*Chenopodiaceae*) family that occurs in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland habitats. The flowering period for this species is April through October, and occurs at elevations ranging from 1 to 984 feet. This species is threatened by grazing, development, and agriculture. Suitable grassland habitat for this species is located along all of the alternatives, and within the proposed Isabel/I-580 Station and Greenville Yard footprints. In addition, there are known occurrences of this species adjacent to the Arroyo Mocho and the Staples Ranch site. The Staples Ranch Specific Plan includes a proposed community park, which may include native plants, such as the San Joaquin spearscale in the landscaping plan.

Congdon's tarplant (*Centromadia parryi* var. *congdonii*). Congdon's tarplant is a CNPS List 1B.2 species. It is a member of the sunflower (*Asteraceae*) family, and occurs in valley and grassland habitats with alkaline soil substrates. The flowering period for this species is May to October, and occurs at elevations ranging from 1 to 750 feet. It is severely threatened by development. Potentially suitable grassland habitat for this species is located along all of the alternatives and within the proposed Isabel/I-580 Station and Greenville Yard footprints.

Hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus*). Hispid bird's-beak is a CNPS List 1B.1 species. It is a member of the figwort (*Scrophulariaceae*) family and blooms from June to September. It is a bristly, much-branched annual, green-root parasitic species 10 – 40 centimeters tall. It occurs in meadows, seeps, playas, and valley and foothill grassland with alkali soil substrates at elevations ranging from 1 to 155 feet. Potentially suitable grassland habitat for this species is located along all of the alternatives, and within the proposed Isabel/I-580 Station and Greenville Yard footprints.

Palmate-bracted bird's beak (*Cordylanthus palmatus*). Palmate-bracted bird's beak is federally and state endangered and a CNPS List 1B.1 species. It is a member of the figwort (*Scrophulariaceae*) family and blooms from May to October. It is an annual herb (hemiparasitict). It occurs in chenopod scrub, valley and foothill grasslands with alkaline soils substrates at elevations ranging from 164 to 1295 feet. Potentially suitable grassland habitat for this species is located along all of the alternatives, and within the proposed Isabel/I-580 Station and Greenville Yard footprints.

Livermore tarplant (*Deinandra bacigalupii*). The Livermore tarplant is a CNPS List 1B.2. It is a member of the sunflower (*Asteraceae*) family and blooms from June to October. It is an annual herb occurring in meadows and seeps with alkaline soils substrates at elevations ranging from 492 to 607 feet. This species has been previously recorded within the Greenville East Station area. Potentially suitable meadow habitat for this species is located along all of the alternatives; within the proposed Isabel/I-580 and Greenville East Station footprints; and possibly within the Greenville Yard.

Saline clover (*Trifolium depauperatum* var. *hydrophilium*). Saline clover is a CNPS List 1B.2 species. It is a member of the legume (*Fabaceae*) family and blooms from April to June. It is found in marshes and swamps, valley and foothill grasslands in alkaline soil substrates, and vernal pools at elevations ranging from 0 to 984 feet. It is threatened by development, trampling, road construction, and vehicles. The CNDDB has recorded occurrences for this species north of I-580 just west of El Charro Road. Potentially suitable grassland habitat for this species is located along all of the alternatives; within the proposed Isabel/I-580 Station footprint; and possibly within the Greenville Yard footprint.

Sensitive Habitats

Wetlands and Other Waters of the U.S. Jurisdictional wetland features found within the study area could include, but are not limited to, seasonal wetlands, riparian scrub, and freshwater marsh habitats.

Under Section 404 of the Clear Water Act (CWA), the United States Army Corps of Engineers (USACE) has the authority to regulate activity that discharges fill or dredge material or otherwise adversely modify wetlands or other waters of the U.S. Waters of the U.S. are defined as follows:

1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2) All interstate waters including interstate wetlands;

3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:

   i) Which are or could be used by interstate or foreign travelers for recreational or other purposed; or

   ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

   iii) Which are used or could be used for industrial purpose by industries in interstate commerce;

4) All impoundments of water otherwise defined as waters of the United States under the definition;

5) Tributaries of waters identified in paragraphs (1)-(4) of this section;

6) The territorial seas; and

7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1)-(6) of this section. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the U.S. The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes and the like are "adjacent wetlands."

Wetlands are further defined as those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Non-jurisdictional wetlands are those wetlands that do not fit the description of jurisdictional wetlands. However, federally non-jurisdictional wetlands that are not covered by the Clean Water Act, including most vernal pools, are still considered sensitive habitats and are protected as "waters of the State" by the SWRCB and RWQCBs, under the authority of the California Porter-Cologne Act.

The BART extension alternatives intersect several "waters of the U.S.," including Cottonwood Creek, Arroyo las Positas, Cayetano Creek, Altamont Creek, Arroyo Mocho, Collier Canyon Creek, Granada Channel, and unnamed tributaries. Some of these watercourses have been historically channelized and altered to some extent beneath I-580 for storm drainage management or for agricultural purposes. The distribution of observed wetlands within the study area corresponds to subtle differences in topography, soils, and land use along the study area; creeks are found throughout the BART extension alternatives and most of the wetlands are found in the non-urban areas of Pleasanton and Livermore, north of I-580, and at the eastern end of the BART extension alternatives at the Greenville East Station area. Frick Lake is a seasonal wetland located north of I-580, northeast of the intersection of Laughlin Road

and Bluffs Drive. Frick Lake is located outside of the BART to Livermore biological survey area (by approximately one-half mile), and it is not hydrologically connected to the proposed Greenville Yard site; therefore, no impacts are expected from the construction and/or operation of the BART extension alternatives in this area.

Critical Habitat

In 2005 the USFWS published the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Recovery plans are developed and implemented for species of animals and plants listed as endangered of threatened unless such plans would not promote the conservation of the species. In this report, the USFWS identified vernal pool habitats within both states. The Livermore Vernal Pool Region, which straddles Alameda, Contra Costa and Santa Clara counties, was identified in this report. The Altamont Hills core area is part of the Livermore Vernal Pool Region. On February 10, 2006 the USFWS designated critical habitat for four vernal pool crustaceans and eleven vernal pool plants. Critical habitat Unit 19C was designated, for vernal pool fairy shrimp, within the Altamont Hills core area (see Figure 3.9-3). The proposed Greenville Yard would be located within the southeastern most part of Unit 19C. This area is located north of the intersection of Laughlin and Northfront Roads.

Wildlife Corridors

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. The study area is not part of a major or local wildlife corridor/travel route, because it does not connect two significant habitats.[20] Additionally much of the study area has already been divided by I-580, and wildlife are not likely to move through the study area north to south (or vice versa). The creeks and arroyos within the study area do not serve as wildlife corridors since they do not connect two significant habitat areas.

Applicable Policies and Regulations

A number of federal and State statutes and local policies provide the regulatory structure that guides the protection of biological resources. The following discussion summarizes those laws and regulations that are most relevant to biological and wetland resources found within the study area.

Federal Endangered Species Act (ESA). The ESA protects fish and wildlife species that have been identified as threatened or endangered by the USFWS or National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). The ESA also protects their habitats. Endangered refers to species, subspecies, or distinct populations that are in danger of extinction through all or a significant portion of their range; threatened refers to species, subspecies, or distinct populations that are likely to become endangered in the near future. Federally threatened

[20] California Wilderness Coalition, *Missing Linkages: Restoring Connectivity to the California Landscape*, November 2000.

species likely to occur in the study area include, but are not limited to, vernal pool fairy shrimp and California tiger salamander.

The USFWS and NOAA Fisheries administer the ESA. In general, NOAA Fisheries is responsible for protection of ESA-listed marine species and anadromous fishes; whereas, listed, proposed, and candidate wildlife and plant species and inland fish species are under USFWS jurisdiction. Section 9 of the ESA prohibits the unlawful take of federally threatened or endangered species. Take of listed species can be authorized through the Section 7 consultation process for actions either undertaken or funded by federal agencies, or take can be authorized through the Section 10 permit process for actions undertaken by nonfederal agencies. Federal agency actions include activities that are on federal land, conducted by a federal agency, funded by a federal agency, or authorized by a federal agency (including issuance of federal permits and licenses).

Under Section 7, the federal agency conducting, funding, or permitting an action (i.e., the federal lead agency) must consult with the USFWS or NOAA Fisheries, 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. In response, the USFWS issues a biological opinion (BO) with a determination that the proposed action either:

- 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) or
- 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 the USFWS may stipulate discretionary "reasonable and prudent" conservation measures. If the project does not jeopardize a listed species, the USFWS issues an incidental take statement to authorize the proposed activity.

In cases where a nonfederal entity is undertaking an action that does not require federal authorization, the take of listed species must be permitted by the USFWS through the Section 10 process. If the proposed project would result in the incidental take of a listed species, the applicant must first obtain a Section 10(a)(1)(B) incidental take permit (ITP). Incidental take under Section 10 is defined as take of federally listed fish and wildlife species "that is incidental to, but not the purposes of, otherwise lawful activities." To receive an ITP, the nonfederal entity is required to prepare a Habitat Conservation Plan, which must include conservation measures that avoid, minimize, and mitigate the project's impact on listed species and their habitat.

Clean Water Act. The CWA was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. The CWA now serves as the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands.

The CWA empowers the EPA to set national water quality standards and effluent limitations and includes programs addressing both point-source and nonpoint-source pollution. Point-source pollution originates or enters surface waters at a single, discrete location, such as an outfall structure or excavation on a construction site. Nonpoint-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool.

Additional details on specific sections of the CWA are provided below. These sections apply to many, if not all, of the wetlands in the study area.

Section 401. Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with Section 401.

Section 402. CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, administered by the EPA. In California, the State Water Resources Control Board (SWRCB) is authorized by the EPA to oversee the NPDES program through the Regional Water Quality Control Boards (RWQCBs) (see Porter-Cologne Water Quality Control Act below). The study area is under the jurisdiction of the San Francisco Bay RWQCB.

NPDES permits are required for projects that disturb more than 1 acre of land and for discharge of groundwater into waterways. The NPDES permitting process requires the applicant to file a public Notice of Intent (NOI) to discharge stormwater and to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP includes a site map and a description of proposed construction activities. In addition, it describes the best management practices (BMPs) that will be implemented to prevent soil erosion and discharge of other construction-related pollutants (e.g., petroleum products, solvents, paints, cement) and potential groundwater pollutants that could contaminate nearby water resources. Permittees are required to conduct monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants.

Section 404. CWA Section 404 regulates the discharge of dredged and fill materials into waters of the U.S. Waters of the U.S. refer to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including non-perennial drainages with a defined bed and bank and any drainage channel that conveys natural runoff, even if it has been realigned, and seasonal and perennial wetlands, including coastal wetlands. Recent legal decisions have limited the USACE's jurisdiction on wetlands that are isolated from or lack a significant nexus to navigable waters. Those wetlands that are not under the USACE's jurisdiction would still fall under the state's jurisdiction, as waters of the State, under the Porter-Cologne Water Quality Control Act, described below.

Applicants must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the U.S., including wetlands, before proceeding with a proposed activity. As part of the wetland delineation and verification process, the USACE will determine whether the wetlands in the study area are regulated under Section 404.

The USACE may issue either an individual permit evaluated on a case-by-case basis or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met for the NWP to apply to a particular project. Waters of the U.S. in the study area are under the jurisdiction of the USACE Sacramento District.

Compliance with Section 404 requires compliance with several other environmental laws and regulations. The USACE cannot issue an individual permit or verify the use of a general permit until the requirements of NEPA, ESA, and National Historic Preservation Act have been met. In addition, the USACE cannot issue or verify any permit until a water quality certification or waiver of certification has been issued pursuant to Section 401.

Certain activities are exempt from the Section 404 permitting process, including:

- Farming, ranching, and forestry activities that are considered normal and ongoing (as of 1985 conditions), such as plowing, harvesting, and minor drainage of upland areas to waters of the U.S.
- Construction and maintenance of stock ponds and irrigation ditches.
- Maintenance of drainage ditches.
- Construction of temporary sedimentation basins in upland areas.
- Construction and maintenance of farm, forest, and mining roads in accordance with BMPs.
- Other activities regulated by an approved program of BMPs authorized by CWA Section 208(b)(4).

Section 404 permits may be issued only for the project's "Least Environmentally Damaging Practical Alternative." That is, authorization of a proposed discharge is prohibited if there is a practicable alternative that would have less adverse impacts and lacks other significant adverse consequences.

Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act requires consultation with the USFWS when the waters of any stream or other body of water are proposed, authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified under a federal permit or license (16 USC 661-667[e]). Most USFWS comments on applications for permits under CWA Section 404 or River and Harbors Act Section 10 are conveyed to the USACE through the consultation process required by this act. As a result, this act will likely be used as part of the CWA permitting process.

The USFWS provides advisory comments and recommends mitigation measures to avoid impacts on wetlands or modify activities that may directly affect wetlands. Mitigation recommended by the USFWS may include restoring or creating habitat to avoid a net loss of wetland functions and values. Although consultation with the USFWS is required, the USACE is not required to implement USFWS recommendations.

Migratory Bird Treaty Act. The Federal Migratory Bird Treaty Act (16 USC 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the U.S. Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Many species of birds are expected to nest within the study area and would be subject to the protection afforded by this federal legislation.

Executive Order 13186, signed January 10, 2001, directs each federal agency taking actions that will have or will likely have a negative impact on migratory bird populations to work with the USFWS to develop an MOU to promote the conservation of migratory bird populations. Protocols developed under the MOU will include the following agency responsibilities:

- Avoid and minimize, to the extent possible, adverse impacts on migratory bird resources when coordinating agency actions.
- Restore and enhance habitat of migratory birds, as practicable.
- Prevent or abate the detrimental alteration of environment for the benefit of migratory birds, as practicable.

Executive Order 11990, Protection of Wetlands. Executive Order 11990 (issued in 1977) is an overall wetland policy for all federal agencies managing federal lands, sponsoring federal projects, or providing federal funds to state and local projects. It requires federal agencies to follow procedures for avoidance, mitigation, and preservation, with public input, before proposing new construction in wetlands. Compliance with CWA Section 404 permit requirements may constitute compliance with the requirements of Executive Order 11990. The DOT's policies for complying with Executive Order 11990 are set forth in DOT Order 5660 1.A, and its regulations for implementing Executive Order 11990 are provided in 23 CFR 777. Wetlands in the study area would be protected by this Executive Order.

California Endangered Species Act. California Endangered Species Act (CESA) protects plant and wildlife species that have been designated by CDFG as threatened or endangered. CESA prohibits the take of endangered and threatened species. Under CESA, take is defined as an activity that would directly or indirectly kill an individual of a species. The definition of take does not include harm or harassment of state-listed species or the destruction of their habitat. In accordance with the CESA, CDFG has jurisdiction over state-listed species (California Fish and Game Code 2070). Additionally, CDFG maintains lists of species of special concern that are defined as species that appear to be vulnerable to extinction because of declining populations, limited ranges, or continuing threats. Swainson's hawk and palmate-bracted bird's-beak are state-listed species that could occur in the study area.

California Fish and Game Code. The California Fish and Game Code provides protection from take for a variety of species.

Fully Protected Species. Fully protected fish species are protected under Section 5515; fully protected amphibian and reptile species are protected under Section 5050; fully protected bird species are protected under Section 3511; and fully protected mammal species are protected under Section 4700. The California Fish and Game Code defines take as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Except for take related to scientific research, all take of fully protected species is prohibited. White-tailed kite is a fully protected species likely to occur in the study area.

Sections 3503 and 3503.5. Section 3503 of the California Fish and Game Code prohibits the killing of birds or the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and the destruction of raptor nests. Many bird species could potentially nest in the study area or vicinity. These nests would be protected under these sections of the California Fish and Game Code.

California Native Plant Protection Act. Regarding rare plant species, CESA defers to the California Native Plant Protection Act of 1977. This act prohibits importing rare and endangered plants into California, taking rare and endangered plants, and selling rare and endangered plants. State-listed plants are protected mainly in cases where state agencies are involved in projects under CEQA. In these cases, plants listed as rare under the Native Plant Protection Act are not protected under CESA but can be protected under the act through the CEQA process. The eight special-status plant species potentially or known to occur in the study area would be protected under this act.

Streambed Alterations. Under Sections 1600–1607 of the California Fish and Game Code, the CDFG has jurisdictional authority over rivers, streams, and lakes from which fish and wildlife derive benefit. Under Section 1602, CDFG regulates projects that will 1) divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit; 2) use material from the streambeds designated by the department; or 3) result in the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake designated by the department. A proponent of a project that has the potential to affect a stream- or lakebed is required to notify the CDFG of the proposed activity.

The ephemeral drainages within the study area are likely to meet the California Fish and Game Code's definition of a stream and would be subject to CDFG regulation, and the CDFG would need to be notified before undertaking activities in the ephemeral drainages. It is likely that CDFG would require a lake or streambed alteration agreement for construction across these drainages.

Porter-Cologne Water Quality Control Act. Section 13260(a) of the Porter-Cologne Water Quality Control Act (contained in the California Water Code) requires any person discharging waste or proposing to discharge waste, other than to a community sewer system, within any region that could affect the quality of the waters of the State (all surface and subsurface waters) to file a report of waste discharge (ROWD). The discharge of dredged or fill material may constitute a discharge of waste that

could affect the quality of waters of the State. All of the wetlands and waterways in the study area are waters of the State, which are protected under this act.

Historically, California relied on its authority under Section 401 of the CWA to regulate discharges of dredged or fill material to California waters. That section requires an applicant to obtain "water quality certification" from the SWRCB through its RWQCBs to ensure compliance with state water quality standards before certain federal licenses or permits may be issued. The permits subject to Section 401 include permits for the discharge of dredged or fill materials (CWA Section 404 permits) issued by the USACE. Waste discharge requirements under the Porter-Cologne Water Quality Control Act were typically waived for projects that required certification. With the recent changes that limited the jurisdiction of wetlands under the CWA, the SWRCB has needed to rely on the ROWD process.

California Native Plant Society (CNPS). CNPS maintains an inventory of special-status plant species. CNPS maintains four species lists of varying rarity. Vascular plants listed as rare or endangered by the CNPS,[21] but which have no designated status or protection under federal or state-endangered species legislation, are defined as follows:

List 1A Plants Believed Extinct.

List 1B Plants Rare, Threatened, or Endangered in California and elsewhere.

List 2 Plants Rare, Threatened, or Endangered in California, but more numerous elsewhere.

List 3 Plants About Which More Information is Needed – A Review List.

List 4 Plants of Limited Distribution – A Watch List.

Threat Code Extension—The CNPS ranking system describes how endangered plants are in California. The extension code descriptions are as follows:

1. Species seriously endangered in California,
2. Species fairly endangered in California,
3. Species not very endangered in California.

In general, plants appearing on CNPS List 1 or 2 are considered to meet CEQA Guidelines Section 15380 criteria. All eight special-status plant species are CNPS List 1B.

Alameda County Regulation of Trees in County Right-of-Way. Although BART is exempt under state law from compliance with local land use ordinances, it does look to local tree ordinances to identify protected trees. Chapter 12.11 of the Alameda County General Ordinance Code contains the Regulation of Trees in County Right-of-Way, which requires approval for the removal of any tree, within the County Right-of-Way, that meet the following criteria: any woody perennial plant characterized by having a single trunk or multi-trunk structure at least ten feet high and having a major trunk that is at least two inches in diameter taken at breast height (DBH) taken at four and one half feet

[21] California Native Plant Society, *California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (sixth edition), 2001.

from the ground. The criteria also include those plants generally designated as trees and any trees that have been planted as replacement trees under the county tree ordinance or any trees planted by the county.

City of Dublin Heritage Tree Ordinance. Chapter 5.60 of the City of Dublin Municipal Code contains the Heritage Tree Ordinance which establishes regulations controlling the removal of and the preservation of heritage trees within all properties within the city. Section 5.60.040 defines Heritage Trees as follows:

1. Any oak, bay, cypress, maple, redwood, buckeye and sycamore tree having a trunk or main stem of twenty-four (24) inches or more in diameter measured at four (4) feet six (6) inches above natural grade;
2. A tree required to be preserved as part of an approved development plan, zoning permit, use permit, site development review or subdivision map;
3. A tree required to be planted as a replacement for an unlawfully removed tree.

City of Pleasanton Tree Preservation Ordinance. Chapter 17.16 of the City of Pleasanton Municipal Code contains the Tree Preservation Ordinance which promotes and protects the public health, safety and general welfare by providing for the regulation of planting, maintenance and removal of heritage trees within the city. Section 17.16.006 defines Heritage Tree as:

1. Any single-trunked tree with a circumference of 55 inches or more measured four and one-half feet above ground level;
2. Any multi-trunked tree of which the two largest trunks have a circumference of 55 inches or more measured four and one-half feet above ground level;
3. Any tree 35 feet or more in height;
4. Any tree of particular historical significance specifically designated by official action;
5. A stand of trees, the nature of which makes each dependent upon the other for survival or the area's natural beauty.

City of Livermore Street Trees and Tree Preservation. Chapter 12.20 of the City of Livermore Municipal Code contains the Street Trees and Tree Preservation Ordinance. The Ordinance is broken into two articles, Article I: Street Trees and Article II: Preservation of Trees. Section 12.20.160 defines protected tree as a tree that meets the following criteria:

1. Any tree located on private property occupied by single-family residential development that meets the following criteria:
    a) Any tree with a circumference (CBH) of 60 inches or more; or
    b) Any California native (see Table 3.9-3) tree having a circumference (CBH) of 24 inches or more;

Table 3.9-3
Native Trees in the City of Livermore

Scientific Name	Common Name
Acer macrophyllum	Big leaf maple
Aesculus californica	California buckeye
Alnus rhombifolia	Alder
Arbutus meziesii	Madrone
Juglans hindsii californica	California black walnut
Pinus sabiniana	Grey pine
Platanus racemosa	California sycamore
Quercus agrifolia	Coast live oak
Quercus berberidifolia	Scrub oak
Quercus chrysolepis	Canyon live oak
Quercus douglasii	Blue oak
Quercus kelloggii	California black oak
Quercus lobata	Valley oak
Quercus wislizenii	Interior live oak
Umbellularia californica	California bay

Source: City of Livermore, Municipal Code, Title 12, Chapter 12, Article 20.

2. Any tree located on private property occupied by commercial, industrial, institutional (i.e., religious, public agency, hospital, care facilities, etc.), mixed-use or multifamily residential (two or more units) development with a circumference (CBH) of 24 inches or more; or

3. Any tree located on an undeveloped or underdeveloped property, regardless of zoning district, use, or development status, for which new development is proposed, with a circumference (CBH) of 18 inches or more; or

4. Any tree located in an open space, riparian, or habitat area with a circumference (CBH) of 18 inches or more; or

5. Any tree approved as part of a site plan approval, or required as a condition of approval for a development project, zoning use permit, use permit or other site development review; or

6. Any tree designated by the city council as determined to be an ancestral tree; and/or

7. Any tree listed on the city's ancestral tree inventory; or

8. Any tree required to be planted as mitigation for unlawfully removed trees.

Impact Assessment and Mitigation Measures

Standards of Significance

A project alternative would result in a significant impact to biological resources if it were to result in a:

- Substantial effect, either directly or through habitat modifications, on any candidate, sensitive, or special-status species;
- Substantial effect on any riparian habitat or other sensitive natural community;
- Substantial effect on protected wetlands;
- Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

For each biological resources impact analyzed below, a level of significance is determined for each project alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, BIO refers to Biological Resources.

Environmental Analysis

Table 3.9-4 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, through identified mitigation measures, all potentially significant impacts would be ameliorated to less-than-significant levels for all alternatives. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.9-5 includes a summary of Impacts BIO-1 to BIO-9. A more detailed description of impacts for each alternative follows.

BIO-1 Jurisdictional Wetlands, Other "Waters of the U.S." and "Waters of the State"

Several low-gradient creeks and their tributaries meander through or cross the footprints of the BART extension alternatives. These include Tassajara Creek, Cottonwood Creek, Collier Canyon Creek, Granada Canal, Arroyo Mocho, Arroyo Seco, Altamont Creek, unnamed tributaries, and Arroyo las Positas. With the exception of Arroyo las Positas, the portions of these creeks within the study area have been channelized and have concrete beds and banks. Portions of Arroyo las Positas have also been realigned and channelized to accommodate

construction of I-580 and development in the surrounding area. Drainage ditches generally run parallel to I-580 and along the edge of the right-of-way, and they have been designed to convey stormwater runoff from I-580 into adjacent drainages.[22]

Potential wetland habitat is likely located along undeveloped portions north and south of I-580 between El Charro Road and Doolan Road and Shea Center Drive and 1st Street; within the proposed Isabel/I-580 Station and Greenville East Station footprints; and the Greenville Yard area (see Figures 3.9-2 a through 3.9-2f). It is also possible that wetlands may be found within the UPRR and SPRR rights-of-way. The exact final location for the proposed stations within the footprint of the stations is not known, but the stations would not occupy the entire station footprint. Construction techniques are unknown at this time, but could require the placement of fill material in wetlands, waters of the U.S. and/or waters of the State, which would result in a potentially significant impact. A more detailed description of the impacts on wetlands, waters of the U.S. and waters of the State associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on wetlands, waters of the U.S., or waters of the State.

Alternative 1 – Greenville East. This alternative would cross the following watercourses – two unnamed tributaries, Tassajara Creek, Cottonwood Creek, Collier Canyon Creek, Arroyo las Positas, Cayetano Creek, Arroyo Seco, and Altamont Creek. The expansion of I-580 between the existing Dublin/Pleasanton Station and Las Positas Road could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Additionally, approximately 24 acres of potential wetland habitat is located in the undeveloped parcels: 1) south of I-580 and west of Livermore Avenue; 2) on both the north and south sides of I-580, between Livermore Avenue and the Las Colinas Road overcrossing; and 3) in the footprints of the proposed Isabel/I-580 and Greenville East Stations and the Greenville Yard. Construction activities associated with this alternative could require the placement of fill material in wetlands, waters of the U.S., and waters of the State which would result in a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would cross the following watercourses – Tassajara Creek, an unnamed tributary to Arroyo Mocho, Arroyo Mocho, Arroyo las Positas, Granada Canal, Arroyo Seco, and Altamont Creek. This alternative would include the development of the proposed Greenville East Station and

[22] Caltrans, 2006.

Table 3.9-4
Summary Comparison for Permanent Biological Resources Impacts in the BART to Livermore Extension Study Area

Alternative	Wetlands, Waters of the U.S., Waters of the State		Special-status Plants and Habitat		Swainson's Hawk Foraging Habitat		Special-status Amphibians and Reptiles, and Habitat		Special-status Vernal Pool Invertebrates and Habitat		Vernal Pool Fairy Shrimp Critical Habitat		California Central Coast Steelhead		Trees, Heritage Trees and Tree Preservation	
	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 - Greenville East	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	NI	NA	PS	Yes
1a - Downtown-Greenville East via UPRR	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes
1b - Downtown-Greenville East via SPRR	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes	PS	Yes
2 – Las Positas	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	NI	NA	PS	Yes
2a - Downtown-Vasco	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes
3 - Portola	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	NI	NA	PS	Yes
3a - Railroad	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes
4 - Isabel/I-580	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	NI	NA	PS	Yes
5 - Quarry	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes	NI	NA	PS	Yes	PS	Yes

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact NA = Not applicable

Table 3.9-5
Comparative Biological Resources Impacts of BART Extension Alternatives

Alternative	Wetlands, Waters of the U.S., Waters of the State	Special-status Plants and Habitat	Swainson's Hawk Foraging Habitat	Special-status Amphibians and Reptiles, and Habitat	Special-status Vernal Pool Invertebrates and Vernal Pool Fairy Shrimp Critical Habitat	California Central Coast Steelhead	Trees, Heritage Trees and Tree Preservation
1 - Greenville East	This alternative has the potential to impact the greatest number of watercourses and wetland habitat. Nine watercourses and approximately 24 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Wetland areas could be present within grassland habitat north of I-580, the proposed Isabel/I-580 and Greenville-East station footprints, and Greenville Yard. The Isabel/I-580 Station footprint is within an unnamed tributary to Arroyo las Positas and Arroyo las Positas.	Due to the amount of undeveloped land that this alternative could impact, including land north of I-580, the Isabel/I-580 Station, and the Greenville Yard and Station, this alternative has the greatest potential to impact habitat for special-status plants. Approximately 800 acres of potential habitat lies within a 1,000-foot buffer centered on the alignment.	Approximately 276 acres of potential Swainson's hawk foraging habitat would be impacted. This habitat is located within the Greenville Station and Greenville Yard areas of the alternative.	This alternative has the potential to impact the greatest amount of potential CTS aquatic habitat. Approximately 12.5 acres of potential aquatic CTS habitat is located with a 1,000-foot buffer centered on the alignment, located north of I-580 between Livermore Avenue and the Las Colinas Road overcrossing, and at the Greenville Yard. This impact has the potential to impact a moderate amount of potential habitat for CRLF and WPT; approximately 31 acres of potential habitat for both species is present in the watercourses this alternative would cross.	This alternative would impact the greatest amount of potential vernal pool invertebrate habitat. Between 10 and 15 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is located north of I-580, along the track south of the Greenville East Station, and at the Isabel/I-580 Station and Greenville Yard. Approximately 113 acres of vernal pool fairy shrimp critical habitat (8 percent of the habitat located in Alameda County) would be impacted with the development of the Greenville Yard.	No CCCS habitat would be impacted.	This alternative could impact a fair amount of trees, due to its length. Trees are located along 11.5-miles of I-580 and within the Isabel/I-580 Station, Greenville East Station and Greenville Yard
1a - Downtown Greenville East via UPRR	This alternative also has the potential to impact a moderate amount of wetland habitat and watercourses. Seven watercourses and approximately 20 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is present along El Charro Road and the UPRR, and within the Greenville East Station and Greenville Yard.	Similar to Alternative 1, this alternative would result in the development of a large amount of currently undeveloped land, largely associated with the Greenville Yard and Station. Approximately 555 acres of potential special-status plant habitat occurs within a 1,000-foot buffer centered on the alignment.	The impact from this alternative is the same as Alternative 1.	This alternative has the potential to impact a moderate amount of potential CTS aquatic habitat. Approximately 5.5 acres of potential aquatic CTS habitat is located within a 1,000-foot buffer centered on the alignment, primarily located within the Greenville Yard. A moderate amount of CRLF habitat could be impacted under this alternative. Approximately 31 acres of potential CRLF habitat is located within a 1,000-foot buffer centered on the alignment that includes the watercourses this alternative would cross. A large amount of potential WPT habitat could be impacted under this alternative. Approximately 95 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment. In addition to the watercourses this alternative would cross, potential WPT habitat is located along the Chain of Lakes.	This alternative would impact a moderate amount of potential vernal pool invertebrate habitat; between 3 and 5 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is located along the track south of the Greenville East Station, and at the Greenville Yard. This alternative would have the same impact on vernal pool fairy shrimp critical habitat as Alternative 1.	Arroyo Mocho supports CCCS; this alterative would run along Arroyo Mocho for approximately 4 miles and cross Arroyo Mocho 7 times	This alternative could impact a moderate amount of trees, due to its length (13.1 miles long) and location along El Charro Road and Stanley Boulevard. Trees are also present along the UPRR and at the Greenville East Station and Greenville Yard.

Table 3.9-5
Comparative Biological Resources Impacts of BART Extension Alternatives

Alternative	Wetlands, Waters of the U.S., Waters of the State	Special-status Plants and Habitat	Swainson's Hawk Foraging Habitat	Special-status Amphibians and Reptiles, and Habitat	Special-status Vernal Pool Invertebrates and Vernal Pool Fairy Shrimp Critical Habitat	California Central Coast Steelhead	Trees, Heritage Trees and Tree Preservation
1b - Downtown Greenville East via SPRR	This alternative has the potential to impact a moderate amount of wetland habitat and watercourses. Seven watercourses and approximately 15 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is present along El Charro Road and within the Greenville East Station and Greenville Yard.	As with Alternative 1 and 1a, this alternative will result in the development of a large amount of currently undeveloped land. Approximately 580 acres of potential special-status plant habitat is located within a 1,000-foot buffer centered on the alignment.	The impact from this alternative is the same as Alternative 1.	Potential impacts on CTS from this alternative would be relatively small. Approximately 1.5 acres of potential CTS aquatic habitat is located within a 1,000-foot buffer centered on the alignment. Impacts on CRLF and WPT would also be similar, but slightly less than under Alternative 1a. Approximately 30 acres of potential CRLF habitat and 94 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment.	This alternative would impact a minor amount of potential vernal pool invertebrate habitat; between 0.5 and 2 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is primarily located at the Greenville Yard. This alternative would have the same impact on vernal pool fairy shrimp critical habitat as Alternative 1.	This alternative would have the same impact on CCCS habitat as Alternative 1a.	This alternative would have the same impact as Alternative 1a. Trees are located adjacent to El Charro Road, north of Stanley Boulevard, along the SPRR right-of-way, and at the Greenville East Station and Greenville Yard
2 - Las Positas	This alternative has the potential to impact a moderate amount of wetland habitat and watercourses. Eight watercourses and approximately 19 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is present within the proposed Isabel/I-580 Station and along the UPRR.	Similar to Alternative 1, this alternative has the potential to impact undeveloped land including land north of I-580 and the Isabel/I-580 Station. There is approximately 575 acres of potential special-status plant habitat located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	A moderate amount of potential aquatic CTS habitat could be impacted under this alternative. Approximately 8 acres of potential CTS aquatic habitat is located within a 1,000-foot buffer centered on the alignment, located primarily north of I-580. A moderate amount of CRLF and CTS habitat could be impacted under this alternative, similar to Alternative 1. Approximately 30 acres of potential CRLF habitat, and 30 acres of potential WPT habitat is located in within a 1,000-foot buffer centered on the alignment, located primarily along watercourses this alterative would cross.	This alternative would impact a moderate amount of potential vernal pool invertebrate habitat; between 7 and 9 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is located north of 1-580, along the track north of the Vasco Yard, and at the Isabel/I-580 Station. No vernal pool fairy shrimp critical habitat would be impacted.	No CCCS habitat would be impacted.	Similar to Alternative 1, this alternative could impact a fair amount of trees. Trees are located along I-580, within the Isabel/I-580 Station and Vasco Road Stations area, and the Vasco Yard.
2a - Downtown-Vasco	This alternative has the potential to impact a moderate amount of wetland habitat and watercourses. Six watercourses and approximately 18 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is present along El Charro Road and the UPRR, and within the Isabel/Stanley Station.	This alternative has the potential to impact less undeveloped land compared to Alternatives 1, 1a, 1b, and 2. Approximately 320 acres of potential special-status plant habitat is located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	This alternative has the potential to impact a relatively small amount of potential CTS aquatic habitat; approximately 5 acres of potential CTS aquatic habitat, located primarily along the tailtracks northeast of the Vasco Yard, lies within a 1,000-foot buffer centered on the alignment. Impacts on potential CRLF and WPT habitat is similar to impacts associated with Alternative 1a. Approximately 28 acres of potential CRLF habitat and 92 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment.	This alternative would impact a moderate amount of potential vernal pool invertebrate habitat; between 4 and 6 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is primarily located along the track north of the Vasco Yard. No vernal pool fairy shrimp critical habitat would be impacted.	This alternative would have the same impact on CCCS habitat as Alternative 1a.	Similar to Alternatives 1a and 1b, this alternative could impact a moderate amount of trees. Trees are located along El Charro Road, north of Stanley Boulevard, along the UPRR, at the Downtown Livermore Station and Vasco Road Station, and at the Vasco Yard

Table 3.9-5
Comparative Biological Resources Impacts of BART Extension Alternatives

Alternative	Wetlands, Waters of the U.S., Waters of the State	Special-status Plants and Habitat	Swainson's Hawk Foraging Habitat	Special-status Amphibians and Reptiles, and Habitat	Special-status Vernal Pool Invertebrates and Vernal Pool Fairy Shrimp Critical Habitat	California Central Coast Steelhead	Trees, Heritage Trees and Tree Preservation
3 - Portola	This alternative could impact a moderate amount of watercourses but a relatively small amount of wetland habitat. Five watercourses and approximately 5 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is present along I-580 and within the Isabel/I-580 Station.	Similar to Alternative 2a, this alternative would impact less undeveloped land that could support special-status plant species. Approximately 275 acres of potential special-status plant habitat located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	No potential CTS aquatic habitat would be impacted. This alternative would impact a relatively small amount of potential CRLF and WPT habitat. Approximately 12 acres of potential CRLF habitat and 12 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment, located along watercourses this alignment would cross, including an unnamed drainage at the Isabel/I-580 Station.	This alternative would impact a relatively small amount of potential vernal pool invertebrate habitat; between 0.5 and 2 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is primarily located at the Isabel/I-580 Station. No vernal pool fairy shrimp critical habitat would be impacted.	No CCCS habitat would be impacted.	This alternative could impact a fair amount of tress. Trees are located along I-580, within the Isabel/I-580 and the Downtown Livermore Stations, and at the Portola/Railroad Yard.
3a - Railroad	This alternative has the potential to impact a moderate amount of wetland habitat and watercourses. Five watercourses and approximately 12 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is located primarily along El Charro Road and within the Isabel/Stanley Station.	Compared to the other alternatives, this alternative would impact a smaller amount of undeveloped land. Approximately 180 acres of potential special-status plant habitat located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	No potential CTS aquatic habitat would be impacted. Impacts on potential CRLF and WPT habitat is similar to impacts associated with Alternatives 1a and 2a. Approximately 26 acres of potential CRLF habitat and 90 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment.	This alternative would impact a relatively small amount of potential vernal pool invertebrate habitat; between 0.5 and 2 acres of potential habitat is located in a 1,000-foot buffer centered on the alternative. Potential habitat is primarily located at the Isabel/Stanley Station. No vernal pool fairy shrimp critical habitat would be impacted.	As with Alternative 1a, this alternative would parallel Arroyo Mocho for approximately 4 miles and cross Arroyo Mocho 7 times. In addition, the use of the Isabel/Stanley Station would impact additional CCCS habitat.	Similar to Alternatives 1a, 1b, and 2a, this alternative could impact a moderate amount of trees. Trees are located along El Charro Road, north of Stanley Boulevard, at the Downtown Livermore Station, and at the Portola/Railroad Yard
4 - Isabel/I-580	This alternative would have the smallest potential impact watercourses and wetland resources. Six watercourses and approximately 5 acres of potential wetlands are located within a 1,000-foot buffer centered on the alignment. Potential wetland habitat is located at the Isabel/I-580 Station.	Similar to Alternatives 2a and 3, this alternative would impact less undeveloped land that could support special-status plant species. Approximately 230 acres of potential special-status plant habitat located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	No potential CTS aquatic habitat would be impacted. Approximately 12 acres of potential CRLF habitat and 12 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment.	This alternative would have same impact as Alternative 3. No vernal pool fairy shrimp critical habitat would be impacted.	No CCCS habitat would be impacted.	As this alternative is the shortest, it would have the least potential impact on trees, which could be located along the 5.2-mile long alignment and at the Isabel/I-580 Station.
5 - Quarry	This alternative would cross the fewest number of watercourses (four), but a fair amount of wetland habitat (approximately 11 acres) is located within a 1,000-foot buffer centered on the alignment, due to its proximity to Arroyo Mocho along El Charro Road and within the Isabel/Stanley Station.	This alternative would impact the least amount of potential special-status plant habitat; approximately 125 acres is located within a 1,000-foot buffer centered on the alignment.	No potential Swainson's hawk foraging habitat would be impacted.	No potential CTS habitat would be impacted. Impacts on potential CRLF and WPT habitat is similar to impacts associated with Alternatives 1a, 2a and 3a. Approximately 23 acres of potential CRLF habitat and 87 acres of potential WPT habitat is located within a 1,000-foot buffer centered on the alignment.	This alternative would have same impact as Alternative 3a. No vernal pool fairy shrimp critical habitat would be impacted.	This alternative would have the same impact on CCCS habitat as Alternative 3a.	Because of its route along El Charro Road and Stanley Boulevard, this alternative could impact a moderate amount of trees. Trees are also located at the Isabel/Stanley Station.

Greenville Yard, which could result in the fill of wetland habitat. The expansion of I-580 between the existing Dublin/Pleasanton Station and Greenville Road could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Based on preliminary maps, this alternative would come in close proximity to the Chain of Lakes along El Charro Road. Construction activities associated with the pile foundations for the aerial structure along El Charro Road could require the placement of fill material in the vicinity of the levees. Finally, wetlands could be found along the UPRR right-of-way. Approximately 20 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the stations and yard footprints. This alternative could require the placement of fill material in wetlands, waters of the U.S., and waters of the State which would result in a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would follow a route similar to Alternative 1a. The only difference would be that this alternative would use the SPRR instead of the UPRR right-of-way. In doing so, this alternative would avoid portions of a waterway and a wetland area located along the UPRR. Approximately 15 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the stations and yard footprints. Construction activities associated with the pile foundations for the aerial structure along El Charro Road could require the placement of fill material in the vicinity of the levees. This alternative could require the placement of fill material in wetlands, waters of the U.S., and waters of the State which would result in a potentially significant impact.

Alternative 2 – Las Positas. This alternative would cross eight creeks: two unnamed tributaries, Tassajara Creek, Cottonwood Creek, Collier Canyon Creek, Arroyo las Positas, Cayetano Creek, and Arroyo Seco. Additionally, an unnamed tributary to Arroyo las Positas crosses the Isabel/I-580 Station and an unnamed tributary to Arroyo Seco crosses the Vasco Road Station. The expansion of I-580 between the existing Dublin/Pleasanton Station and Las Positas Road could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Wetland areas could be present within the footprint of the proposed Isabel/I-580 Station and within the UPRR right-of-way. The area around the proposed Vasco Road Station and Vasco Yard is developed and would not support wetlands; however the Vasco Yard tailtracks come in close contact with a seasonal wetland. Approximately 19 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the proposed Isabel/I-580 Station footprint and the Vasco Yard tailtracks. This alternative could require the placement of fill material in wetlands, waters of the U.S., and waters of the State which would result in a potentially significant impact.

Alternative 2a – Downtown-Vasco. This alternative would cross six creeks: Tassajara Creek, an unnamed tributary, Arroyo Mocho, Arroyo las Positas, Granada Canal, and Arroyo Seco. Other wetland areas could be present within the proposed Isabel/Stanley Station area and UPRR right-of-way area. The expansion of I-580 between the existing Dublin/Pleasanton Station and El Charro Road could result in the permanent fill of roadside drainages along I-580

that could be jurisdictional. The area around the proposed Vasco Road Station and Vasco Yard is developed and would not support wetlands; however the Vasco Yard tailtracks come in close contact with a seasonal wetland. Approximately 18 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the proposed Vasco Yard tailtracks. Based on preliminary maps, this alternative would come in close proximity to the Chain of Lakes along El Charro Road. Construction activities associated with the pile foundations for the aerial structure along El Charro Road could require the placement of fill material in the vicinity of the levees. The footprint area of the proposed Vasco Road Station includes a portion of an unnamed tributary to Arroyo Seco. Fill of wetlands, waters of the U.S., and waters of the State would result in a potentially significant impact.

Alternative 3 – Portola. This alternative would cross five creeks: Tassajara Creek, an unnamed tributary, Cottonwood Creek, Collier Canyon Creek, and Arroyo las Positas. The proposed Isabel/I-580 Station footprint includes a portion of an unnamed tributary of Arroyo las Positas. Wetland areas could be present within the proposed Isabel/I-580 Station area. The expansion of I-580 between the existing Dublin/Pleasanton Station and Portola Avenue could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Approximately 5 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the Isabel/I-580 Station footprint. Fill of wetlands, waters of the U.S., and waters of the State would result in a potentially significant impact.

Alternative 3a – Railroad. Alternative 3a would cross five creeks: Tassajara Creek, an unnamed tributary, Arroyo Mocho, Arroyo las Positas, and Granada Canal. The expansion of I-580 between the existing Dublin/Pleasanton Station and El Charro Road could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Although the proposed Isabel/Stanley Station's northern boundary is along the Arroyo Mocho, construction of the station would not place any fill in the Arroyo Mocho and the station design would incorporate setbacks to avoid direct effects. Other wetland areas could be present within the Isabel/Stanley Station area. Approximately 12 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the Isabel/Stanley Station footprint. Based on preliminary maps, this alternative would come in close proximity to the Chain of Lakes along El Charro Road. Construction activities associated with the pile foundations for the aerial structure along El Charro Road could require the placement of fill material in the vicinity of the levees. Fill of wetlands, waters of the U.S., and waters of the State would result in a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 would cross six creeks: Tassajara Creek, two unnamed tributaries, Cottonwood Creek, Collier Canyon Creek and Arroyo las Positas. The proposed Isabel/I-580 Station footprint would also include a portion of an unnamed tributary to Arroyo las Positas. Other wetland areas could be present within the Isabel/I-580 Station area. Furthermore, the expansion of I-580 between the existing Dublin/Pleasanton Station and the

proposed Isabel/I-580 Station could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Approximately 5 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the station footprint. Fill of wetlands, waters of the U.S., and waters of the State would result in a potentially significant impact.

Alternative 5 – Quarry. Alternative 5 would cross four creeks: Tassajara Creek, an unnamed tributary to Arroyo Mocho, Arroyo las Positas, and Arroyo Mocho. Although the proposed Isabel/Stanley Station's northern boundary is along the Arroyo Mocho, construction of the station would not place any fill in the Arroyo Mocho and the design of the station would incorporate setbacks to avoid direct effects. The expansion of I-580 between the existing Dublin/Pleasanton Station and El Charro Road could result in the permanent fill of roadside drainages along I-580 that could be jurisdictional. Construction activities associated with the pile foundations for the aerial structure along El Charro Road could require the placement of fill material in the vicinity of the levees. Other wetland areas could be present within the Isabel/Stanley Station. Approximately 11 acres of potential wetland habitat is estimated to occur in a 1,000-foot zone centered on this alternative's alignment and within the station footprint. Fill of wetlands, waters of the U.S., and waters of the State would result in a potentially significant impact.

MITIGATION MEASURES. Because wetlands, waters of the U.S., and waters of the State are found along all of the alternatives, Mitigation Measures BIO-1.1 through 1.3 would apply to all of the alternatives. The mitigation strategies described below would reduce this impact to a less-than-significant level. (LTS)

BIO-1.1 *Prepare a Wetland Delineation.* BART shall prepare a wetland delineation for the selected extension alternative to determine the amount of wetlands, waters of the U.S., and waters of the State that could be impacted by the construction of the BART extension. If no wetlands or waters are found, or if the wetlands and waters can be avoided through project design, no additional mitigation would be required. If wetlands or waters could be impacted, the wetland delineation shall be submitted to the USACE for verification.

BIO-1.2 *Obtain All Applicable Wetland Permits.* BART shall acquire all applicable wetland permits for the selected alternative. These permits include, but would not be limited to, a Section 404 Wetlands Fill permit from the USACE or a Report of Waste Discharge from the Regional Water Quality Control Board (RWQCB), and a section 401 Water Quality Certification from the RWQCB. These permits would require a verified wetland delineation. Additionally, a Section 1602 Streambed Alteration Agreement from the California Department of Fish and Game (CDFG) would be required if the alternative would cross or affect any stream course.

BIO-1.3 *Prepare and Implement a Wetland Mitigation Plan.* As part of the wetland permitting process, BART shall prepare and implement a wetland mitigation plan

that ensures no-net-loss of wetland and waters habitat. This plan shall include measures for avoidance, minimization, and compensation for wetland impacts. Avoidance and minimization measures could include the designation of buffers around wetland features to be avoided, or project design measures, such as free-span bridges. Compensation measures will include the preservation and/or creation of wetland or waters. The final mitigation ratios (the amount of wetlands and waters created or preserved compared to the amount impacted) will be determined in consultation with the resource agencies. In addition, a wetland mitigation and monitoring plan shall be developed and implemented that includes the following:

- Descriptions of the wetland types, and their expected functions and values;
- Performance standards and monitoring protocol to ensure the success of the mitigation wetlands over a period to be determined with the resource agencies;
- Engineering plans showing the location, size and configuration of wetlands to be created or restored;
- An implementation schedule showing that construction or preservation of mitigation areas shall commence prior to or concurrently with the initiation of construction; and
- A description of legal protection measures for the preserved wetlands (i.e., dedication of fee title, conservation easement, and/or an endowment held by an approved conservation organization, government agency or mitigation bank).

BIO-2 Special-status Plant Species

A query of the CNPSEI lists 40 plants species that occur in the vicinity of the BART extension alternatives. Based on habitats in the study area, the list was reduced to eight species as having a moderate likelihood of occurrence or as being present along the BART extension alternatives. These species are listed in Table 3.9-1. No floristic surveys have been conducted for the BART extension alternatives, but other projects[23,24,25] and recorded occurrences in the CNDDB document the presence of some of these species within the area and are used to inform this comparison of alternatives at a program-level analysis.

Construction of the BART extension alternatives could result in disturbance of grassland habitat, wetlands and riparian areas, and could potentially result in the destruction of special-status plant species if they were found to occur in this habitat. While all eight plant species have specific habitat requirements, they all could potentially occur in grassland habitat. Therefore, it is assumed for this impact assessment that these species may occur in areas with

[23] City of Livermore, *Final EIR for the El Charro Specific Plan*, April 2007.

[24] City of Pleasanton, *Stoneridge Drive Specific Plan/Staples Ranch Final EIR*, August 2008.

[25] Caltrans, *IS/EA I-580 Westbound HOV Lane Project*. Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment. March 2009.

disturbed annual grassland and ruderal habitats, as delineated on Figures 3.9-2a through 3.9-2f. Construction of any of the BART extension alternatives could result in the removal of habitats that could support some or all of the special-status plant species listed in Table 3.9-1. This would be considered a potentially significant impact. A more detailed description of the impacts on special-status plant species associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on special-status plants.

Alternative 1 – Greenville East. This alternative would result in the loss of disturbed annual grassland and ruderal habitat because of the widening of I-580 to accommodate BART operations in the median and because of development of the proposed Isabel/I-580 Station, Greenville East Station, and Greenville Yard. Approximately 800 acres of potentially suitable habitat is present in the proposed stations and yards, and in a 1,000-foot-wide zone centered on the alignment for this alternative. These areas could provide habitat for the eight special-status plant species identified in Table 3.9-1. The loss of habitat for special-status plant species and the loss of the individual species due to development of Alternative 1 could result in a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would result in the loss of disturbed annual grassland and ruderal habitat because of the widening of I-580 to accommodate BART operations in the median and because of development of the proposed Greenville East Station and Greenville Yard. Approximately 555 acres of potentially suitable habitat for eight special-status plant species is present in the proposed stations and yards, as well as in a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species and the loss of the individual species due to development of Alternative 1a could result in a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would also result in the loss of disturbed annual grassland and ruderal habitat because of the widening of I-580 to accommodate BART operations in the median and because of development of the proposed Greenville East Station and Greenville Yard. Approximately 580 acres of potentially suitable habitat for eight special-status plant species is present in the proposed stations and yards, as well as in a 1,000-foot-wide zone centered on the alignment for this alternative. Impacts associated with this alternative would be slightly greater than the impacts associated with Alterative 1a, described above, because of additional suitable habitat along the SPRR right-of-way.

Alternative 2 – Las Positas. This alternative would result in the loss of disturbed annual grassland and ruderal habitat because of the widening of I-580 to accommodate BART operations in the median and along Las Positas Road, which could provide habitat for eight special-status plant species. Additionally, potentially suitable habitat is found at the Isabel/I-580 Station that could be lost with this area's development. Approximately 575 acres of potentially suitable habitat is present at the Isabel/I-580 Station and in a 1,000-foot-wide zone centered on the alignment for this alternative. While the routes differ, this alternative would potentially result in impacts similar to those identified under Alternatives 1a and 1b.

Alternative 2a – Downtown-Vasco. This alternative would result in the loss of disturbed annual grassland and ruderal habitat because of the widening of I-580 to accommodate BART operations in the median, which could provide habitat for eight special-status plant species. Approximately 320 acres of potentially suitable habitat are present in a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species, and the loss of the individual species, due to development of the alternative would result in a potentially significant impact; however, there is less habitat along this alternative than the previously described alternatives because it traverses more urbanized areas.

Alternative 3 – Portola. This alternative would result in the loss of disturbed annual grassland and ruderal habitat, which could provide suitable habitat for eight special-status plant species, because of the widening of I-580 to accommodate BART operations in the median. The area within the Isabel/I-580 Station footprint could also provide suitable habitat for these species. Approximately 275 acres of potentially suitable habitat is present at the Isabel/I-580 Station and in a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species and the loss of the individual species due to development of this alternative would result in a potentially significant impact. The magnitude of this impact is similar to Alternative 2a.

Alternative 3a – Railroad. This alternative would result in the loss of disturbed annual grassland and ruderal habitat, which could provide suitable habitat for eight special-status plant species, because of the widening of I-580 to accommodate BART operations in the median and because of development within the proposed Isabel/Stanley Station area. Approximately 180 acres of potentially suitable habitat is present at the Isabel/Stanley Station and in a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species and the loss of the individual species due to development of this alternative would result in a potentially significant impact. The magnitude of this impact, however, is less than the other alternatives described previously, because it is has a shorter segment along I-580 where a substantial amount of the grassland and ruderal habitat is located.

Alternative 4 – Isabel/I-580. This alternative would result in the loss of disturbed annual grassland and ruderal habitat which could provide suitable habitat for eight special-status plant species because of the widening of I-580 to accommodate BART operations in the median and because of development within the proposed Isabel/I-580 Station area. Approximately 230

acres of potentially suitable habitat is present at the Isabel/I-580 Station and in a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species and the loss of the individual species due to development of Alternative 4 would result in a potentially significant impact.

Alternative 5 – Quarry. This alternative would result in the loss of disturbed annual grassland and ruderal habitat which could provide suitable habitat for eight special-status plant species because of the widening of I-580 to accommodate BART operations in the median and because of development within the proposed Isabel/Stanley Station area. Approximately 125 acres of potentially suitable habitat is present in at the Isabel/Stanley Station and along a 1,000-foot-wide zone centered on the alignment for this alternative. The loss of habitat for special-status plant species and the loss of the individual species due to development of Alternative 5 would result in a potentially significant impact; however, this alternative would impact the least amount of potentially suitable habitat because it is the shortest alignment and follows a predominantly urbanized alignment.

MITIGATION MEASURES. The following mitigation measure would reduce impacts to special-status plant species to a less-than-significant level by conducting a floristic survey for special-status plant species and if any special-status plant species is found, avoiding, transplanting or monitoring plants that would be affected by the selected BART extension alternative. Because there is potentially suitable habitat for special-status plant species along all of the alternative alignments, Mitigation Measure BIO-2.1 applies to all of the alternatives; Mitigation Measures BIO-2.2 and BIO-2.3 would only be required depending on the results of Mitigation Measure BIO-2.1. (LTS)

BIO-2.1 *Conduct a Floristic Survey*. BART shall retain a qualified botanist to conduct plant surveys within the construction zone for special-status plant species, including but not limited to, heartscale, brittlescale, San Joaquin spearscale, Congdon's tarplant, Hispid bird's-beak, palmate-bracted bird's-beak, Livermore tarplant, and saline clover during the appropriate time of year (April to November). The surveys shall be conducted in accordance with current CDFG and USFWS rare plant survey protocols. The results of the survey shall be summarized in a report to the CDFG, and would be valid for two years. If no special-status plants are located during the surveys, no further mitigation would be required.

BIO-2.2 *Consult with CDFG and USFWS if State or Federally Listed Plants Are Found; Obtain and Comply with Incidental Take Permits*. If palmate-bracketed bird's beak is found during the rare plant surveys, BART shall consult with CDFG and USFWS to obtain incidental take permits, under Section 2081 of the CESA and either Section 7 or 10 of the FESA. Consultation with the USFWS under Section 7 of the FESA could occur as part of the CWA Section 404 permit process, described under Mitigation Measure BIO-1.2.

BIO-2.3 Develop and Implement Mitigation in Consultation with CDFG if Other Special-Status Plants Are Found. If other special-status plant species (excluding palmate-bracketed bird's beak) are found during the rare plant surveys, BART shall notify CDFG. Mitigation shall be developed in consultation with CDFG and could include measures such as transplanting plants, collecting seed or clippings and replanting species in an on-site location, if feasible. This measure shall also serve as the notification required under the California Native Plant Protection Act.

BIO-3 Swainson's Hawk Foraging Habitat

Swainson's hawks can forage within 10 miles of an active nest and a nest has been recorded approximately 9.5 miles from the proposed Greenville East Station and Greenville Yard. A nest site is considered active by CDFG if it has been occupied within the last five years; the nest closest to the study area was reported active in 2006. CDFG considers a 10-mile flight distance between active nest sites and suitable foraging habitats as a standard for direct impact analysis. For the most part, the BART extension alternatives follow existing roadways and railroad lines and would not impact raptor foraging habitat. However, the construction of the proposed Greenville East Station and Greenville Yard that are proposed for Alternatives 1, 1a, and 1b would result in the loss of approximately 276 acres of foraging habitat. A more detailed description of the impacts on Swainson's hawk foraging habitat associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on Swainson's hawk foraging habitat.

Alternative 1 – Greenville East. As described above, the nearest recorded occurrence of an active Swainson's hawk nest is approximately 9.5 miles northwest of the proposed Greenville East Station and Greenville Yard. Observations of Swainson's hawks in the Livermore Valley area have also been recorded but no nesting has been identified.[26,27,28] The loss of potential Swainson's hawk foraging habitat due to the construction of the proposed Greenville East Station and Greenville Yard under Alternative 1 would total approximately 276 acres, which would be considered a potentially significant impact.

[26] Audubon, Cornell Lab of Ornithology, eBIRD data from 2005-2009, http://ebird.org, accessed April 9, 2009.

[27] Cimino, Rich, Ohlone Audubon, electronic communication with PBS&J February 4, 2009.

[28] Edwards, Art, Ohlone Audubon, electronic communication with PBS&J February 6, 2009.

Alternative 1a – Downtown-Greenville East via UPRR. Suitable foraging habitat for Swainson's hawk is located at the Greenville East Station and Greenville Yard. Impacts on foraging habitat as a result of this alternative would be the same as described above under Alternative 1.

Alternative 1b – Downtown-Greenville East via SPRR. Suitable foraging habitat for Swainson's hawk is located at the Greenville East Station and Greenville Yard. Impacts on foraging habitat as a result of this alternative would be the same as described above under Alternative 1.

Alternative 2 – Las Positas. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. As a result, no impact on Swainson's hawk foraging habitat would occur with this alternative.

Alternative 2a – Downtown-Vasco. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. Accordingly, there would be no impact to the Swainson's hawk foraging habitat.

Alternative 3 – Portola. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. Accordingly, there would be no impact to the Swainson's hawk foraging habitat.

Alternative 3a – Railroad. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. Accordingly, there would be no impact to the Swainson's hawk foraging habitat.

Alternative 4 – Isabel/I-580. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. Accordingly, there would be no impact to the Swainson's hawk foraging habitat.

Alternative 5 – Quarry. The stations and yards associated with this alternative are more than 10 miles from the closest Swainson's hawk nest. Accordingly, there would be no impact to the Swainson's hawk foraging habitat.

MITIGATION MEASURE. The following measure would reduce the loss of Swainson's hawk foraging habitat to a less-than-significant level. Mitigation Measure BIO-3.1 would ensure that an appropriate acreage of suitable raptor foraging habitat is preserved to compensate for the loss of foraging habitat due to the construction of Alternatives 1, 1a, or 1b within the Greenville area by one of the following mitigation options: 1) the purchase of mitigation credits; 2) payment of mitigation fee at an approved CDFG mitigation bank; or 3) purchasing conservation easements or fee titles in East Alameda County or an area within 10 miles of the nearest Swainson's hawk nest. Implementation of this mitigation measure would effectively reduce potential impacts on foraging habitat to less than significant. (LTS)

BIO-3.1 Consult with CDFG and Mitigate for Loss of Swainson's Hawk Foraging Habitat (Alternatives 1, 1a, 1b). BART shall ensure that an appropriate number of acres (as approved by CDFG during consultation) of agricultural land, annual grasslands, or other suitable raptor foraging habitat are preserved within eastern Alameda County, and/or southwestern San Joaquin counties. Given the proximity of the nest site to San Joaquin County, it is acceptable to have this off-site preservation outside Alameda County. Preserve areas shall be established prior to project construction, if feasible, and may occur through at least one of the following options:

a. Purchase mitigation credits at an approved CDFG mitigation bank that is within East Alameda County or southwestern San Joaquin County.

b. Pay a mitigation fee to a habitat development and management company, through a negotiated agreement between said company, BART, and CDFG. The funds must be used towards the purchase of lands within 10 miles of the nearest Swainson's hawk nest, unless otherwise approved by CDFG (consistent with CDFG guidelines).

c. Purchase conservation easements or fee title in east Alameda and/or southwestern San Joaquin County. This must occur on lands within 10 miles of the nearest Swainson's hawk nest, unless otherwise approved by CDFG (consistent with CDFG Guidelines).

BIO-4 Special-status Amphibians and Reptiles

No habitat assessments or surveys have been conducted for special-status amphibians and reptiles, including CRLF, CTS, and WPT in the BART extension alternatives study area. However, the CNDDB contains recorded occurrences of all three species adjacent to all of the alternatives, and this information is used to inform the program-level analysis here. Environmental documents for the I-580 Eastbound and Westbound HOV expansion projects list the species as present; furthermore, studies for these environmental documents identify potential breeding and upland habitat for CTS and CRLF and have recorded observation of WPT along I-580.[29] Figure 3.9-3 shows the recorded occurrences of CTS, CRLF and WPT within the study area. Most have been found within grassland and aquatic habitat (creeks and arroyos) within the study area. Construction and operation of the BART extension alternatives could result in disturbance of breeding and upland habitat for special-status amphibians and reptiles. This disturbance would be considered a potentially significant impact. A more detailed description of the impacts on special-status amphibians and reptiles associated with each alternative is provided below.

[29] Caltrans, 2009.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on special-status amphibians or reptiles.

Alternative 1 – Greenville East. Potential habitat for CTS is located along Alternative 1, at the Isabel/I-580 Station, north of I-580 between Livermore Avenue and the Las Colinas Road overcrossing, and at the Greenville Yard. Construction activities associated with the Isabel/I-580 Station and the Greenville Yard could result in the permanent fill of wetlands that provide habitat for CTS. Additionally the widening of I-580 to accommodate the BART extension alternative could result in impacts to streams along I-580 where CRLF and WPT have been recorded. For purposes of this analysis, this alternative could impact approximately 12.5 acres of potential CTS habitat, 31 acres of potential CRLF habitat, and 31 acres of potential WPT habitat. Adverse modification of habitat (including fill of habitat or water quality impacts) for CTS, CRLF, and/or WPT would result in a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would include the development of the Greenville Yard. As described above, construction of the yard would result in the permanent fill of potential CTS habitat. Additionally, this alternative would run adjacent to an unnamed tributary to Arroyo Seco, near the Vasco Road Station, where CRLF have been recorded even though the tributary is a concrete-lined canal. Arroyo Mocho along El Charro Road and the Chain of Lakes could provide suitable habitat for WPT. For purposes of this analysis, this alternative could impact approximately 5.5 acres of potential CTS habitat, 31 acres of potential CRLF habitat, and 95 acres of potential WPT habitat. Adverse modification of habitat (including fill of habitat or water quality impacts) for CTS, CRLF, and/or WPT would result in a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would include the development of the Greenville Yard. As described above, construction of the yard would result in the permanent fill of potential CTS habitat. Additionally, Arroyo Mocho along El Charro Road and the Chain of Lakes could provide suitable habitat for WPT. For purposes of this analysis, this alternative could impact approximately 1.5 acres of potential CTS habitat, 30 acres of potential CRLF habitat, and 94 acres of WPT potential habitat. Adverse modification of habitat (including fill of habitat or water quality impacts) for CTS, CRLF, and/or WPT would result in a potentially significant impact.

Alternative 2 – Las Positas. This alternative proposes the development of the Isabel/I-580 Station and the widening of I-580 right-of-way to the north between Livermore Avenue and the Las Colinas Road overcrossing, which would potentially impact CTS habitat. Additionally, this alternative would run adjacent to an unnamed tributary to Arroyo Seco, near the Vasco

Road Station, where CRLF have been recorded. For purposes of this analysis, this alternative could impact approximately 8 acres of potential CTS habitat, 30 acres of potential CRLF habitat, and 30 acres of potential WPT habitat. As described previously, adverse modification of habitat (including fill of habitat or water quality impacts) for CTS, CRLF, and/or WPT would result in a potentially significant impact.

Alternatives 2a – Downtown-Vasco. Suitable habitat for WPT could be present within Arroyo Mocho and the Chain of Lakes. Habitat for CTS is primarily located along the tailtracks northeast of the Vasco Yard. For purposes of this analysis, this alternative could potentially impact approximately 5 acres of potential CTS habitat, 28 acres of potential CRLF habitat, and 92 acres of potential WPT habitat. Fill of potential CRLF, WPT, and CTS habitat would be a potentially significant impact.

Alternative 3 – Portola. Alternative 3 proposes the development of the Isabel/I-580 Station that supports potential CRLF and WPT habitat. This alternative would not impact any potential CTS habitat. For purposes of this analysis, this alternative could impact approximately 12 acres of potential CRLF habitat and 12 acres of potential WPT habitat. Permanent fill of potential CRLF and WPT habitat would result in a potentially significant impact.

Alternative 3a – Railroad. As described under Alternative 2a, suitable habitat for WPT could be present within Arroyo Mocho and the Chain of Lakes. This alternative would not impact any potential CTS habitat. For purposes of this analysis, this alternative could impact approximately 26 acres of potential CRLF habitat and 90 acres of potential WPT habitat. Fill of potential CRLF and WPT habitat is a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 proposes the development of the Isabel/I-580 Station that supports potential CRLF and WPT stream habitat. This alternative would not impact any potential CTS habitat. For purposes of this analysis, this alternative could potentially impact approximately 12 acres of CRLF habitat and 12 acres of WPT habitat. Permanent fill of potential CRLF and WPT stream habitat would result in a potentially significant impact.

Alternative 5 – Quarry. As described under Alternative 2a, suitable habitat for WPT could be present within Arroyo Mocho and the Chain of Lakes. This alternative would not impact any potential CTS habitat. For purposes of this analysis, this alternative could impact approximately 23 acres of potential CRLF habitat and 87 acres of potential WPT habitat. Fill of potential CRLF and WPT habitat is a potentially significant impact.

MITIGATION MEASURES. The following measures would reduce the impact on special-status amphibians and reptiles to a less-than-significant level. Mitigation Measures BIO-4.1 through BIO-4.3 address particular special-status reptile and amphibian species. Mitigation Measure BIO-4.1 applies to Alternatives 1, 1a, 1b, 2, and 2a. Mitigation Measures BIO 4-2 and 4-3 apply to all of the alternatives. (LTS)

BIO-4.1 Consult with USFWS and Reduce Impacts on California Tiger Salamander (Alternatives 1, 1a, 1b, 2, 2a). BART shall comply with the following steps to ensure protection of the CTS and its habitat.

a. BART shall retain a qualified herpetologist to conduct California tiger salamander (CTS) habitat assessment for the selected BART extension alternative. The habitat assessment shall follow the prevailing Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander.[30] A CTS habitat assessment report shall be submitted to the USFWS.

b. Based on the results of the CTS habitat assessment, the USFWS may require protocol level surveys in suitable habitat. Surveys shall be conducted in accordance with the most current survey protocol established by the USFWS.

c. In the event that CTS are found or if during consultation with the USFWS, BART assumes presence of the CTS within suitable habitat along the selected BART extension alternative, BART shall ensure that individual CTS are not impacted during construction activities and that no net loss of habitat occurs through avoidance, preservation, creation and/or purchase of credits. The selected measures may be part of the permitting process.

d. Avoidance measures may include the following or equivalent protective measures:

   – To minimize disturbance of breeding and dispersing CTS, construction activity within CTS upland habitat could be conducted during the dry season between May 1 and October 15 or before the onset of the rainy season, whichever occurs first. If construction activities are necessary in CTS upland habitat between October 16 and April 30, BART would contact the USFWS for approval to extend the work period.

   – To minimize disturbance and mortality of adult and juvenile CTS in aquatic habitat and underground burrows, BART could minimize the extent of ground-disturbing activities within these habitats by requiring the contractor to limit the work area to the minimum necessary for construction. In addition, BART could ensure that the contractor would install temporary exclusion fence between the construction work area and potential aquatic habitat for all construction within CTS upland habitat.

[30] USFWS, CDFG, *2003 Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander*, October 2003.

- BART could ensure that a qualified wildlife biologist monitors all construction activities within CTS upland habitat. This would ensure no take of individual CTS occurs during project construction. If a CTS is found, then the monitor would immediately stop construction and contact USFWS and/or CDFG for advice.

e. BART would preserve additional upland habitat within a USFWS-approved conservation area. BART would coordinate or consult with USFWS to determine the appropriate compensation ratio and location of the conservation area. This may be accomplished by purchasing credits at a USFWS-approved mitigation bank.

BIO-4.2 *Consult with USFWS and Reduce Impacts on California Red-Legged Frog*. BART shall comply with the following steps to ensure protection of the CRLF and its habitat.

a. BART shall retain a qualified herpetologist to conduct California red-legged frog (CRLF) habitat assessment for the selected BART extension alternative. The habitat assessment shall follow the prevailing Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog.[31] The CRLF habitat assessment can be carried out concurrent with the CTS habitat assessment. A CRLF habitat assessment report shall be submitted to the USFWS.

b. Based on the results of the CRLF habitat assessment, the USFWS may require protocol level surveys in suitable habitat. Surveys shall be conducted in accordance with the most current survey protocol established by the USFWS.

c. In the event that CRLF are found or if during consultation with the USFWS, BART assumes presence of the CRLF along the selected BART extension alternative, then BART shall ensure no net loss of habitat shall be achieved through avoidance, preservation, creation and/or purchase of credits. The final selected measures may be part of the permitting process.

d. Avoidance measures may include the following or equivalent protective measures:

- To minimize disturbance of breeding and dispersing CRLF, construction activity within CRLF upland habitat could be conducted during the dry season between April 15 and October 15 or before the onset of the rainy season, whichever occurs first. If construction activities are necessary in

[31] USFWS, *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog*. August 2005.

CRLF upland habitat between October 15 and April 15, BART would contact the USFWS for approval to extend the work period.

- To minimize disturbance and mortality of adult and juvenile CRLF in aquatic habitat and underground burrows, BART could minimize the extent of ground-disturbing activities within these habitats by requiring the contractor to limit the work area to the minimum necessary for construction. In addition, BART could ensure that the contractor would install temporary exclusion fence between the construction work area and potential aquatic habitat for all construction within grasslands near aquatic habitat.

- BART could ensure that a qualified wildlife biologist monitors all construction activities within CRLF upland habitat. This would ensure no take of individual CRLF occurs during project construction. If a CRLF is found, then the monitor would immediately stop construction in that area and contact USFWS and/or CDFG for advice.

e. BART would preserve additional upland habitat within a USFWS-approved conservation area. BART would coordinate or consult with USFWS to determine the appropriate compensation ratio and location of the conservation area. This may be accomplished by purchasing credits at a USFWS-approved mitigation bank.

BIO-4.3 Consult with CDFG and Reduce Impacts on Western Pond Turtle. BART shall comply with the following steps to ensure protection of the WPT and its habitat.

a. BART shall retain a qualified herpetologist to conduct WPT habitat assessment surveys prior to any ground disturbance near the arroyos and waterways within an area to be determined based on consultation with CDFG. A pre-construction survey report shall be submitted to the CDFG. If no western pond turtles are found during the survey, then no additional mitigation is required.

b. In the event that a WPT is found, the herpetologist shall move the WPT to a place of suitable habitat within the same arroyo downstream of the construction area.

BIO-5 Special-Status Vernal Pool Invertebrates

Surveys for special-status vernal pool invertebrates, including the curved-foot hygrotus diving beetle, vernal pool fairy shrimp, and California linderiella have not been completed for the BART extension alternatives. Nevertheless, information on the habitat available to support such special-status species is an appropriate basis upon which to compare the BART extension alternatives at a program level. Suitable habitat for vernal pool invertebrates may be at the Isabel/I-580 Station (both north and south of I-580), north of I-580 between Livermore Avenue

and the Las Colinas Road overcrossing, and at the eastern end of the alternatives proposing the Greenville Yard. The CNDDB contains recorded occurrences of vernal pool fairy shrimp and California linderiella near the Greenville Yard location. A more detailed description of the impacts on vernal pool invertebrates associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on vernal pool invertebrate habitat.

Alternative 1 – Greenville East. Potential habitat for vernal pool invertebrates is located along Alternative 1, at the Isabel/I-580 Station, north of I-580 between Livermore Avenue and the Las Colinas Road overcrossing, along the track south of the Greenville East Station, and at the Greenville Yard. Construction activities in these locations under Alternative 1 could result in the permanent fill of wetlands that provide habitat for vernal pool invertebrates. Additionally, the widening of I-580 to accommodate this alternative in the median could result in the permanent fill of potential habitat located north of I-580 between Livermore Avenue and the Las Colinas Road overcrossing. It is estimated that between 10 and 15 acres of potential habitat could be filled as a result of this alternative, a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would include the development of the Greenville Yard, impacts for which are described above. Additionally, suitable habitat for vernal pool invertebrates could be located along the UPRR right-of-way, particularly the portion south of the Greenville East Station. It is estimated that between 3 and 5 acres of potential habitat could be filled as a result of this alternative, a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative would also include the development of the Greenville Yard, impacts for which are described above. Additionally, suitable habitat for vernal pool invertebrates could be located along the SPRR, although it appears that fewer wetlands are present along the SPRR right-of way than along the UPRR which is part of Alternative 1a. It is estimated that between 0.5 and 2 acres of potential habitat could be filled as a result of this alternative, a potentially significant impact.

Alternative 2 – Las Positas. This alternative would include development of the Isabel/I-580 Station and expansion of I-580 between Livermore Avenue and the Las Colinas Road overcrossing. Wetlands are located in these areas and along the tailtracks beyond the Vasco Yard. It is estimated that between 7 and 9 acres of potential habitat could be filled as a result of Alternative 2, a potentially significant impact.

Alternative 2a – Downtown-Vasco. This alternative could impact wetlands along the UPRR right-of-way, particularly at the tailtracks beyond the Vasco Yard. It is estimated that between 4 and 6 acres of wetlands could be filled as a result of this alternative, a potentially significant impact.

Alternative 3 – Portola. Alternative 3 would include development of the Isabel/I-580 Station. As described previously, potential vernal pool invertebrate habitat is located within the footprint of this station. It is estimated that between 0.5 and 2 acres of wetlands could be filled as a result of this alternative, a potentially significant impact.

Alternative 3a – Railroad. This alternative could impact wetlands near the Isabel/Stanley Station. It is estimated that between 0.5 and 2 acres of wetlands could be filled as a result of this alternative, a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 would include development of the Isabel/I-580 Station. As described previously, potential vernal pool invertebrate habitat is located within the footprint of this station. It is estimated that between 0.5 and 2 acres of wetlands could be filled as a result of this alternative, a potentially significant impact.

Alternative 5 – Quarry. This alternative could impact wetlands near the Isabel/Stanley Station. It is estimated that between 0.5 and 2 acres of wetlands could be filled as a result of this alternative, a potentially significant impact.

MITIGATION MEASURES. Mitigation Measure BIO-1.1, prepare a wetland delineation, in combination with the following strategies, would reduce potential impacts to vernal pool invertebrates. Mitigation Measure BIO-1.1 would determine the location of any potentially suitable vernal pool crustacean habitat. If no suitable vernal pool habitat is located in the wetland delineation boundary, no additional mitigation is required. However, if such habitat is identified, then the following measures shall be pursued. Implementation of Mitigation Measure BIO-5.1 would reduce impacts on vernal pool invertebrates and their habitat to a less-than-significant level. (LTS)

BIO-5.1 Consult with USFWS and Reduce Impacts on Vernal Pool Invertebrates and Their Habitat. BART shall comply with the following steps to ensure protection of vernal pool invertebrates and their habitat.

a. BART, in consultation with the USFWS, shall either (1) conduct a protocol-level survey for federally listed vernal pool crustaceans, or (2) assume presence of federally-listed vernal pool crustaceans in areas of suitable habitat. Surveys shall be conducted by qualified biologists in accordance with the most recent USFWS guidelines or protocols to determine the time of year and survey methodology (survey timing for these species is dependent on yearly rainfall patterns and seasonal occurrences, and is determined on a case-by-case basis).

The surveys may be done as part of the 404 permit process, if a 404 permit is required.

If surveys along the selected BART extension alternative reveal no occurrences of federally listed vernal pool crustaceans, no further mitigation would be required.

b. If surveys determine that one or more special-status vernal pool invertebrate species occurs along the selected BART extension alternative, or if BART, in consultation with the USFWS, assumes presence of federally-listed vernal pool invertebrates in all affected habitats, no net loss of habitat shall be achieved through avoidance, preservation, creation and/or purchase of credits. The selected measures may be part of the permitting process.

c. Where feasible, all vernal pool invertebrate habitat shall be avoided. If habitat that can be avoided during construction activities is identified at a distance determined in consultation with USFWS, a USFWS-approved biologist (monitor) shall inspect any construction-related activities to ensure that no unnecessary take of listed species or destruction of their habitat occurs. BART will establish monitoring and reporting protocols to reduce impacts to vernal pool invertebrate species and habitat.

d. BART shall ensure that an appropriate number of acres, as approved by USFWS during consultation, are preserved to mitigate for direct or indirect impacts on vernal pool crustacean habitat.

e. Water quality in the avoided wetlands shall be protected using erosion control techniques, such as silt fencing or straw waddles during construction in the watershed. This shall be completed in accordance with the State Construction Permit, as outlined in the NPDES General Permit No. CAS000002, Waste Discharge Requirements, Order No. 99-08-DWQ.

BIO-6 Vernal Pool Fairy Shrimp Critical Habitat

Critical habitat for vernal pool fairy shrimp has been designated around the northeastern edge of the City of Livermore. The USFWS-designated critical habitat Unit 19C totals approximately 1,455 acres, of which approximately 113 acres could be lost with development of the Greenville Yard. While lands designated as critical habitat have not been purchased by the USFWS or are not protected by title or easement, the USFWS will ensure that federally-permitted actions (such as the CWA 404 permit, or projects with federal funding) do not change (adversely modify) critical habitat in such a way that it appreciably diminishes the value of the habitat for the conservation of the species. Construction activities associated with the development of the Greenville Yard, such as paving and grading would result in the permanent loss of this habitat. Adverse modification of critical habitat, resulting from direct or indirect

impacts would be considered a significant impact. A more detailed description of the impacts on vernal pool fairy shrimp critical habitat associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on vernal pool fairy shrimp critical habitat.

Alternative 1 – Greenville East. The Greenville Yard associated with this alternative is located in an area designated as critical habitat for vernal pool fairy shrimp. The development of the Greenville Yard could result in the loss of approximately 113 acres of critical habitat, which is approximately 8 percent of the Critical Habitat unit 19C. The loss of this habitat as a result of this alternative would be a potentially significant impact.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative also proposes the development of the Greenville Yard, which is located in an area designated as critical habitat for the vernal pool fairy shrimp. Impacts from this alternative would be the same as those identified for Alternative 1.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative also proposes the development of the Greenville Yard, which is located in an area designated as critical habitat for the vernal pool fairy shrimp. Impacts from this alternative would be the same as those identified for Alternative 1.

Alternative 2 – Las Positas. Critical habitat for the vernal pool fairy shrimp does not exist along this alterative and, thus, no impact would occur.

Alternative 2a – Downtown-Vasco. Critical habitat for the vernal pool fairy shrimp does not exist along this alterative and, thus, no impact would occur.

Alternative 3 – Portola. Critical habitat has not been designated along this alterative and, thus, no impact would occur.

Alternative 3a – Railroad. Critical habitat for the vernal pool fairy shrimp does not exist along this alterative and, thus, no impact would occur.

Alternative 4 – Isabel/I-580. Critical habitat for the vernal pool fairy shrimp does not exist along this alterative and, thus, no impact would occur.

Alternative 5 – Quarry. Critical habitat for the vernal pool fairy shrimp does not exist along this alterative and, thus, no impact would occur.

MITIGATION MEASURE. Mitigation Measure BIO-5.1, requiring BART to take steps to avoid, mitigate, or compensate for the loss of vernal pool invertebrates habitat, would also apply to Impact BIO-6 regarding the vernal pool fairy shrimp critical habitat. That mitigation measure would also be necessary to compensate for loss of the habitat that is anticipated for Alternatives 1, 1a, and 1b. Implementation of Mitigation Measures BIO-5.1 would reduce the impact on critical habitat to a less-than-significant level by ensuring that an adequate amount of vernal pool fairy shrimp habitat is preserved. (LTS)

BIO-7 California Central Coast Steelhead

The federally listed threatened CCCS includes all naturally spawned populations of steelhead (and their progeny) in California streams from the Russian River to Aptos Creek, and the drainages of San Francisco and San Pablo Bays eastward to the Napa River (inclusive), excluding the Sacramento-San Joaquin River Basin.

Riverine riparian vegetation adjacent to the arroyo could be removed as a result of construction. Riverine riparian vegetation is important as it provides shaded riverine aquatic (SRA) habitat, which is an important habitat component for all salmonids and other fish species because it provides cover, shelter, shade, and contributes to food production. Additionally, SRA is defined by the USFWS, as, "the near-shore aquatic area occurring at the interface of the river and adjacent woody riparian habitat, where the river bank is composed of eroding, earthen substrate supporting riparian vegetation which overhangs and/or protrudes into the water, and the water may contain woody debris, including logs, branches, leaves, and roots, as well as variable depths, velocities and currents."

Arroyo Mocho is the only stream within the study area that supports a population of CCCS; therefore, adverse modification of Arroyo Mocho and its riparian vegetation, resulting from direct or indirect impacts (e.g., increased surface runoff), would be considered a significant impact. A more detailed description of the impacts on CCCS associated with each alternative is provided below. Impacts to water quality are described in Section 3.8, Hydrology and Water Quality.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on CCCS.

Alternative 1 – Greenville East. No suitable CCCS habitat is present within the arroyos and creeks crossing this alternative. Therefore, no impact to CCCS habitat would occur under Alternative 1.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative would include the installation of an aerial alignment adjacent to approximately four miles of Arroyo Mocho along El Charro Road and Stanley Boulevard. In addition, the proposed alignment crosses the Arroyo Mocho seven times. Although construction plans are unknown at this point, modification due to fill and/or removal of riparian vegetation within Arroyo Mocho could result in direct or indirect impacts and would be considered a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would have the same potentially significant impacts as Alternative 1a, since this alternative would potentially affect the same stretches of the Arroyo Mocho.

Alternative 2 – Las Positas. No suitable CCCS habitat is present within the arroyos and creeks crossing this alternative. Therefore, no impact to CCCS habitat would occur under Alternative 2.

Alternative 2a – Downtown-Vasco. Alternative 2a would have the same potentially significant impacts as Alternative 1a and 1b, since this alternative would potentially affect the same stretches of the Arroyo Mocho.

Alternative 3 – Portola. No suitable CCCS habitat is present within the arroyos and creeks crossing this alternative. Therefore, no impact to CCCS habitat would occur under Alternative 3.

Alternative 3a – Railroad. This alternative would also include the installation of tracks adjacent to Arroyo Mocho along El Charro Road and Stanley Boulevard and seven crossings of the arroyo, similar to Alternatives 1a, 1b, and 2a. Although the proposed Isabel/Stanley Station's northern boundary is along the Arroyo Mocho, construction of the station would not place any fill in the Arroyo Mocho and station design would incorporate setbacks to avoid direct effects. Impacts to water quality are addressed in Section 3.8 Hydrology and Water Quality, as described in the section, adherence to the NPDES construction and post-construction BMPs would reduce impacts from water quality to less than significant.

Alternative 4 – Isabel/I-580. No suitable CCCS habitat is present within the arroyos and creeks crossing this alternative. Therefore, no impact to CCCS habitat would occur under Alternative 4.

Alternatives 5 – Quarry. Alternative 5 would have a similar, although shorter, alignment than Alternative 3a. Accordingly, the potentially significant impacts to CCCS habitat identified for Alternative 3a would also apply to this alternative.

MITIGATION MEASURES. The following measures would reduce the potentially significant impact on CCCS and their habitat to less than significant. (LTS)

BIO-7.1 Avoid the Rainy Season During In-Water Construction (Alternatives 1a, 1b, 2a, 3a, 5). BART will consult with National Oceanic and Atmospheric Administration (NOAA) Fisheries, and/or CDFG (as applicable) to define the schedule for in-water work, as well as for work on bridges and/or culverts within the main channel of the Arroyo Mocho. If the waterway is not inundated, work may occur without restriction if approved by NOAA and/or CDFG.

BIO-7.2 Consult with NOAA Fisheries and USACE and Mitigate for the Loss of Riverine Riparian Vegetation (Alternatives 1a, 1b, 2a, 3a, 5). If construction-related impacts on riverine (e.g., riparian woodland) riparian vegetation along or within the Arroyo Mocho occur, the impacts shall be mitigated by BART as determined in consultation with the NOAA Fisheries and the USACE. Mitigation could occur through either the purchase of "freshwater riverine habitat" at an approved mitigation bank or payment into the USACE "in-lieu fee fund" for riverine aquatic bed habitat. Final mitigation ratios and locations are to be negotiated with the regulatory agencies prior to initiation of construction activities. Detailed mitigation requirements shall be identified in the final regulatory agency permits.

BIO-8 Trees, Heritage Trees, and Tree Preservation

The cities of Dublin, Pleasanton, and Livermore, as well as Alameda County, have ordinances protecting trees, particularly heritage trees. A tree survey has not been conducted for this assessment of the BART extension alternatives. Nevertheless, review of aerial photographs and identification of areas with relatively high tree densities is useful to compare the impacts to trees of the various alternatives and to indicate whether there are substantial differences among the alternatives. Construction activities for the BART extension alternatives could result in the grading and removal of trees that could be protected under local ordinances. Although BART is exempt by state law from compliance with local land use ordinances and as such is not legally required to comply with local ordinances, BART considers loss of protected trees a significant impact. A more detailed description of the impacts on trees associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts on trees.

Alternative 1 – Greenville East. This alternative could result in the removal of trees along I-580 and within the Isabel/I-580 Station area. There are also trees at the Greenville East Station and Greenville Yard. Impacts on trees protected by local ordinances would be considered potentially significant.

Alternative 1a – Downtown-Greenville East via UPRR. This alternative could result in the removal of trees adjacent to El Charro Road and north of Stanley Boulevard. There are also trees along the UPRR and at the Greenville East Station and Greenville Yard. Impacts on trees protected by local ordinance would be considered potentially significant.

Alternative 1b – Downtown-Greenville East via SPRR. This alternative could result in the removal of trees adjacent to El Charro Road, north of Stanley Boulevard, along the SPRR right-of-way, and at the Greenville East Station and Greenville Yard. As a result, this alternative would have impacts similar to Alternative 1a.

Alternative 2 – Las Positas. This alternative could result in the removal of trees along I-580, within the Isabel/I-580 Station and Vasco Road Station area, and the Vasco Yard. The potential disruption to trees would be considered a potentially significant impact.

Alternative 2a – Downtown-Vasco. This alternative could result in the removal of trees adjacent to El Charro Road, north of Stanley Boulevard, along the UPRR, at the Downtown Livermore Station and Vasco Road Station, and at the Vasco Yard. This alternative would have impacts similar to the preceding alternatives. While this alternative is slightly shorter than Alternatives 1, 1a, and 1b, trees could be removed at the Vasco Road Station and the Vasco Yard, which would not occur with the other longer alternatives.

Alternative 3 – Portola. This alternative could result in the removal of trees along I-580, within the Isabel/I-580 and the Downtown Livermore Stations, and at the Portola/Railroad Yard. While this alternative is shorter than the preceding alternatives, trees not affected by the other alternatives but could be impacted under Alternative 3 include those at the Downtown Livermore Station and at the Portola/Railroad Yard.

Alternative 3a – Railroad. This alternative could result in the removal of trees adjacent to El Charro Road, north of Stanley Boulevard, at the Downtown Livermore Station, and at the Portola/Railroad Yard. Loss of trees in these locations as a result of Alternative 3a would be considered a potentially significant impact.

Alternative 4 – Isabel/I-580. This alternative could result in the removal of trees along I-580 and within the Isabel/I-580 Station. This alternative would have less impact than the preceding alternatives because it is one of the shortest alignments and occurs predominantly in the median of I-580 except at the terminus station, where it could affect trees.

Alternative 5 – Quarry. This alternative could result in the removal of trees adjacent to El Charro Road and north of Stanley Boulevard. This alternative would have impacts similar to Alternative 3a, although it would not affect trees in the Downtown Livermore Station area. This alternative would have a potentially significant impact on trees.

MITIGATION MEASURE. The following mitigation measure would reduce impacts to trees to a less-than-significant level. (LTS)

BIO-8.1 *Conduct Tree Survey and Replace Trees at Suitable Ratios*. BART shall retain a certified arborist to survey trees along the selected BART extension alternative, as well as in potential construction yard/staging areas, to identify and evaluate trees that shall be removed. A report shall be prepared and submitted to BART to document the trees that are to be removed. BART shall then mitigate impacts to trees based on the following or equivalent protective measures depending on the size and health of trees to be removed.

- Prior to the start of construction, BART shall install exclusion fencing at the dripline of any tree that will not be affected by the construction and prohibit any storage of construction materials or other materials inside the fence.
- Mitigation, at an inch-by-inch ratio, shall be provided for native trees larger than 24 inches in circumference measured at four (4) feet six (6) inches above natural grade. For trees within open space, riparian, or habitat area, mitigation shall be provided for any tree with a circumference 18 inches or more above natural grade at an inch-by-inch ratio.

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would occur in segments that are fully urbanized and contain no native habitat. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the biological analysis or conclusions presented earlier in this section.

Cumulative Analysis

The cumulative context for BIO-CU-9, and BIO-CU-11 through BIO-CU-13 is the northeastern portion of Alameda County. This area was selected as it is somewhat contained by the surrounding hills and has similar habitats as the BART extension alternatives study area. The cumulative context for BIO-CU-10 (Swainson's Hawk Foraging Habitat) is the northeastern portion of Alameda County plus the southern portion of San Joaquin County, from the Alameda/San Joaquin county line east to I-5. This cumulative context is larger because of the distance that Swainson's hawks travel between nest sites and foraging habitat. Development in the northeastern portion of the County (including growth in accordance with the general plans of the local jurisdictions), major infrastructure projects (such as the I-580 Widening and HOV Lanes, Staples Ranch, El Charro, and East Dublin Specific Plans), and other

foreseeable projects in the area (such as the Iron Horse Trail along the UPRR tracks) would cumulatively contribute to biological impacts.

BIO-CU-9 Cumulative Impacts to Sensitive Biological Resources (including Jurisdictional Wetlands, Waters of the U.S. and Waters of the State; Special-Status Plants; Special-Status Vernal Pool Invertebrates and Special-Status Amphibians and Reptiles)

The historic and ongoing loss of sensitive biological resources, including wetlands, waters of the U.S., waters of the State, and special-status plants, vernal pool invertebrates, amphibians and reptiles, in the northeastern portion of Alameda County occurred and continues to occur as natural habitats are converted to agricultural and urban uses, and watercourses are altered for flood control and water supply purposes. Future development identified by local cities and the County and infrastructure improvements proposed by Caltrans and Zone 7 will be subject to compliance with State and federal laws identified above under "Applicable Policies and Regulations," would reduce cumulative impacts on sensitive biological resources. In addition, future development would also be subject to measures similar to those identified below, should a potentially significant impact to sensitive biological resources occur.

MITIGATION MEASURE. Implementation of Mitigation Measures BIO-1.1 through 1.3, 2.1 through 2.3, and 4.1 through 4.3, which would require focused surveys and mitigation plans to be developed and implemented, would reduce the project's contribution to this significant cumulative impact to less than considerable. Nevertheless, the residual impacts in combination with those of other cumulative development in northeast Alameda County and southern San Joaquin County are still regarded as cumulatively significant. The sensitivity of these listed resources and the historic and ongoing reduction of their habitat suggest that, despite good-faith efforts to curtail their loss and to restore their habitat, the cumulative impact would be potentially significant and unavoidable. (PSU)

BIO-CU-10 Cumulative Impacts to Swainson's Hawk Foraging Habitat

Although the Livermore area does not appear to support nesting Swainson's hawks, suitable nesting and foraging habitat is present in northeastern Alameda County and southern San Joaquin. Ongoing development throughout this area has eroded the suitable nesting and foraging habitat for the Swainson's hawk. As a result, the cumulative effect of future development in combination with Alternatives 1, 1a, and 1b, would be significant. Nearly 280 acres of habitat could be affected by these BART extension alternatives, and their contribution would be cumulatively considerable. The other BART extension alternatives (Alternatives 2, 2a, 3, 3a, 4, and 5) would not affect Swainson's hawk habitat, so that there would be no cumulative impacts with these alternatives.

MITIGATION MEASURE. Implementation of Mitigation Measure BIO-3.1, which would require compensation for the loss of Swainson's hawk foraging habitat, would reduce the project's contribution to this significant cumulative impact to less than considerable, In

addition, San Joaquin County has a program in place that requires developers to pay a mitigation fee to offset loss of Swainson's hawk foraging habitat; the funds collected are used to ensure preservation of foraging habitat in perpetuity. Swainson's hawks and other raptors would be able to forage over much of the undeveloped portions of northeastern Alameda County and southern San Joaquin County; therefore, the cumulative impact on the loss of foraging habitat would be less than significant. (LTS)

BIO-CU-11 Cumulative Impacts to Vernal Pool Fairy Shrimp Critical Habitat

Approximately 1,455 acres of critical habitat for the vernal pool fairy shrimp have been designated in Alameda County, as Unit 19C. Further loss of critical habitat would result in a significant cumulative impact because of the limited amount designated in the region.

Because the designation of critical habitat provides another layer of protection, land designated as such is not as likely to be developed as land not designated critical habitat. In addition, future development would also be subject to measures similar to those identified below, should a potentially significant impact to vernal pool fairy shrimp critical habitat occur.

Alternatives 2, 2a, 3, 3a, 4 and 5 would not impact critical habitat. Thus, these alternatives would not contribute to cumulative impact to the fairy shrimp habitat.

On the other hand, construction of the Greenville Yard associated with Alternatives 1, 1a, and 1b could result in the loss of 113 acres, or approximately 8 percent of the critical habitat in Unit 19C. The loss of critical habitat if one of these alternatives were selected as the BART extension alternative would be a considerable contribution to this significant cumulative impact.

MITIGATION MEASURE. Implementation of Mitigation Measure BIO-5.1, which requires BART to provide compensation for loss of habitat for the vernal pool fairy shrimp, would reduce the project's contribution to this significant cumulative impact. However as discussed under Impact BIO-CU-9, the residual impacts associated with the BART extension alternative in combination with those of other cumulative development in Alameda County are still regarded as cumulatively significant. The critical habitat is highly sensitive and its sustainability may be jeopardized by future activities including habitat conversion to urban uses or intensive agriculture, hydrologic disruptions or modifications, grazing animals, off-road recreational vehicles, and control of invasive species. Despite ongoing efforts to protect the habitat, this Program EIR conservatively considers the cumulative impact to be potentially significant and unavoidable. (PSU)

BIO-CU-12 Cumulative Impacts to Central California Coast Steelhead

Arroyo Mocho is the only stream in northeastern Alameda County that provides habitat for CCCS. There are no known projects in this area that could affect this stream, but there is undeveloped land along the stream that could be developed. For example, both the Staples Ranch Specific Plan in Pleasanton and the El Charro Specific Plan in Livermore, combined with the I-580 improvements, would all alter drainage and undeveloped land in the vicinity of the creek. Future flood management projects by Zone 7 and the local jurisdictions could also impact the Arroyo Mocho, but these activities could also provide a beneficial impact if the projects restore the riverine habitat for CCCS. Other streams in the region, including Arroyo las Positas and Arroyo Valle historically supported CCCS, but no longer provide suitable habitat for this species. Additional loss of habitat and changes in water quality in the Arroyo Mocho would result in a potentially significant cumulative impact.

Alternatives 1, 2, 3, and 4 would not impact Arroyo Mocho and would not contribute to the potentially significant cumulative impact. Therefore, with these alternatives there would be no cumulative impact on CCCS.

In contrast, Alternatives 1a, 1b, 2a, 3a, and 5 have the potential to contribute to this potentially significant cumulative impact as construction activities would occur along or possibly in the Arroyo Mocho. Therefore, the contribution of these alternatives to the cumulative impacts would be considerable.

MITIGATION MEASURES. Implementation of Mitigation Measures BIO-7.1 and 7.2 would require avoidance measures during the time period that CCCS are likely to be present in Arroyo Mocho; and compensation for the loss of riverine riparian habitat. Furthermore water quality protection measures during construction and operation as described in Section 3.8, Hydrology and Water Quality, and in Section 3.16, Construction Impacts, would support efforts to restore the Arroyo Mocho for the CCCS. These measures would reduce the potentially significant impact on CCCS and their habitat to less than significant for Alternatives 1a, 1b, 2a, 3a, and 5. As a result, the project's contribution to significant cumulative impacts would be reduced to less than cumulatively considerable. Future development would also be subject to measures similar to those identified above, should a potentially significant impact to CCCS occur. Therefore, with mitigation, this cumulative impact on CCCS would be less than significant. (LTS)

BIO-CU-13 Cumulative Impacts to Trees, Heritage Trees, Tree Preservation

Trees are protected through local ordinances and policies in the cities of Dublin, Pleasanton and Livermore, and in Alameda County. Impacts on protected trees are reduced and mitigated for through the requirements of these ordinances and policies. Therefore, cumulative impacts on trees would be less than significant.

However, BART is exempt by state law from compliance with local land use ordinances and as such is not legally required to comply with local ordinances. For Alternatives 1, 2, 3, and 4, impacts on trees could occur along I-580 and within the Isabel/I-580 Station area. Trees along El Charro Road and north of Stanley Boulevard could be impacted under Alternatives 1a, 1b, 2a, 3a, and 5. BART does consider the loss of protected trees a potentially significant impact. The combination of the BART extension alternatives and foreseeable or anticipated development based on local general plans and specific plans could result in a significant cumulative loss of trees, including heritage and other protected trees. While the BART extension alternatives would be subject to the below mitigation measure, other future development would also be subject to the same local ordinances and policies in the cities of Dublin, Pleasanton, and Livermore, and in Alameda County, and measures similar to that identified below would be implemented, should a potentially significant impact to trees occur.

MITIGATION MEASURES. Implementation of Mitigation Measure BIO-8.1, which calls for tree surveys and replacement of removed trees at suitable ratios, would ensure that the impacts on protected trees from the selected BART extension alternative are fully mitigated. As a result, the potential contribution to cumulative impacts to trees by the selected BART extension alternative would be less than considerable. Therefore, the cumulative impact to trees, heritage trees and tree preservation would be less than significant. (LTS)

3.10 NOISE AND VIBRATION

Introduction

The proposed BART service would emit noise and vibration that could affect communities along the BART extension alternatives. The noise levels would be similar to that which a person might experience adjacent to a highway or local roadway. However, noise and vibration as BART railcars pass by would be intermittent based on the system operating schedule. Residential development along the corridors for the BART extension alternatives contains a number of "sensitive receptors" who could be annoyed by the proximity of transit operations.

This section provides an introduction to basic concepts and terminology necessary to understand noise and vibration. Background, or ambient, noise levels are described for representative segments of the corridors, based on specific noise measurements and other studies conducted in the area. This baseline information is important to understand how conditions would change with the introduction of enhanced transit service in the corridor for the alternatives. The increase in noise and vibration resulting from the transit vehicles and other BART activities (such as those that would be anticipated at the maintenance yard) is compared to thresholds that the U.S. Federal Transit Administration (FTA) has adopted to identify adverse community response. As appropriate, mitigation measures are recommended that would reduce noise impacts from the BART extension alternatives.

Comments received from the public in response to the NOP included concerns regarding noise generated by trains along the proposed routes and by vehicles traveling to the proposed stations. These concerns are evaluated in this section.

Existing Conditions

Characteristics of Sound and Noise

Sound is generated when an object vibrates and causes minute periodic fluctuations in atmospheric pressure. Human perception of sound is dependent on various factors including frequency, magnitude, and duration. Frequency is the number of pressure variations per second (Hertz). Humans can typically hear sound waves with frequencies between 20 and 20,000 Hertz.

Since the human range of hearing is so large, sound magnitude is measured in units of decibels (dB) on a logarithmic scale. The human ear does not perceive sound at the low and high frequencies as well as it does at the middle frequencies. To obtain a single number that better characterizes the noise level perceived by a human ear, a weighting scale called A-weighting decibel scale (dBA) is typically used. On this scale, the low and high frequencies are given less weight than the middle frequencies.

Noise is the term generally given to the "unwanted" aspects of sound. Many factors influence how a sound is perceived and whether it is considered annoying to a listener. These factors include the physical characteristics of a sound (e.g., frequency, magnitude, duration, etc.) and also non-acoustic factors (e.g., the acuity of a listener's hearing ability, the activity of the listener during exposure, etc.) that can influence the judgment of listeners regarding the degree of "undesirability" of a sound. Excessive noise can negatively affect the physiological or psychological well-being of individuals or communities.

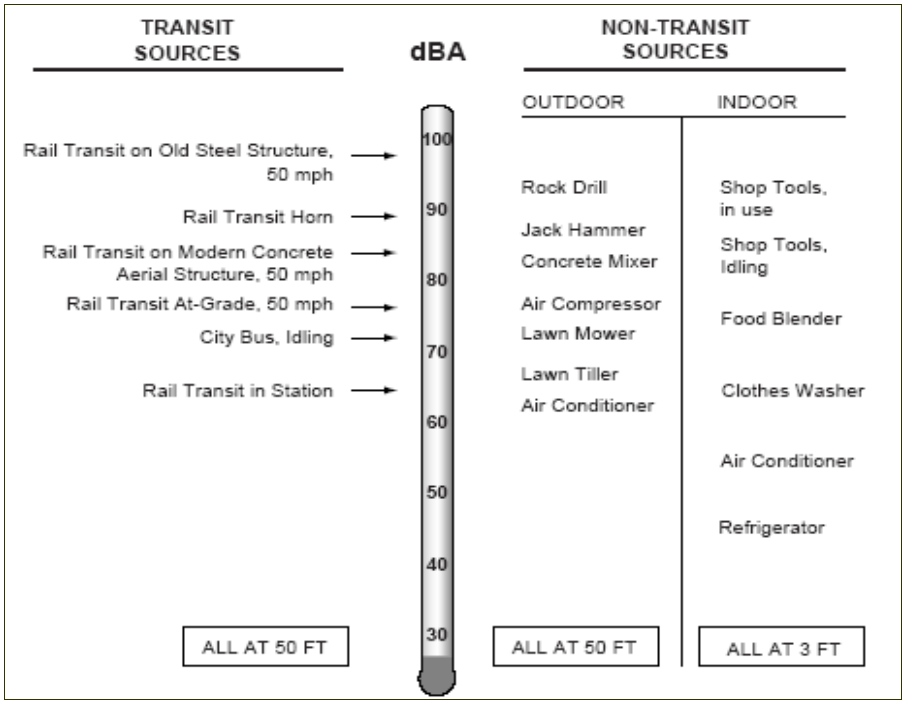
All quantitative descriptors used in environmental noise assessments recognize the strong correlation between the high acoustical energy content of a sound (i.e., its loudness and duration) and the disruptive effect it is likely to have as noise. Because environmental noise fluctuates over time, most descriptors average the sound level over the time of exposure, and some add "penalties" during the times of day when intrusive sounds would be more disruptive to listeners. The most commonly used descriptors are:

- Equivalent A-weighted noise level (Leq). The Leq is an average or constant sound level over a given period that would have the same sound energy as the time-varying A-weighted sound over the same period. The period is typically taken over 1 hour and represented as Leq (h).
- Day-night average noise level (L_{dn}). The L_{dn} is a 24-hour average sound level, but for the night hours between 10:00 p.m. and 7:00 a.m., 10 dBA is added to the average. This additional 10 dBA accounts for the tendency of people to perceive noise more loudly at night.
- Community noise equivalent level (CNEL). The CNEL is similar to the L_{dn} except that, in addition to the 10:00 p.m. to 7:00 a.m. 10 dBA penalty, a 5 dBA penalty is applied to noise levels occurring from 7:00 p.m. to 10:00 p.m. Typically, day-night average noise levels are within 1 dBA of the CNEL.
- Maximum Sound Level (Lmax). The Lmax is the maximum sound level during an event or test.

Figure 3.10-1 gives examples of typical noise levels from various transit and non-transit sources. The figure shows that typical rail transit horns are louder than rail transit on aerial structures, which in turn are typically louder than rail transit at grade. In the case of noise for a railcar, one study measured the maximum noise level from a BART railcar traveling 80 mph to be 84 dBA at 50 feet.[1]

[1] HMMH, *Noise and Vibration Impact Assessment for BART Warm Springs Extension Project*, February 2003.

Figure 3.10-1
Examples of Typical Noise Levels for Various Sources

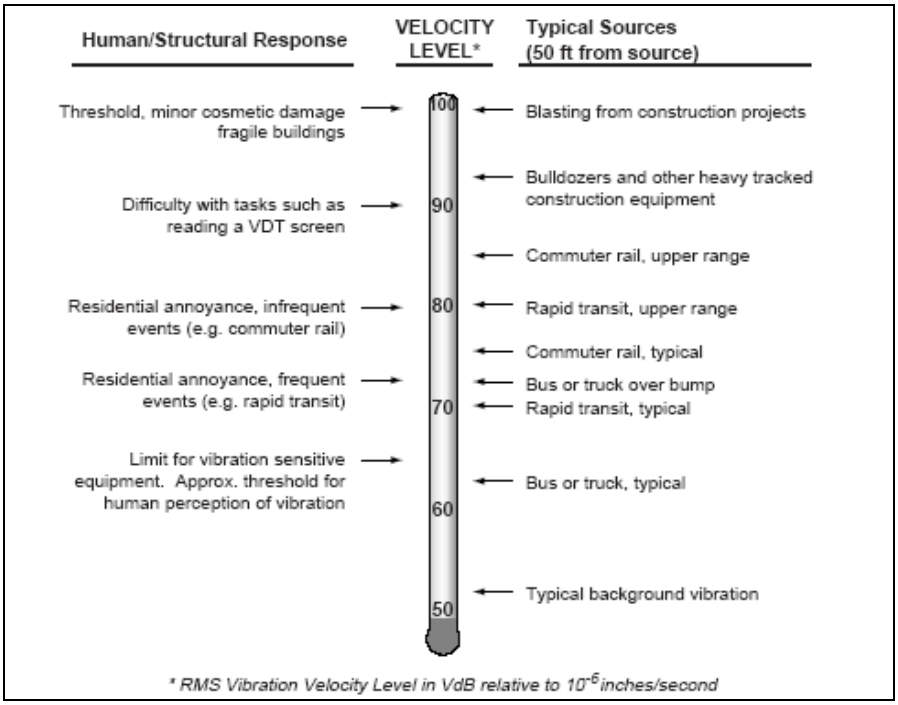


Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report*, May 2006.

Definition and Measurement of Vibration

While sound is the transmission of energy through the air, groundborne vibration is the transmission of energy through the ground or other solid medium. Vibrations are perceived by humans as the motion of the floor or building. Such vibrations within buildings can, in turn, generate noise by transmitting energy through the air causing a rumble called groundborne noise. The magnitude of vibration is measured in vibration decibels (VdB). People can usually perceive vibrations of 65 VdB or greater, with levels exceeding 75 VdB commonly considered annoying. Typical background vibration in residential areas is 50 VdB or lower, below the typically perceptible threshold of 65 VdB. However, near rapid transit or light rail systems, vibration levels are usually between 70 and 80 VdB. Figure 3.10-2 provides other examples of typical vibration levels. The occurrence of vibration events with a magnitude large enough to cause annoyance is not as common as noise exposures severe enough to cause annoyance. For example, vibrations do not generally cause an adverse reaction from people who are outdoors.

Figure 3.10-2
Examples of Typical Vibration Levels for Various Sources



Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report,* May 2006.

Besides being an annoyance, extreme levels of vibration can also damage fragile structures. The potential for building damage from vibration is typically evaluated by examining the peak particle velocity (PPV), which is maximum instantaneous peak of a vibration signal.

Vibration levels near transit systems are influenced by a number of factors, which may include:

- Vehicle design (e.g., suspension, wheel design);
- Guideway design (e.g., stiffness, type of joints);
- Geology (e.g., type and depth of soil); and
- Receiving building design (e.g., wood, masonry).

Existing Noise and Vibration Sources

The dominant and consistent source of noise near the corridor of the BART extension alternatives is on-road vehicle traffic. Sensitive receptors (i.e., land uses that are particularly sensitive to changes in the ambient noise environment, such as residential areas, schools, and hospitals) within the cities of Dublin, Pleasanton, and Livermore, and in Alameda County along the corridor are exposed to noise originating from I-580 and local roadways. Other existing noise sources include trains along the existing UPRR tracks used by freight and the Altamont Commuter Express (ACE) service and short-term construction activities. The Vulcan Minerals Quarry along El Charro Road also generates noise directly from sources on the quarry and indirectly from trucks traveling on El Charro to and from the quarry. In addition, the Livermore Municipal Airport located near Airway Boulevard just south of I-580 can generate high levels of noise.

Typically, indoor vibration levels near traffic corridors are below the threshold of human perception (below 65 VdB). In some instances, poorly maintained, rough roads with heavy-duty vehicles may generate perceptible vibrations; however, perceptible vibration levels would more likely be generated from construction equipment during construction rather than from transit vehicles traveling the corridor after construction is complete.

Noise Measurements

Existing noise levels in the vicinity of the BART extension alternatives were characterized, in part, by taking noise measurements using a noise meter at the locations described in Table 3.10-1 and identified in Figure 3.10-3. These locations were selected based on predominant noise sources, type of land use, and locations potentially affected by the BART extension alternatives. Specifically, locations were selected at or near land uses that would be sensitive to noise such as residences, schools, and parks. These noise measurement locations were identified to be representative of existing noise levels along the corridor at locations that may be impacted by the BART extension alternatives. The area encompassing the various receptors that could be affected by alternatives, as shown in Figure 3.10-3, defines the study area for this noise analysis.

At these locations, 24-hour measurements were taken using a Metrosonics db-3080 Noise Dosimeter (a Type II meter), calibrated at the sites. Information collected included 1-minute L_{eq} and L_{max}, all in dBA. A summary of the measurements is found in Table 3.10-1. Note that this dosimeter provides readings of all measured parameters in 0.1 dBA increments, although the measured parameters are not known to this accuracy. Environmental noise levels have a relatively large intrinsic variability (e.g., it would not be unusual for a series of CNEL values measured at the same location over a period of several days to extend over a range of 1 to 2 dBA). Also, Type II dosimeter readings are limited in terms of accuracy; that is, Type II dosimeter readings are likely within 1 dBA of the true parameter values, at best. However, it is standard practice to report measured values exactly as the measuring instrument displays them and this convention has been carried over to the parameters displayed in Table 3.10-1.

Table 3.10-1
Summary of Existing Noise Measurements along the Study Area, 2008-2009

Location	Predominant Noise Source	Primary Land Use Category	Descriptor	Measured Value (dBA)
S1-Freisman Road, Livermore, CA. Located near 1614 Freisman Road, South of I-580. Located approximately 100 feet from edge of I-580 near the Las Positas Golf Course.	Traffic from I-580	Recreational	24-hour L_{eq}	71.4
			Min. hourly L_{eq}	65.0
			L_{max}	84.5
			L_{dn}	75.9
			CNEL	76.2
S2-BART Parking Lot at Airway Blvd, Livermore, CA. Located north part of proposed Isabel/I-580 Station, about 260 feet from edge of Airway Blvd and about 850 feet south of edge of I-580. Adjacent to existing small farm/residence.	Traffic from I-580	Residential	24-hour L_{eq}	61.1
			Min. hourly L_{eq}	50.6
			L_{max}	81.1
			L_{dn}	64.9
			CNEL	65.5
S3-Stanley Boulevard & Kitty Hawk Road, Livermore, CA. Located on south side of E. Stanley Boulevard, east of Kitty Hawk, just before first residence. Near site of proposed Isabel/Stanley Station. Monitor was approximately 12 feet from edge of E. Stanley Boulevard and 90 feet from edge of Kitty Hawk Road.	Traffic from E. Stanley Boulevard and Kitty Hawk Road, trains	Residential	24-hour L_{eq}	70.8
			Min. hourly L_{eq}	59.3
			L_{max}	99.6
			L_{dn}	74.0
			CNEL	74.5
S4-Between Kitty Hawk Road & Rockrose Street, Livermore, CA. Located east of Kitty Hawk Road near opening to trail off Rockrose Street. Monitor was located about 200 feet from the edge of Kitty Hawk Road and about 90 feet from edge to Rockrose Street. There is partial shielding from Kitty Hawk Road by a berm.	Traffic from Kitty Hawk Road	Residential	24-hour L_{eq}	52.4
			Min. hourly L_{eq}	42.6
			L_{max}	72.8
			L_{dn}	56.7
			CNEL	56.9
S5-First Street, Livermore, CA. Located south of First Street in downtown Livermore next to apartments between 2nd Street and Inman Street. Near site of existing Downtown Livermore Station. Monitor was located about 26 feet from edge of First Street.	Traffic from First Street and Trains	Residential	24-hour L_{eq}	62.2
			Min. hourly L_{eq}	50.8
			L_{max}	93.4
			L_{dn}	65.2
			CNEL	65.9

Table 3.10-1
Summary of Existing Noise Measurements along the Study Area, 2008-2009

Location	Predominant Noise Source	Primary Land Use Category	Descriptor	Measured Value (dBA)
S6-Junction Avenue Middle School, 298 Junction Avenue Livermore, CA. Located in parking lot of Junction Avenue Middle School east of Junction Avenue, adjacent to church. Near site of existing Downtown Livermore Station. Monitor was located about 30 feet from edge of Junction Avenue.	Traffic from Junction Avenue and Trains	Residential and Institutional	24-hour L_{eq}	58.2
			Min. hourly L_{eq}	45.4
			L_{max}	92.5
			L_{dn}	62.7
			CNEL	62.9
S7-Church, 3187 Gardella Plaza, Livermore, CA. Located east of church, south of Gardella Plaza, and north of tracks. Near site of existing Downtown Livermore Station. Monitor was located 37 feet from edge of Gardella Plaza**,** 150 feet from tracks, and 400 feet from First Street.	Traffic from First Street and Trains	Residential and Institutional	24-hour L_{eq}	57.6
			Min. hourly L_{eq}	44.1
			L_{max}	93.4
			L_{dn}	62.4
			CNEL	62.5
S8-Near Kindercare, 4655 Lassen Rd, Livermore, CA. Located at west end of Lassen Road, north of I-580, and west of Kindercare. Monitor was located about 550 feet north of edge of I-580 and 150 feet from Kindercare property.	Traffic from I-580	Residential and Institutional	24-hour L_{eq}	60.2
			Min. hourly L_{eq}	52.9
			L_{max}	75.9
			L_{dn}	65.8
			CNEL	66.1
S9-Herman Ave and Aspenwood Way, Livermore, CA. Located on east side of Herman Avenue at Aspenwood Way. Monitor was located about 10 feet from edge of Herman Avenue and about 1,300 feet from edge of I-580.	Traffic from Herman Avenue and I-580	Residential and Institutional	24-hour L_{eq}	60.1
			Min. hourly L_{eq}	51.2
			L_{max}	89.6
			L_{dn}	64.4
			CNEL	64.8
S10-Patterson Pass Rd, Livermore, CA. Located north side of Patterson Pass Road, east of Candy Court, and near first home to west of S. Vasco Road. Monitor was located about 14 feet from edge of Patterson Pass Road and about 155 feet from Candy Court.	Traffic from Patterson Pass Road and trains	Residential	24-hour L_{eq}	62.3
			Min. hourly L_{eq}	48.0
			L_{max}	96.2
			L_{dn}	66.7
			CNEL	67.0

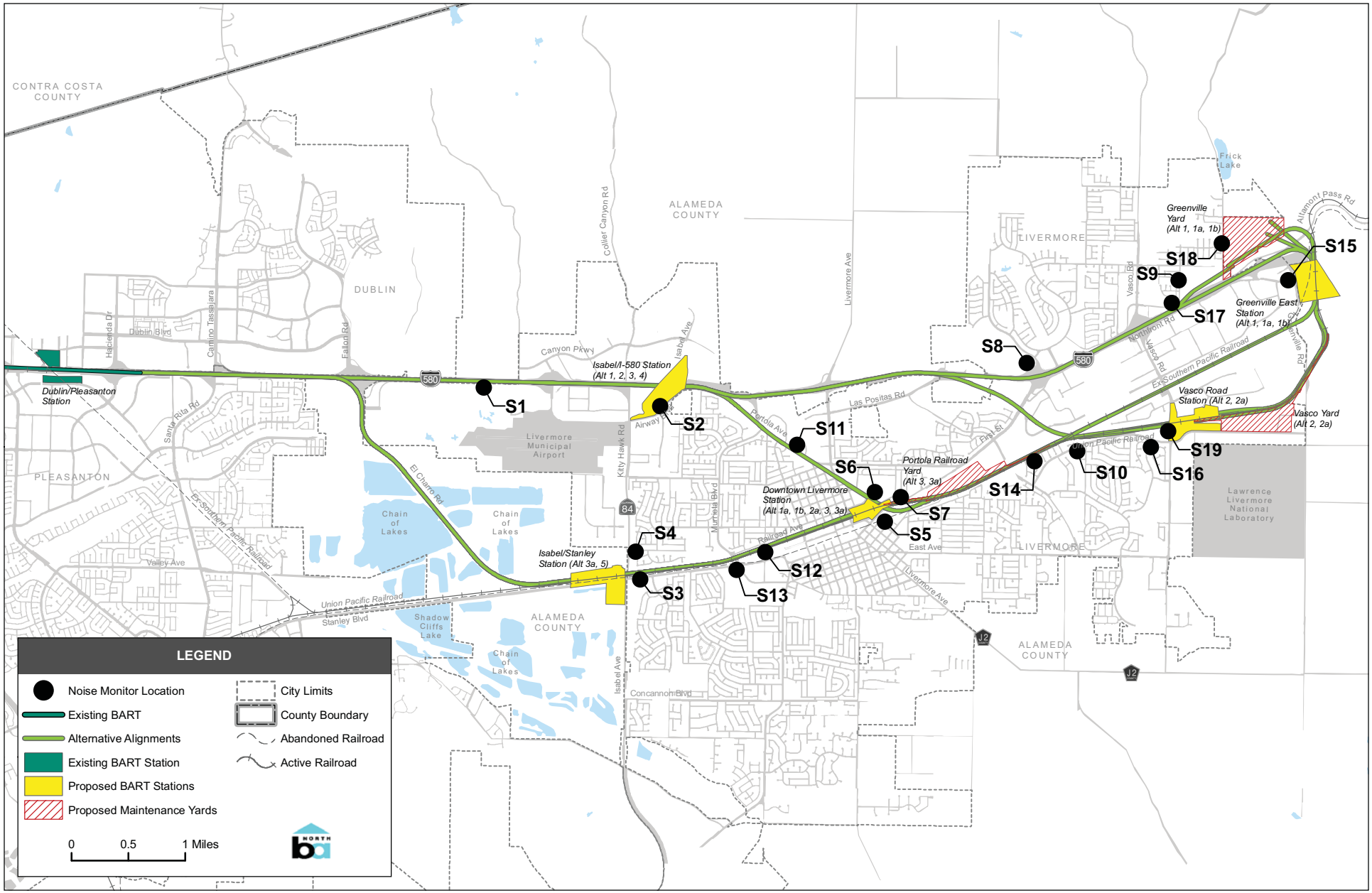
Table 3.10-1
Summary of Existing Noise Measurements along the Study Area, 2008-2009

Location	Predominant Noise Source	Primary Land Use Category	Descriptor	Measured Value (dBA)
S11-Portola Avenue and Alviso Place, Livermore, CA. Located at Park and Ride at Portola Avenue. Monitor was located about 75 feet from edge of Portola Avenue.	Traffic from Portola Avenue	Residential	24-hour L_{eq}	58.7
			Min. hourly L_{eq}	52.6
			L_{max}	85.8
			L_{dn}	64.0
			CNEL	64.2
S12-Stanley Boulevard, Livermore, CA. Located behind commercial area (specifically Suite 1104). Monitor was located about 25 feet from tracks and more than 500 feet from Stanley Boulevard (building between road and monitor). No wall between tracks and monitor.	Trains	Commercial to the South and Residential to the North	24-hour L_{eq}	63.6
			Min. hourly L_{eq}	47.8
			L_{max}	98.5
			L_{dn}	70.7
			CNEL	70.9
S13-Stanley Boulevard & West of Murrieta Boulevard, Livermore, CA. Located next to the AM/PM store. Monitor was located at the park about 30 feet from edge of Stanley Boulevard.	Traffic from Stanley Boulevard and Trains	Commercial and Recreation	24-hour L_{eq}	62.7
			Min. hourly L_{eq}	49.7
			L_{max}	86.6
			L_{dn}	66.8
			CNEL	67.2
S14-Shawna Street, Livermore, CA. Located near the corner house of Shawna Street and Trixie Drive. Monitor was located about 12 feet from edge of Shawna Street. Shielded from train noise by wall.	Traffic from Shawna Street and Trains	Residential	24-hour L_{eq}	58.3
			Min. hourly L_{eq}	43.4
			L_{max}	100.0
			L_{dn}	61.4
			CNEL	61.4
S15-Southfront Road, Livermore, CA. Located next to the hotel, behind Chevron gas station. Monitor was located about 200 feet from Southfront Road and about 250 feet from N. Greenville Road. Near site of proposed Greenville East Station.	Traffic from Southfront Road, N. Greenville Road, and I-580	Commercial, Light Industrial, Hotel	24-hour L_{eq}	61.7
			Min. hourly L_{eq}	54.6
			L_{max}	91.6
			L_{dn}	66.3
			CNEL	66.5

Table 3.10-1
Summary of Existing Noise Measurements along the Study Area, 2008-2009

Location	Predominant Noise Source	Primary Land Use Category	Descriptor	Measured Value (dBA)
S16- Patterson Pass Road & Arlene Way, Livermore, CA. Monitor was located about 25 feet from edge of Patterson Pass Road.	Traffic from Patterson Pass Road and Trains.	Residential	24-hour L_{eq}	61.4
			Min. hourly L_{eq}	53.3
			L_{max}	93.3
			L_{dn}	65.5
			CNEL	65.7
S17-Northfront Road, Livermore, CA. Located at the Northfront Trailhead Park. Monitor was located about 75 feet from edge of Northfront Road.	Traffic from Northfront Road and I-580	Residential and Recreational	24-hour L_{eq}	70.0
			Min. hourly L_{eq}	64.8
			L_{max}	92.9
			L_{dn}	76.1
			CNEL	76.3
S18-Laughlin Road, Livermore, CA. Located between Altamont Creek Road and Edgewater Road. Monitor was located about 15 feet from edge of Laughlin Road.	Traffic from Laughlin Road	Residential	24-hour L_{eq}	58.8
			Min. hourly L_{eq}	44.2
			L_{max}	88.4
			L_{dn}	61.9
			CNEL	62.6
S19-Park on Patterson Pass Road, Livermore, CA. Located at the park by Patterson Pass Road and S. Vasco Road. Monitor was located at north part of the park, north of Patterson Pass Road, and south of tracks. Located about 350 feet from Patterson Pass Road and about 150 feet from tracks. Near existing Vasco Road Station.	Traffic from Patterson Pass Road and Trains	Residential and Recreational	24-hour L_{eq}	58.8
			Min. hourly L_{eq}	48.9
			L_{max}	92.6
			L_{dn}	65.8
			CNEL	66.2

Source: ERM, 2009.



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE MONITORS IN BART TO LIVERMORE STUDY AREA

FIGURE 3.10-3

In addition to the noise monitoring locations shown in Figure 3.10-3, existing Specific Plans, General Plans, and other nearby studies present measured or estimated noise levels in the study area. The Staples Ranch Specific Plan[2] and Livermore Municipal Airport Altitude and Noise Study[3] estimated that noise levels along El Charro Road and Fallon Road vary from 55 to 65 dBA CNEL. The City of Livermore General Plan[4] estimated the following 2003 noise levels 50 feet from the edge of major roadways:

- Airway Boulevard between I-580 and Kitty Hawk Road: 67.0 dBA CNEL;
- Airway Boulevard between Kitty Hawk Road and Portola Avenue: 62.5 dBA CNEL;
- First Street between S. Livermore Avenue and Mines Road: 71 dBA CNEL;
- First Street between Mines Road and I-580: 72 dBA CNEL
- Greenville Road between Northfront Road and Southfront Road: 66 dBA CNEL;
- Las Positas Road between N. Livermore Avenue and Vasco Road: 64 through 65 dBA CNEL;
- Patterson Pass Road between Joyce Street and Vasco Road: 64 dBA CNEL;
- Portola Avenue between I-580 and First Street: 66 through 68 dBA CNEL;
- Railroad Avenue between Stanley Boulevard and First Street: 66 through 68 dBA CNEL;
- Stanley Boulevard between Isabel Avenue and Murrieta Boulevard: 70 dBA CNEL; and
- I-580 between Airway Boulevard and Greenville Road: 80 through 81 dBA CNEL.

A substantial increase in traffic volumes would need to have occurred to result in even a modest increase in the CNEL. For example, traffic volumes would need to double to trigger a 3 dBA increase in noise levels. As a result, the above CNEL are expected to be representative of existing conditions within 1-2 dBA.

The City of Livermore also estimated that 2003 noise from freight and ACE trains reach 60 dBA CNEL at approximately 650 feet from the centerline of the tracks.

The Environmental Assessment/Initial Study (EA/IS) for the I-580 Eastbound HOV lane project[5] and EA/IS for the I-580 Westbound HOV lane project[6] also provided measured and predicted peak-hour existing noise levels. Some of the measured peak-hour noise levels are presented below:

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2 City of Pleasanton, *Stoneridge Drive Specific Plan Amendment/Staples Ranch EIR*, Chapter 3.7 Noise, dated April 2008.

3 City of Pleasanton, *Livermore Municipal Airport Altitude and Noise Study*, dated May 28, 2003.

4 City of Livermore, *2003-2025 General Plan*, Amended June 2009.

5 Caltrans, *I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive*, dated September 2006.

6 Caltrans, *I-580 Westbound HOV Lane Project*, dated March 2009.

- Residence at 3684 Kirkcaldy Court, Pleasanton: 70 dBA;
- Comfort Inn at 2625 Constitution Drive, Livermore: 73 dBA;
- Saddleback Park at Sutter Street and Saddleback Circle, Livermore: 77 dBA;
- Los Positas Creek Apartments along Paseo Laguna Seco, Livermore: 65 dBA; and
- Residence at 5151 Sundial Circle, Livermore: 67 dBA.

Sensitive Receptors

The BART extension alternatives traverse the cities of Dublin, Pleasanton, and Livermore. The noise criteria used to determine the level of impact are based on the representative land use types along the BART extension alternatives corridor; therefore, land uses along the corridor for the extension alternatives need to be identified as part of the analysis. In particular, land uses that house noise-sensitive receptors need to be recognized to describe impacts of the BART extension alternatives. Sensitive receptors include residences, hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and outdoor recreation areas. Figure 3.3-2 in Section 3.3, Land Use, and Table 3.12-2 in Section 3.12, Public Health and Safety, of this EIR show the key sensitive land uses in the vicinity of the BART extension alternatives. Table 3.10-2 below lists the key noise sensitive receptors near the study area that are closest to the proposed alignments. This table does not identify specific residences, which are located throughout the study area as shown in Figure 3.3-1 in Section 3.3, Land Use. Residences are also sensitive receptors, which along with hotels, are particularly sensitive to night-time noise. A number of parks and schools are near several of the proposed alignments, particularly near downtown Livermore.

Applicable Policies and Regulations

The FTA noise guidelines are commonly recognized as the basis for determining significant impacts from rail projects. BART has adopted the FTA construction and operational noise criteria as its own. Because BART is exempt by state law (California Government Code Section 53090) from local city and county guidelines and standards, those laws and guidelines are not presented here.

FTA Guidelines. In its document, *Transit Noise and Vibration Impact Assessment*,[7] the FTA provides guidance for occasions when noise and vibration impacts are significant. In particular, Figure 3.10-4 identifies degrees of impact for transit projects based on land use and existing and alternative-associated noise levels. The land use categories are described in Table 3.10-3. Category 1 includes land uses where quite is an essential element to the intended purposed, such as outdoor amphitheaters, and Category 2 includes homes, hospitals, and hotels where people sleep. Category 3 land uses encompass typically indoor environments where noise sensitivity is important, such as schools, libraries, and churches, and the criteria account for the reduction in average noise levels provided by a building structure. The L_{dn} noise descriptor is used for Category 2, because it accounts for greater human

[7] FTA, *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

Table 3.10-2
Sensitive Receptors in BART Extension Alternatives Corridor (Other than Residences and Hotels)

Sensitive Receptor Name	Address	Receptor Type
Las Positas Golf Course	917 Clubhouse Drive Livermore, CA	Park
Park	East Airway Boulevard and Sutter Street Livermore, CA	Park
Livermore Downs Park	2101 Paseo Laguna Seco Livermore, CA	Park
Northfront Trailhead Park	6315 Almaden Way Livermore, CA	Park
Portola Park	Portola Avenue and N. Livermore Avenue Livermore, CA	Park
Doolan Park	Junction Avenue and Ladd Avenue Livermore, CA	Park
Don Gasper De Portola Elementary	2451 Portola Avenue Livermore, CA	Elementary School
Granada High School	400 Wall Street Livermore, CA	High School
Junction Avenue Middle School	298 Junction Ave Livermore, CA	Middle School
Ladd School	2801 Ladd Avenue Livermore, CA	Elementary School
Livermore High School	600 Maple Street Livermore, CA	High School
Valley Memorial Hospital	1111 E. Stanley Boulevard Livermore, CA	Hospital

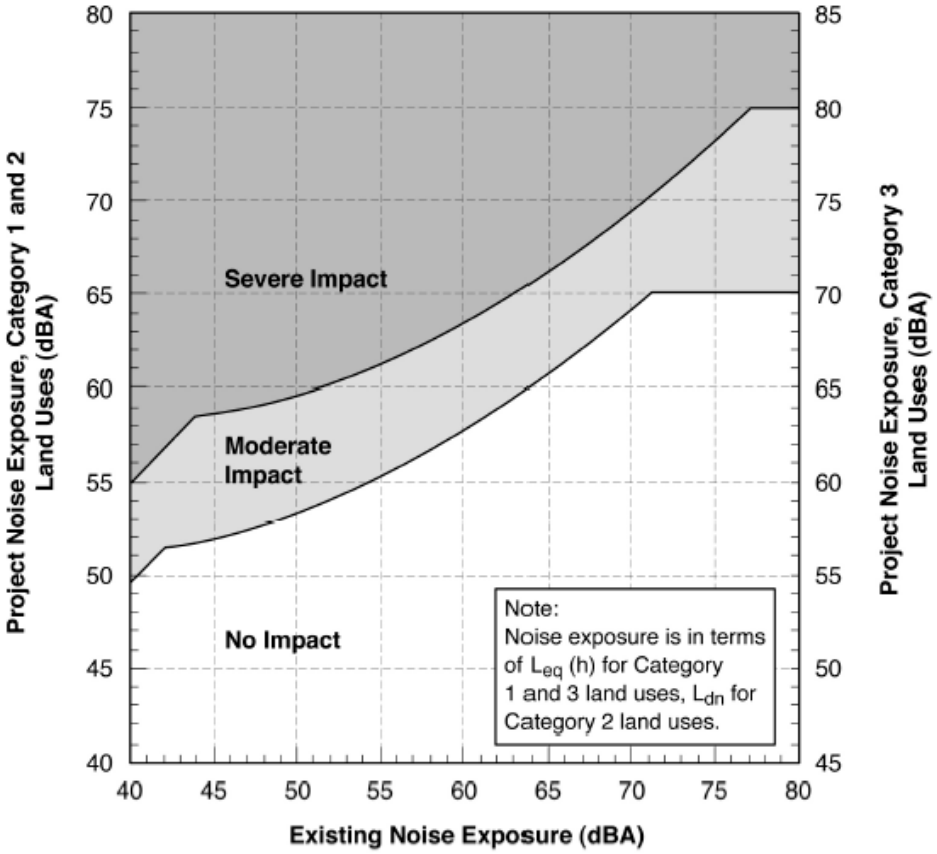
Source: ERM, 2009.

Table 3.10-3
FTA Land Use Categories

Land Use Category	Description
1	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	Residences and buildings in which people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	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 fall into this category, and include medical offices, conference rooms, recording studios, and concert halls. Places for meditation or study are associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Source: FTA*, Transit Noise and Vibration Impact Assessment, Final Report,* May 2006.

Figure 3.10-4
FTA Noise Impact Criteria for Transit Projects

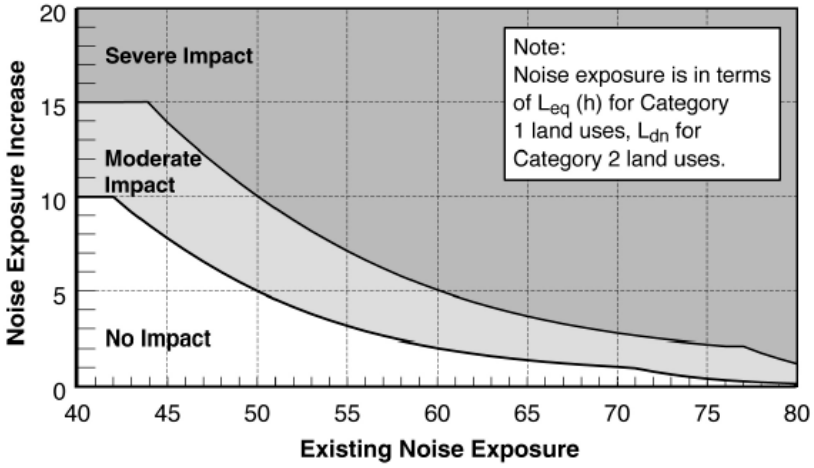


Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report,* May 2006.

sensitivity to nighttime noise, which would be most likely to disrupt sleep at the affected sensitive land uses. The criteria for Categories 1 and 3 are based on the hourly L_{eq} noise descriptor for the noisiest hour of transit-related activities, which could affect essential activities at the sensitive land uses.

As seen in Figure 3.10-4, the criteria allow for a project to generate more noise in areas with higher existing noise levels, before triggering an adverse human response. However, even though the project by itself can generate higher noise levels, the overall effect is to permit a smaller increase in total or cumulative noise levels (existing plus selected alternative) as the ambient noise increases. This trend is more apparent in Figure 3.10-5.

Figure 3.10-5
Increase in Cumulative Noise Levels Allowed by Noise Impact Criteria for Transit Projects



Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report,* May 2006.

The FTA criteria for groundborne vibration and resulting groundborne noise impacts are identified in Table 3.10-4. Similar to the noise criteria, the criteria in Table 3.10-4 are based on type of land use. Category 1 land uses include hospitals and manufacturing facilities that have vibration-sensitive equipment. All types of residential land uses are considered Category 2 land uses. Category 3 land uses are institutional land uses with facilities used primarily in the day such as schools and churches.

Table 3.10-4
FTA Vibration Impact Criteria for Transit Projects

Land Use Category	Groundborne Vibration (VdB)	Groundborne Noise (dBA)
Category 1: Buildings where vibration would interfere with interior operations.	65	None
Category 2: Residences and buildings where people normally sleep.	72	35
Category 3: Institutional land use with primarily daytime use.	75	40

Source: FTA, *Transit Noise and Vibration Impact Assessment*, Final Report, May 2006.

Note:

Criteria are for frequent events defined as more than 70 vibration events per day (includes total contribution from project).

Impact Assessment and Mitigation Measures

Standards of Significance

The BART extension alternatives would pose a significant noise and vibration impact if any of the alternatives would result in:

- A substantial permanent increase in ambient noise or vibration levels in the vicinity above levels existing without the alternative; or
- A substantial temporary or periodic increase in ambient noise or vibration levels in the vicinity above levels existing without the alternative.

To help quantify substantial increases to ambient conditions, the criteria below are used to define significance for noise and vibration impacts.

Operational Criteria. For operational impacts, noise and vibration criteria are based on the FTA guidelines. Noise criteria for FTA-defined "Moderate Impact" or "Severe Impact" categories are shown in Table 3.10-5. Noise levels resulting in a "severe" impact under FTA criteria are considered in all cases to be significant for CEQA purposes. Noise levels resulting in a "moderate" impact under FTA criteria are also considered to be potentially significant for CEQA purposes, although site-specific circumstances could be invoked to judge whether such increases would result in a perceptible and substantial deterioration from existing conditions. Factors relevant to such a judgment could include the ambient noise levels from existing sources; the proximity, sensitivity, and number of noise-sensitive receptors; the degree of increase over ambient noise levels; and other site-specific factors that may result in a perceptible and substantial deterioration from existing conditions." The noise levels in this table are the tabular form of the FTA criteria described in Figure 3.10-4. Land use categories associated with Table 3.10-5 are described in Table 3.10-5.

Vibration levels exceeding those in Table 3.10-6 during operations are considered significant. Considering the expected frequency of the BART extension alternatives (about 213 train trips per day), the criteria under "Frequent Events" would apply.

Impact Classification. To determine noise impacts to land uses in the BART extension alternatives corridor, a level of significance is determined according to established methodology and reported for each identified impact, as specified below. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section NO, refers to Noise.

Table 3.10-5
Noise Impact Criteria during Operations

Existing Noise Exposure *	Project Noise Impact Exposure, $L_{eq}(h)$[a] or L_{dn} (dBA)[a]					
	Category 1 or 2 Sites[a]			Category 3 Sites[a]		
$L_{eq}(h)$ or L_{dn} (dBA)	No Impact	Moderate Impact	Severe Impact	No Impact	Moderate Impact	Severe Impact
	< Ambient	Ambient	> Ambient	< Ambient	Ambient	> Ambient
<43	+10	+10 to 15	+15	+15	+15 to 20	+20
43	<52	52-58	>58	<57	57-63	>63
44	<52	52-58	>58	<57	57-63	>63
45	<52	52-58	>58	<57	57-63	>63
46	<53	53-59	>59	<58	58-64	>64
47	<53	53-59	>59	<58	58-64	>64
48	<53	53-59	>59	<58	58-64	>64
49	<54	54-59	>59	<59	59-64	>64
50	<54	54-59	>59	<59	59-64	>64
51	<54	54-60	>60	<59	59-65	>65
52	<55	55-60	>60	<60	60-65	>65
53	<55	55-60	>60	<60	60-65	>65
54	<55	55-61	>61	<60	60-66	>66
55	<56	56-61	>61	<61	61-66	>66
56	<56	56-62	>62	<61	61-67	>67
57	<57	57-62	>62	<62	62-67	>67
58	<57	57-62	>62	<62	62-67	>67
59	<58	58-63	>63	<63	63-68	>68
60	<58	58-63	>63	<63	63-68	>68
61	<59	59-64	>64	<64	64-69	>69
62	<59	59-64	>64	<64	64-69	>69
63	<60	60-65	>65	<65	65-70	>70
64	<61	61-65	>65	<66	66-70	>70
65	<61	61-66	>66	<66	66-71	>71
66	<62	62-67	>67	<67	67-72	>72
67	<63	63-67	>67	<68	68-72	>72
68	<63	63-68	>68	<68	68-73	>73
69	<64	64-69	>69	<69	69-74	>74
70	<65	65-69	>69	<70	70-74	>74
71	<66	66-70	>70	<71	71-75	>75
72	<66	66-71	>71	<71	71-76	>76
73	<66	66-71	>71	<71	71-76	>76
74	<66	66-72	>72	<71	71-77	>77
75	<66	66-73	>73	<71	71-78	>78
76	<66	66-74	>74	<71	71-79	>79
77	<66	66-74	>74	<71	71-79	>79
>77	<66	66-75	>75	<71	71-80	>80

Table 3.10-5
Noise Impact Criteria during Operations

Source: FTA, Transit Noise and Vibration Impact Assessment, Final Report, May 2006.

Notes:

a. L_{eq} is used for land use where nighttime sensitivity is a factor; L_{dn} (during the hour of maximum transit noise exposure is used for land use involving only daytime activities. The values under "Project Noise Impact Exposure" refer to noise level generated by the project only and ignore all other sources of noise. Other existing noise sources are taken into account in the values listed under "Existing Noise Exposure."

b. Land Use Category Descriptions:

1. 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. 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. 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, and museums. Certain historical sites, parks, and recreational facilities are also included.

Table 3.10-6
Groundborne Vibration (GBV) Impact Criteria during Operations

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch/sec)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations (research facilities, hospitals with vibration sensitive equipment)	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime uses (schools, churches)	75 VdB	78 VdB	83 VdB

Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report*, May 2006.

Notes:

a. "Frequent Events" is defined as more than 70 vibration events of the same source per day.

b. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.

c. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.

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.

Methodology

The following approach was used to assess noise and vibration impacts associated with the BART extension alternatives.

Existing Noise. The noise measurements presented in Table 3.10-1 along with data from the EA/IS for the I-580 Westbound and Eastbound HOV lane projects, Staples Ranch Specific Plan, and City of Livermore General Plan are used to define the existing noise levels at receptors closest to the alignment. These existing noise levels account for existing traffic and/or trains depending on the location. For example, some noise measurements were made adjacent to the UPRR and so are dominated by noise from freight and ACE trains. Under certain circumstances, potential impacts to receptors at a distance from influential roadway and rail noise sources different those than measured or provided in the plans or studies need to be assessed. In these circumstances, the measured noise levels (expressed as L_{dn}) are adjusted for these different distances using equations recommended by the FTA Guidelines.

Future background noise levels are expected to remain the same or increase as the area grows and traffic increases on the local roads. However, as background noise increases, noise sources from the BART extension alternatives would have less of an effect on resulting total future noise levels. The significance criteria listed on Table 3.10-5 show that as the existing noise levels increase, the project by itself can generate higher noise levels before significantly impacting sensitive receptors (although the overall effect is to permit a small increase in total cumulative noise levels). Therefore, to be conservative, future background is assumed to remain at existing levels to maximize the effect of sources from the BART extension alternatives when determining the significance of future noise impacts. This analysis also assumes that train traffic along the UPRR remains at existing levels.

Operational Noise from Trains and Associated Facilities. Year 2035 noise levels (L_{dn}) from the BART extension alternatives are calculated using the methods and equations contained in the FTA Guidelines. Table 3.10-7 summarizes the key parameters used for calculating noise from the BART trains.

Noise from special trackwork and aerial configurations are also considered in the analysis. When a train crosses special trackwork such as a railroad switch, the gap over the switch generates additional noise. For the BART extension alternatives, the noise from such trackwork can be treated as a stationary source with an SEL_{ref} of 100 dBA per the FTA Guidelines. Aerial guideways with slab tracks also generate additional noise compared to at-grade ballasts track because the ballasts absorb more noise than the slab. The FTA Guidelines recommend adding 4 dBA to predicted noise levels to account for the aerial structure.

Table 3.10-7
Summary of Key Parameters for Operational Noise Analysis of BART Trains

Parameter	Year 2035
Reference Sound Exposure Level (SEL_{ref}) dBA at 50 feet (see note)	79
Number of cars per train (N_{pk}) during the peak hour	10
Average number of cars per train (N_d) during the daytime (between 7:00 a.m. and 10:00 p.m.)	7.3
Average number of cars per train (N_n) during the nighttime (between 10:00 p.m. and 7:00 a.m.)	5.8
Peak hour volume of trains (V_{pk})	10
Average hourly daytime volume of trains (V_d) (between 7:00 a.m. and 10:00 p.m.)	10
Average hourly nighttime volume of trains (V_n) (between 10:00 p.m. and 7:00 a.m.)	7
Maximum train speed (S)	80 mph
Train speed at switches	50 mph
Track type (e.g., welded, jointed)	welded

Source: ERM, 2009. Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009.

Note:

BART SEL from Noise and Vibration Impact Assessment for BART Warm Springs Extension Project, dated February 2003 by HMMH, where L_{max} was measured as 84 dBA at 50 feet for a single BART car traveling at 80 mph. Frequency and speed based on data from Wilbur Smith and Associates (WSA) and AECOM. Parameters account for trains traveling in both directions. Typically, trains are always in operation except between 1:30 a.m. and 3 a.m. (includes time for getting trains to initial and final locations).

In addition to noise from trains running on tracks, the BART extension alternatives would also generate noise from other sources including mechanical equipment for subway alignments and activities from the maintenance facilities. In addition, the BART extension alternatives would have substations located along the corridor. These BART facilities can be treated as stationary noise sources with the SEL_{ref} below (at a reference distance of 50 feet).

- Vent Shaft (assume equivalent to auxiliary equipment) = 101 dBA;
- Train Maintenance Facility = 118 dBA (assumes 20 train movements in one hour, adjusted for actual train movements per hour); and
- Substation = 99 dBA.

According to the FTA Guidelines, noise from the maintenance facility may be assumed to, on average, come from the center of the facility. This analysis, however, takes a more conservative approach and also considers the distance from the edge of the maintenance facility.

Noise from trains and associated facilities is initially predicted at 50 feet and then adjusted for distance using equations from the FTA Guidelines.

Noise from Automobiles. At this program level, an assessment of noise from vehicular traffic is conducted at a qualitative level, comparing relative impacts among the nine alternatives. This includes impacts at nearby intersections and impacts from widening of the I-580. In particular, the assessment compares the potential overall increases in total traffic volumes at intersections. Ultimately, the level of significance will be determined based on the existing noise levels and the increase in noise levels as a result of the alternatives. As an example, if a BART extension alternative increased traffic on a roadway segment by 20 percent (assuming everything else stays the same), noise levels would be expected to increase by 0.8 dBA. In areas with an existing noise level of 72 dBA (L_{dn}) or less, this increase would be acceptable based on the noise criteria identified on Table 3.10-5. However, if the existing noise level is greater than 72 dBA (L_{dn}), a 0.8 dBA increase would be significant according to the significance thresholds being applied. As described in the "Existing Conditions" section above, the Livermore General Plan identifies noise levels on roadways that may be impacted by the BART to Livermore Extension Program, including those leading to or near the stations associated with the alternatives. This includes First Street between S. Livermore Avenue and I-580 and Stanley Boulevard between Isabel Avenue and Murrieta Boulevard, both of which have existing noise levels of about 70 dBA. Both Greenville Road and Portola Avenue are in the 65 to 70 dBA range. To compare the different alternatives, the qualitative assessment presented here examines the total increase in traffic at a particular intersection. Assuming traffic in the project area is about the same in all directions and assuming the alternative results in an increase of traffic volume on only one roadway (e.g., north and southbound traffic), a 20 percent increase on one roadway would be equivalent to a 10 percent increase for the overall intersection. Thus, an intersection with an overall traffic volume increase of 10 percent or more is conservatively assumed to have potentially significant noise impacts. The precise existing and projected noise levels at intersections are not known at this program-level analysis but will be evaluated in greater detail during the project-level studies.

Vibration. Vibration from the BART extension alternatives was evaluated using the general vibration assessment approach described in the FTA Guidelines which focus on public annoyance from vibration. The Guidelines provide information on typical groundborne vibration levels for rapid transit, light rail vehicles, and locomotives as a function of distance. The FTA Guidelines consider vibration from light rail vehicles and rapid transit vehicles (such as BART) to be similar.

The Guidelines also include adjustment factors for speed and special trackwork (e.g., switches). In particular, the FTA Guidelines recommend adding 4 VdB for vehicles traveling at 80 mph and 10 VdB for special trackwork. However, the noise penalty from special trackwork decreases with distance because it essentially acts as a stationary vibration source.

According to the FTA Guidelines, the groundborne vibration levels can be converted to groundborne noise depending on peak frequency of ground vibration. Typically groundborne noise from surface track and subways can be estimated by subtracting 50 VdB and 35 VdB, respectively, from the groundborne vibration levels.

Vibration can also cause damage to buildings. However, this impact is typically only a concern if the building is adjacent to the tracks and constructed of materials that are susceptible to cracking. Vibration impacts are of particular concern if historical buildings, which are older and generally more fragile, are near the alignments.

Environmental Analysis

Table 3.10-8 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, many of the alternatives may produce significant noise and vibration impacts, some of which may not be reduced sufficiently with mitigation. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.10-9 includes a summary of the noise and vibration analysis. A more detailed description of impacts for each alternative follows.

NO-1 Noise from BART Trains during Operation

Noise associated with BART trains along an alternative alignment can result from any of the following various sources: wheel and track interaction, wheel and railroad switch interaction, and horns. As the BART train travels on the tracks, noise would be generated from the contact between the wheels of the BART railcars and tracks. In addition, noise generated as BART trains travel over switches would contribute to increased noise levels. Switches allow trains to cross from one track to another, and as BART trains travels over these rail switches, the gaps in the rail (at locations called frogs) can result in higher noise levels than rail segments with no gaps. For the BART extension alternatives, these switches would likely be located near select stations. Also, as a safety measure, when BART trains approach a station, they sound their warning horns with a series of short blasts, which further contributes to noise levels.

The significance of the increased noise is based on the affected land use, the existing noise level without the extension, and the predicted increase attributable to the extension, as described in the "Methodology" section. The quieter the existing noise levels are, the greater the increment of BART train noise needed before the resultant noise level would be considered a significant impact. Table 3.10-10 compares the estimated impacts for the different alternatives. The table identifies linear feet of potential noise impacts where the FTA criteria may be exceeded and the BART extension alternatives (may have significant noise impacts. Figures 3.10-6 through 3.10-14 show the key locations where noise levels were predicted (as listed on the Table 3.10-11 through 3.10-15) and highlight portions of the alignment that may have significant noise impacts on nearby sensitive receptors.

Table 3.10-8
Summary Comparison of Operational Noise and Vibration Impacts from the BART to Livermore Extension Alternatives

	Noise from BART Trains		Noise from Operation of Maintenance Facility		Noise from Ventilation Shafts Used for Tunnels		Noise from Substations		Noise from Local Traffic		Vibration	
Alternative	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 – Greenville East	LTS	NA	PS	Yes	NI	NA	PS	No	PS	No	LTS	NA
1a – Downtown-Greenville East via UPRR	PS	No	PS	Yes	NI	NA	PS	No	PS	No	PS	No
1b – Downtown-Greenville East via SPRR	PS	No	PS	Yes	NI	NA	PS	No	PS	No	PS	No
2 – Las Positas	PS	No	LTS	NA	NI	NA	PS	No	PS	No	LTS	NA
2a – Downtown-Vasco	PS	No	LTS	NA	NI	NA	PS	No	PS	No	PS	No
3 – Portola	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	No	PS	No
3a – Railroad	PS	No	PS	Yes	NI	NA	PS	No	PS	No	PS	No
4 – Isabel/I-580	LTS	NA	LTS	NA	NI	NA	PS	No	PS	No	LTS	NA
5 – Quarry	PS	No	LTS	NA	NI	NA	PS	No	PS	No	LTS	NA

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact NA = Not Applicable

Table 3.10-9
Comparative Impacts of Build Alternatives on Noise and Vibration

Alternative	Noise From BART Trains	Noise from Maintenance Facility	Noise From Ventilation Shafts	Noise From Substations	Noise From Local Traffic	Vibration Impacts
1 – Greenville East	Since this alternative follows I-580, which currently has relatively high noise levels, impacts from BART trains would not be significant.	Activities from the Greenville Yard would result in a potentially significant noise level increase at receptors near Laughlin Road.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 11.5 miles of track with substations every 1.5 miles, which may result in a significant noise level increase near substations.	17 study area intersections would experience an increase in traffic under this alternative that may affect nearby sensitive receptors. In addition, about 10.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	Receptors are at a sufficient distance from tracks that vibration impacts would not be significant.
1a – Downtown Greenville East via UPRR	The train noise of this alternative could impact the greatest number of receptors, potentially affecting sensitive receptors along 28,000 feet of the alignment. See Figure 3.10-7.	Like Alternative 1, activities from the Greenville Yard would result in a potentially significant noise level increase at receptors near Laughlin Road.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 13.1 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels near substations. Alternatives 1a and 1b would have the greatest number of substations and so would have the greatest potential for	11 study area intersections would experience an increase in traffic under this alternative that may affect nearby sensitive receptors. In addition, about 1.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving	There would be potential for vibration impacts to residents along 4,000 feet of alignment.

Table 3.10-9
Comparative Impacts of Build Alternatives on Noise and Vibration

Alternative	Noise From BART Trains	Noise from Maintenance Facility	Noise From Ventilation Shafts	Noise From Substations	Noise From Local Traffic	Vibration Impacts
				impacts.	closer to sensitive receptors.	
1b – Downtown Greenville East via SPRR	This alternative could have less train noise impacts than Alternative 1a, potentially affecting sensitive receptors along 24,500 feet of this alignment. See Figure 3.10-8.	As with Alternative 1 and 1a, activities from the Greenville Yard would result in a potentially significant noise level increase at receptors near Laughlin Road.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 13.2 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels. Alternative 1a and 1b would have the greatest number of substations and so would have the greatest potential for impacts.	11 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. About 1.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	There would be potential for vibration impacts to residents along 4,000 feet of alignment.
2 – Las Positas	This alternative would potentially affect sensitive receptors along 6,500 feet of the alignment. See Figure 3.10-9.	Noise from the Vasco Yard would not increase noise levels significantly.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 10.0 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels.	21 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. In addition, about 6.3 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	Receptors are at a sufficient distance from tracks that impacts would not be significant.

Table 3.10-9
Comparative Impacts of Build Alternatives on Noise and Vibration

Alternative	Noise From BART Trains	Noise from Maintenance Facility	Noise From Ventilation Shafts	Noise From Substations	Noise From Local Traffic	Vibration Impacts
2a – Downtown–Vasco	This alternative would potentially affect the same extent of sensitive receptors as Alternative 1a. See Figure 3.10-10.	Noise from the Vasco Yard would not increase noise levels significantly.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 12.0 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels.	15 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. About 1.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	There would be potential vibration impacts to residents along 4,000 feet of alignment.
3 – Portola	This alternative runs either at grade along I-580 or underground into Downtown Livermore and so would have a less-than-significant impact from train noise.	Noise levels from the Portola Yard may increase noise levels significantly at nearby receptors.	Noise from ventilation shafts along Portola Avenue may increase noise levels significantly.	This alternative would include 7.2 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels.	10 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. In addition, about 4.9 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	There would be potential for vibration impacts to residents along 6,000 feet of alignment. This has the most potential vibration impacts of all the alternatives.

Table 3.10-9
Comparative Impacts of Build Alternatives on Noise and Vibration

Alternative	Noise From BART Trains	Noise from Maintenance Facility	Noise From Ventilation Shafts	Noise From Substations	Noise From Local Traffic	Vibration Impacts
3a - Railroad	This alternative would potentially affect sensitive receptors along 16,000 feet of this alternative. See Figure 3.10-12.	As with Alternative 3, noise levels from the Portola Yard may increase noise levels significantly at nearby receptors.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 7.9 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels.	11 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. In addition, about 1.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	Similar to Alternatives 1a, 1b, and 2a, there would be potential for vibration impacts to residents along 4,000 feet of alignment.
4 – Isabel/I-580	This alternative only runs along I-580 and would have a less-than-significant impact from train noise.	This alternative does not have a maintenance facility but would incrementally increase noise levels wherever maintenance activities are performed.	No noise impacts from ventilation shafts, since this alternative would not require these facilities.	This alternative would include 5.2 miles of track with substations every 1.5 miles, which may result in a significant increase in noise levels.	10 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. About 5.2 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors.	Receptors are at a sufficient distance from tracks that impacts would not be significant.

Table 3.10-9
Comparative Impacts of Build Alternatives on Noise and Vibration

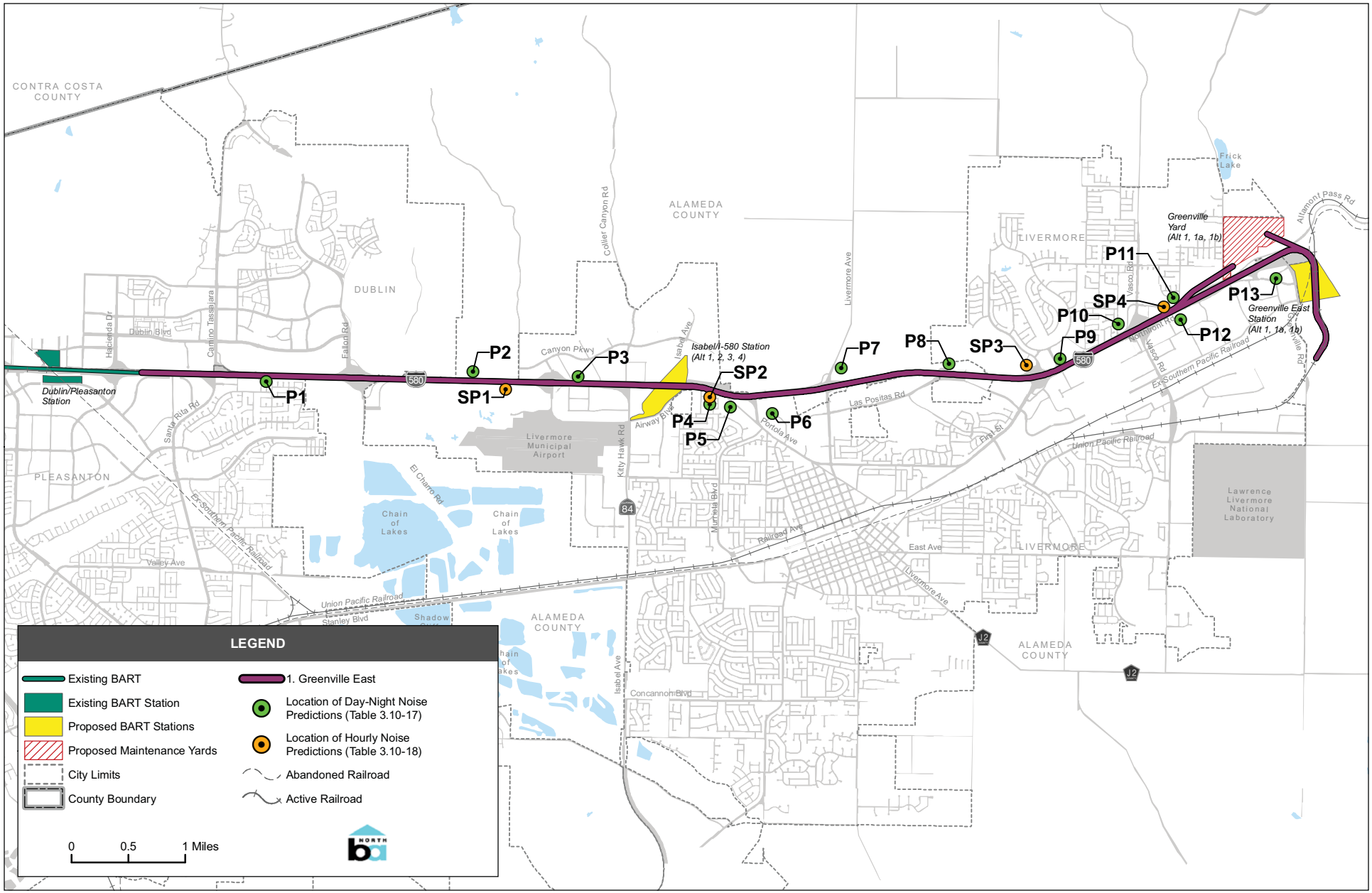
Alternative	Noise From BART Trains	Noise from Maintenance Facility	Noise From Ventilation Shafts	Noise From Substations	Noise From Local Traffic	Vibration Impacts
5 - Quarry	This alternative has the potential to affect sensitive receptors along 1,000 feet of this alignment. See Figure 3.10-14.	This alternative does not have a maintenance facility but would incrementally increase noise levels wherever maintenance activities are performed.	No noise impacts from ventilation shafts, since this alternative would not require these facilities	This alternative would include 5.5 miles of track with substations every 1.5 miles. Alternatives 4 and Alternative 5 would have the fewest number of substations and impact the least number of sensitive receptors.	9 study area intersections would experience an increase in traffic that may affect nearby sensitive receptors. As with Alternatives 1a, 1b, 2a, and 3a, about 1.7 miles of I-580 would be widened resulting in increased noise levels from automobiles moving closer to sensitive receptors. This alternative may have the least overall noise impact from traffic.	Receptors are at a sufficient distance from tracks that impacts would not be significant.

Table 3.10-10
Summary Comparison for BART Train Noise
of the BART to Livermore Extension Alternatives

Alternative	Relative Potential for Noise Impacts
No Build	None
1 – Greenville East	None
1a – Downtown-Greenville East via UPRR	Potential to affect sensitive receptors along roughly 28,000 feet of this alignment.
1b – Downtown-Greenville East via SPRR	Potential to affect sensitive receptors along roughly 24,500 feet of this alignment.
2 – Las Positas	Potential to affect sensitive receptors along roughly 6,500 feet of this alignment.
2a – Downtown–Vasco	Potential to affect sensitive receptors along roughly 28,000 feet of this alignment.
3 – Portola	None
3a – Railroad	Potential to affect sensitive receptors along roughly 16,000 feet of this alignment.
4 – Isabel/I-580	None
5 – Quarry	Potential to affect sensitive receptors along roughly 1,000 feet of this alignment.

Source: ERM, 2009.

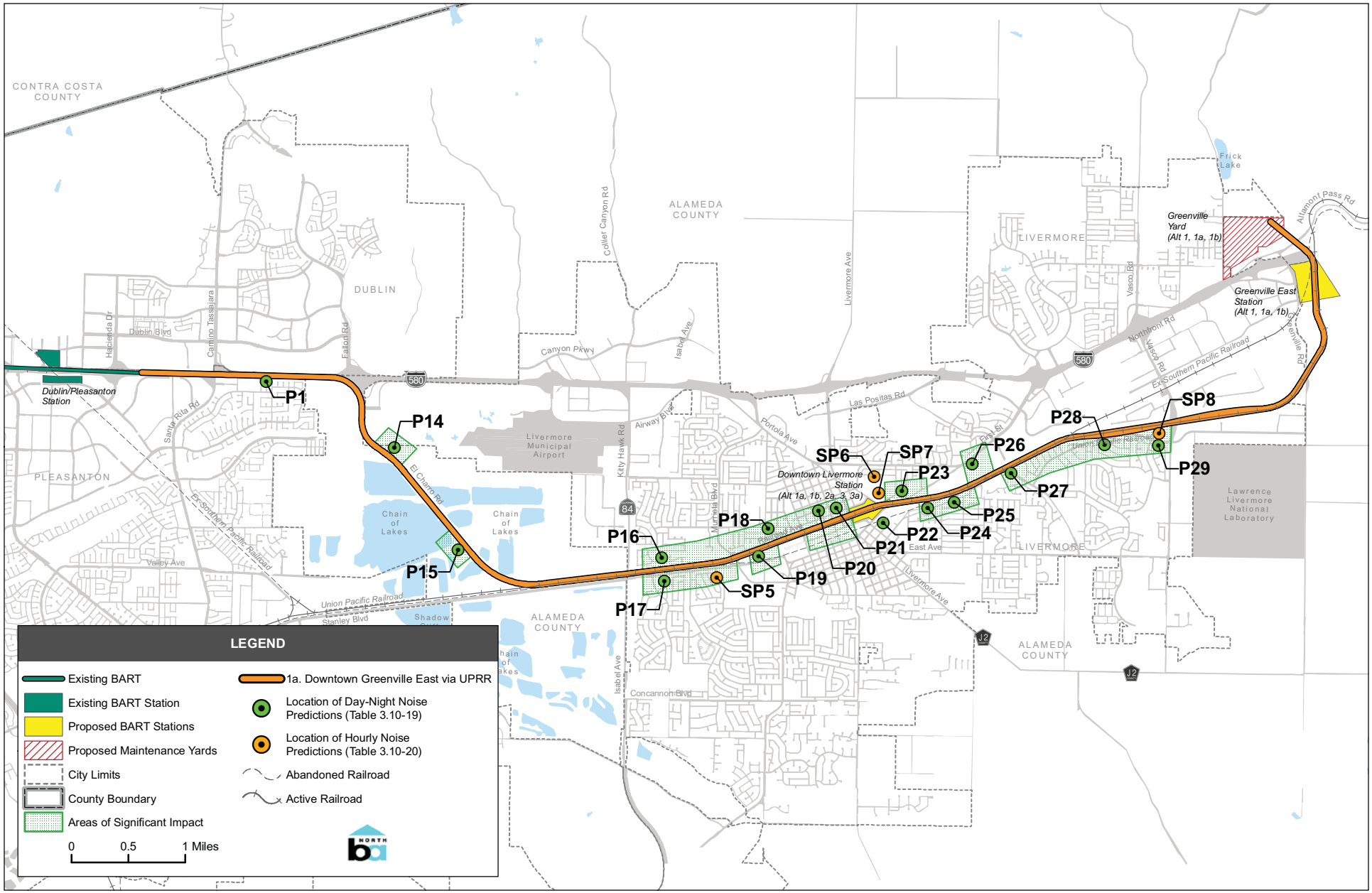
No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new train-related noise impacts.



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 1

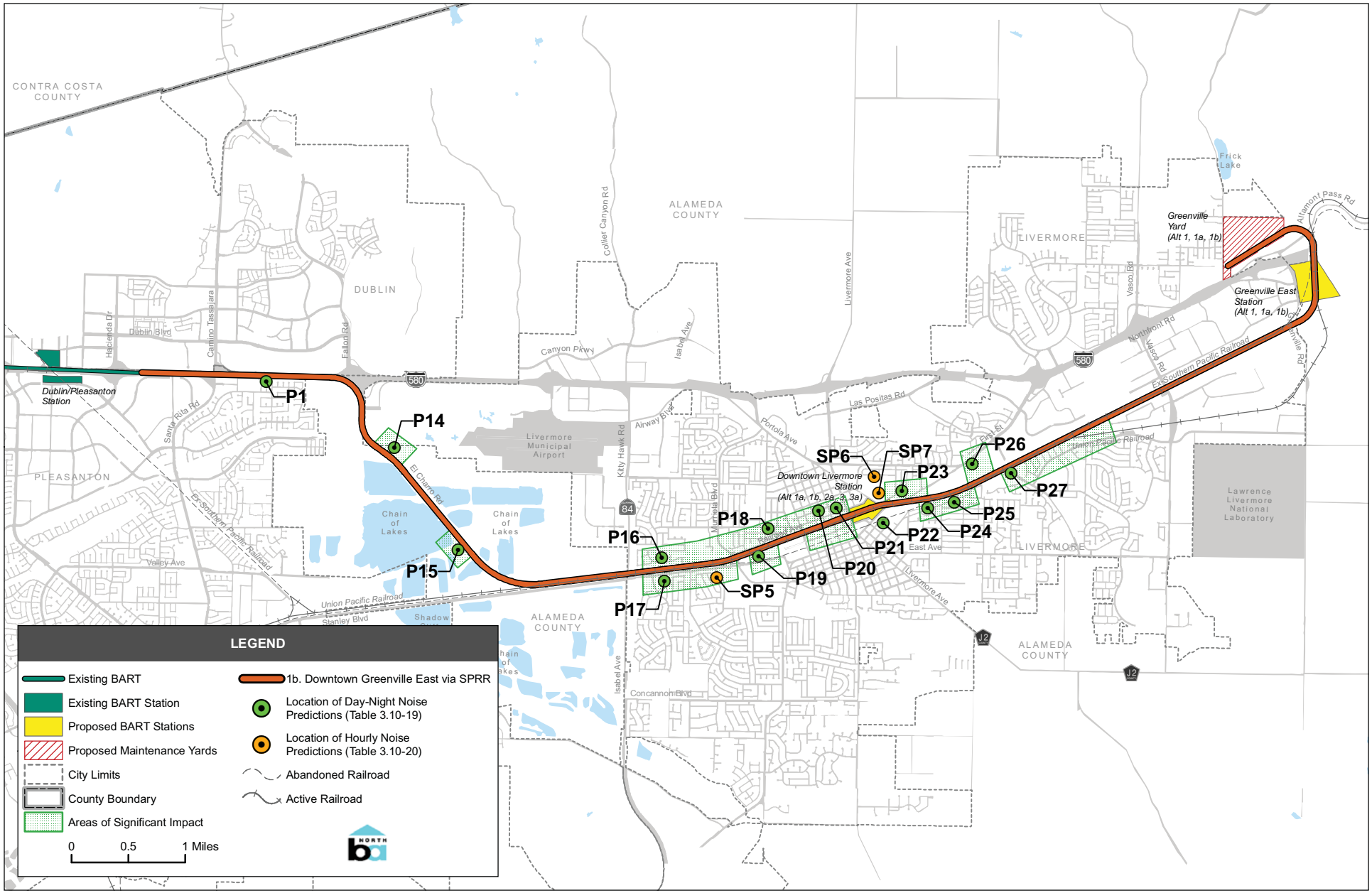
FIGURE 3.10-6



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 1a

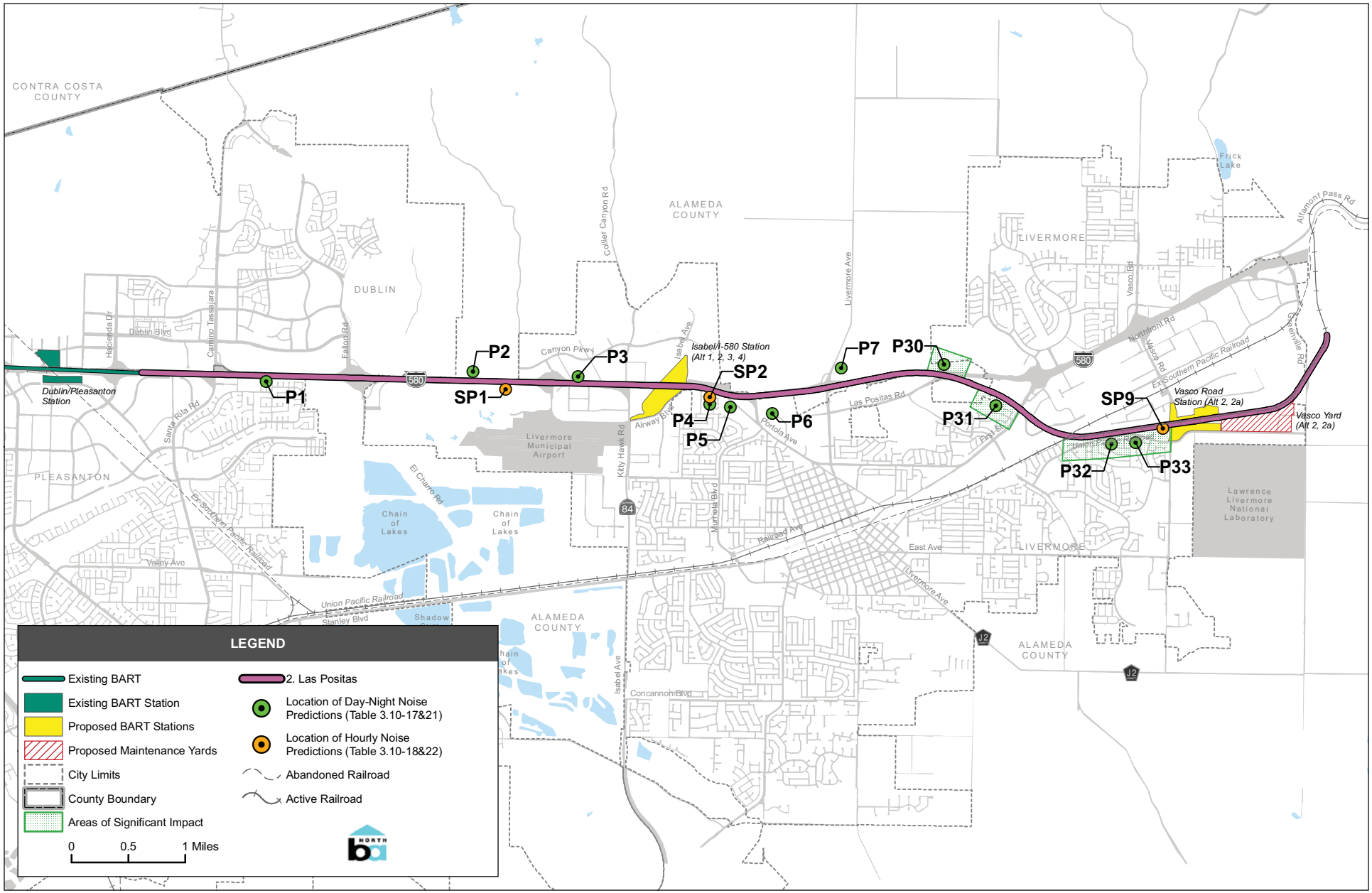
FIGURE 3.10-7



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 1b

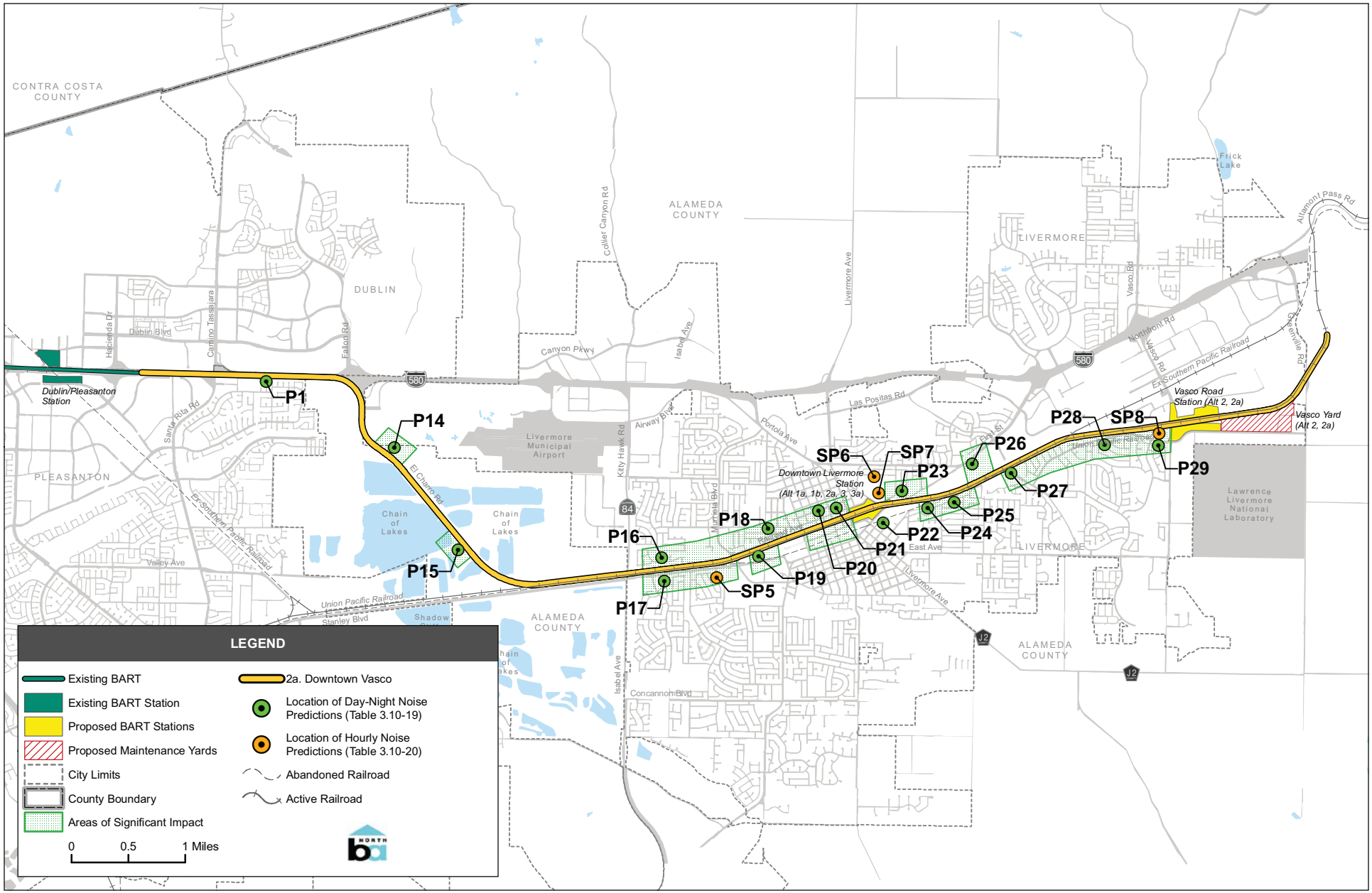
FIGURE 3.10-8



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 2

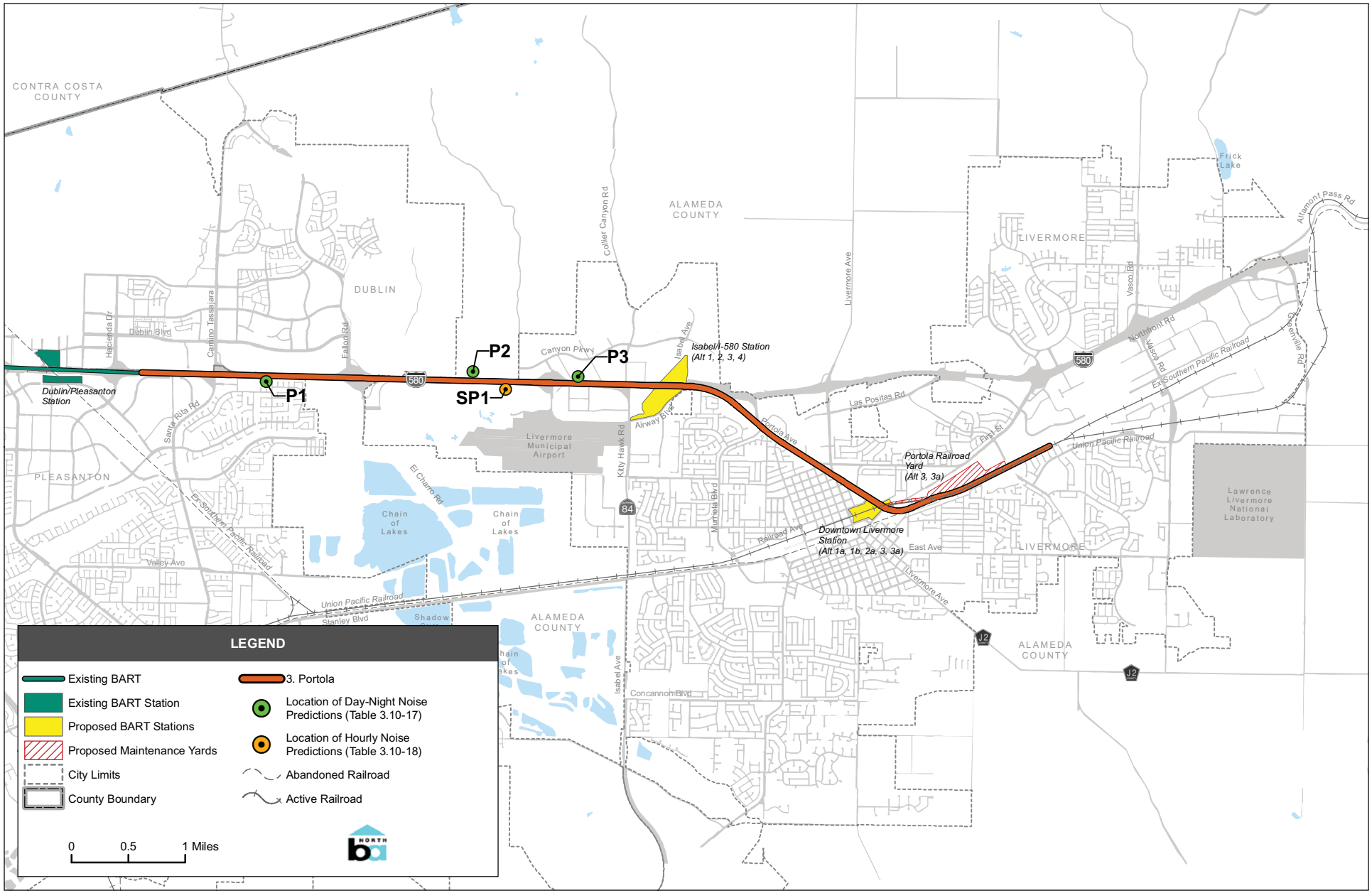
FIGURE 3.10-9



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 2a

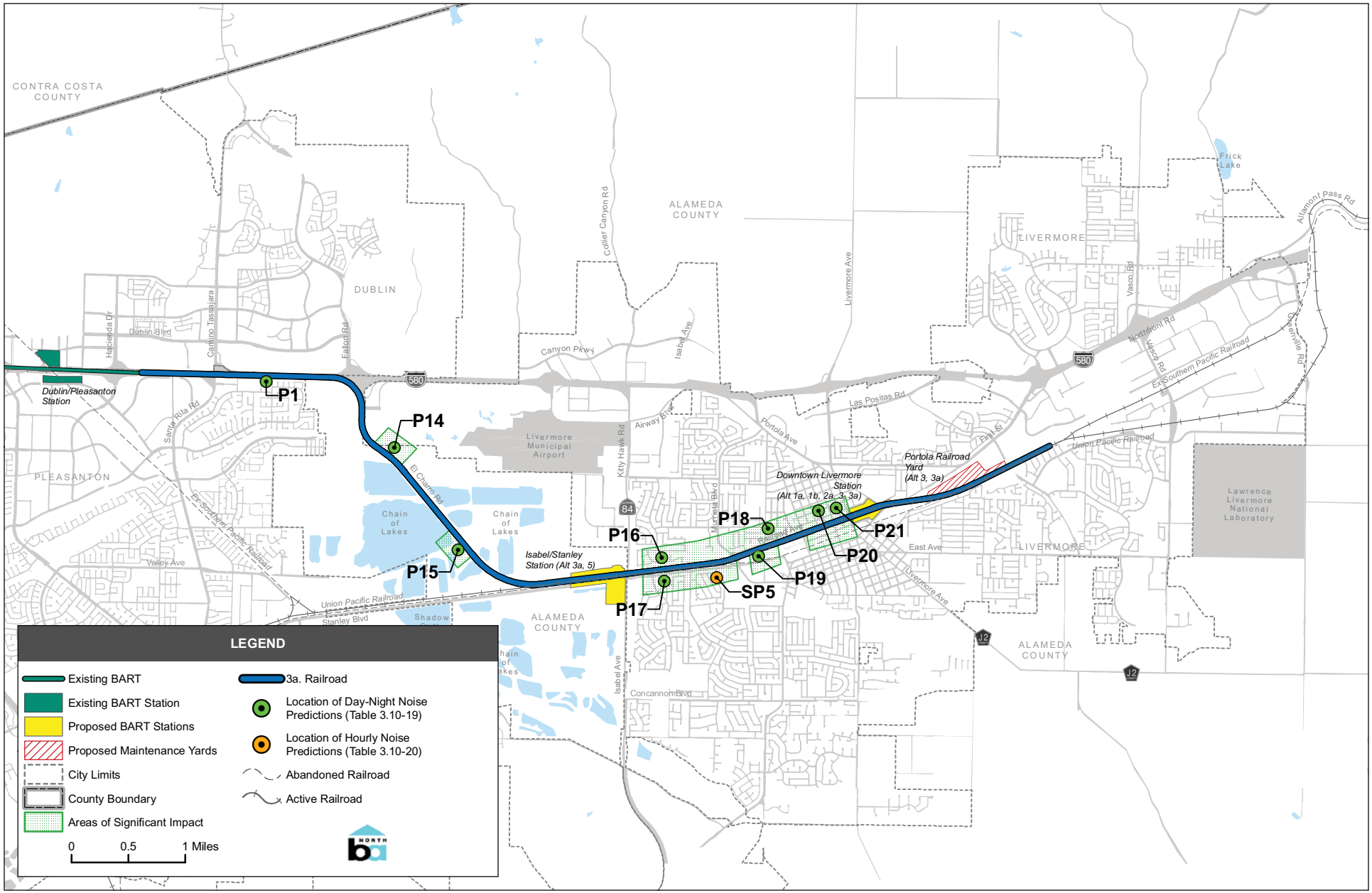
FIGURE 3.10-10



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 3

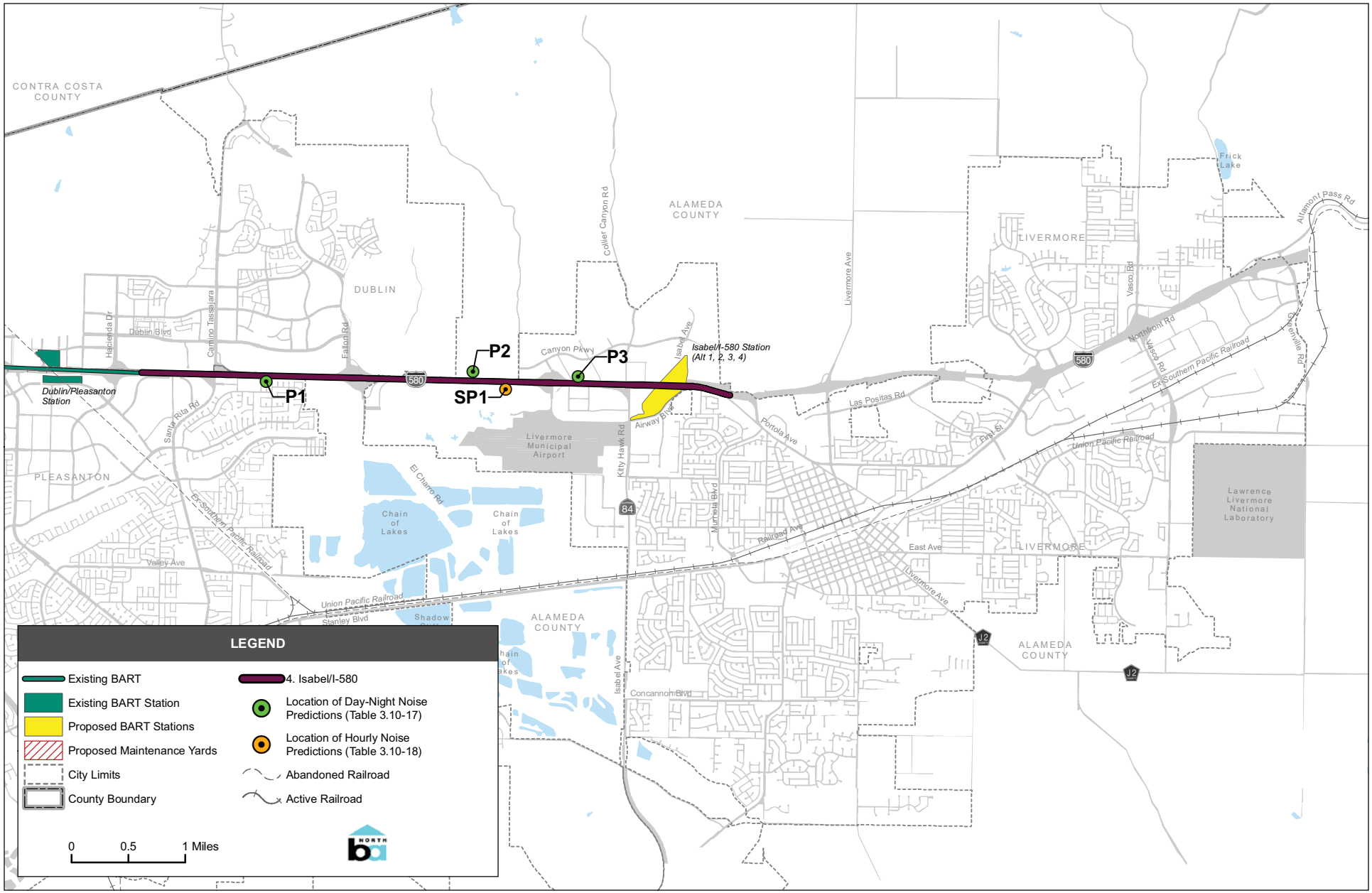
FIGURE 3.10-11



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 3a

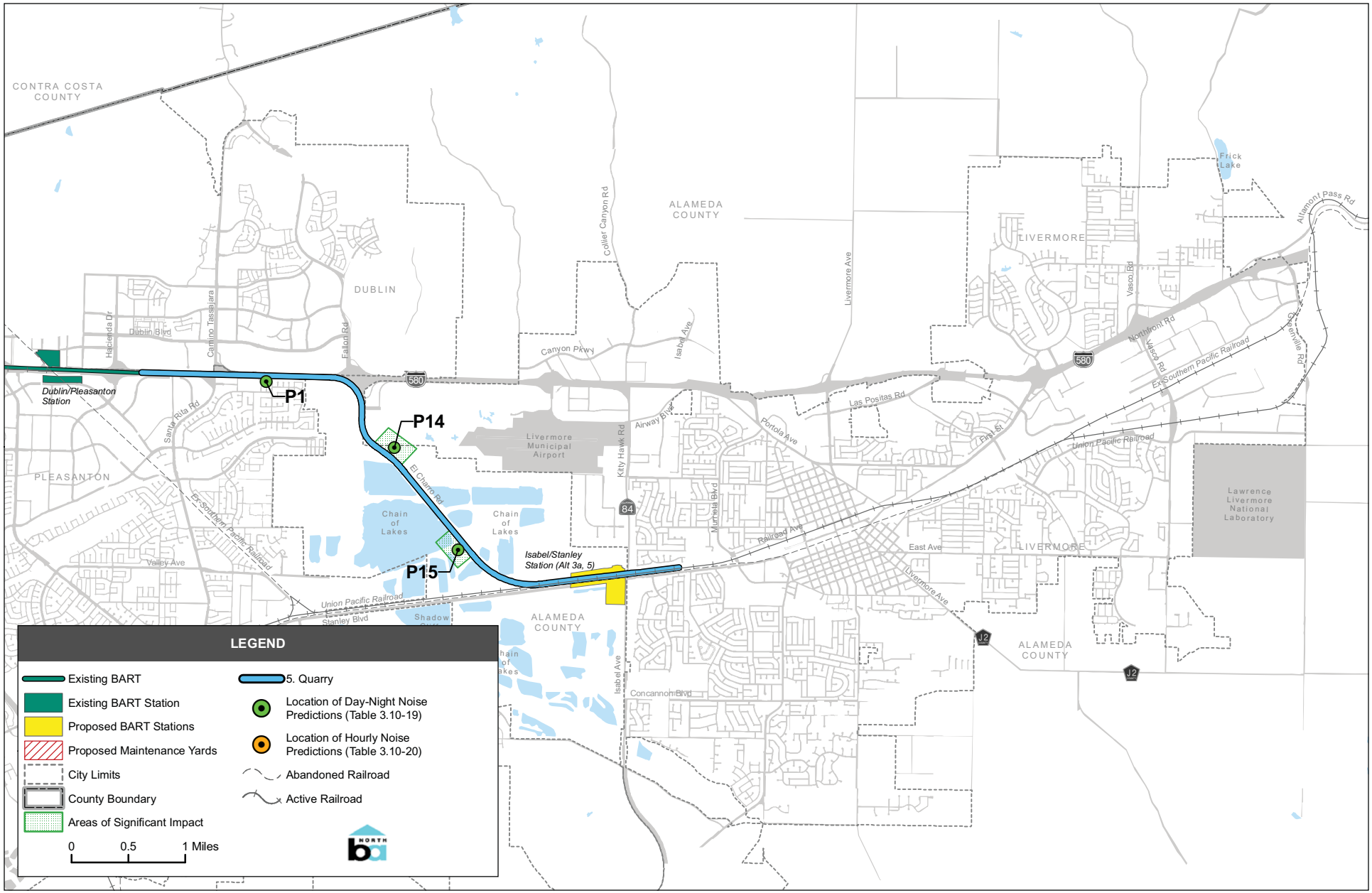
FIGURE 3.10-12



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 4

FIGURE 3.10-13



Source: ERM, 2009; AECOM, May 4, 2009.

LOCATION OF NOISE PREDICTIONS ASSOCIATED WITH ALTERNATIVE 5

FIGURE 3.10-14

Alternative 1 – Greenville East. Alternative 1 would have two aboveground stations (the Isabel/I-580 Station, which is at grade, and the Greenville East Station, which would be located on an aerial structure), and about 11.5 miles of track. Tables 3.10-11 and 3.10-12 show the existing noise levels, the upper limit on acceptable noise levels under FTA Guidelines, and the predicted noise level for this alternative in 2035. Table 3.10-11 reports the predicted day-night average noise levels (L_{dn}) in residential or hotel areas where day-night noise levels are critical because of the nighttime sensitivity of the receptors. Table 3.10-12 shows hourly average noise levels (L_{eq}) at the golf course, parks, and schools near the tracks, where peak-hour noise levels are important because of the need for quiet during teaching, studying, or meditation. In addition to the noise generated from the BART trains (without background noise), these two tables show the increase in noise levels when the BART train noise is combined with existing background levels. The predicted noise levels presented in these tables do not consider the additional noise from switches and horns near the stations. The impacts from switches and horns, which would occur near the stations, are discussed further below.

Noise from Trains. As shown in Tables 3.10-11 and 3.10-12, all predicted noise levels for 2035 fall below the significance criteria for Alternative 1. For example, at the closest receptors without any type of sound wall or barrier (160 feet from tracks between Santa Rita Road and El Charro Road), the acceptable day-night noise level is less than 66 dBA. The predicted day-night noise from the BART train is 65 dBA, which is within acceptable levels. At this particular location, the additional noise would increase existing noise levels by 0.3 dBA

All predicted 2035 hourly noise levels are less than significant at the nearby facilities that would be sensitive to peak-hour noise levels, which, for Alternative 1, include recreational facilities and the schools. For example, the peak-hour noise level is predicted to be 62 dBA near the closest park along the alignment (near Sutter Street south of I-580), which is below the significance level of 66 dBA. The associated increase in noise levels at this park is predicted to be 1.8 dBA.

Noise from Stations. Noise could be generated near the stations as BART trains travel over switches and/or sound their horns as they enter a station. The Isabel/I-580 Station is not anticipated to have a nearby switch and so the noise from the BART trains near this station would be attributed to tracks and horns. The nearest residence is about 400 feet from the tracks and about 1,600 feet southeast of the station. At this location, the existing day-night noise level is estimated to be 64 dBA, which would have an acceptable day-night noise level contribution from BART trains of less than 61 dBA (ignoring existing noise levels). The day-night noise level contribution from BART trains at this receptor is 60 dBA, which would result in a net increase of 1.5 dBA when considering existing noise levels. This noise level does not take into account partial shielding provided by the natural berm between this location and the tracks and from the parking garage.

Table 3.10-11
Alternative 1-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses (Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Traian Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approx Length of Impact
Between Hacienda Dr. and Santa Rita Road	No sensitive receptors adjacent to alignment on this segment									
Between Santa Rita Road and El Charro Road	Estimated from S1	P1	Residences south of I-580, 160 feet from alignment	77	<66	65	77.3	0.3	No	NA
Between El Charro Road and Airway Boulevard	Estimated from S1	P2	Residence north of I-580, 180 feet from alignment	75	<66	65	75.4	0.4	No	NA
Between Airway Boulevard and Future Isabel Avenue.	C-ST7	P3	Hotel north of I-580, 280 feet from alignment	71	<66	63	71.6	0.6	No	NA
Between Future Isabel Avenue and N. Livermore Avenue	C-R28A	P4	Residence south of I-580, 380 feet from alignment	61	<59	57	62.3	1.3	No	NA
Between Future Isabel Avenue and N. Livermore Avenue	C-R31	P5	Mobile Home to south, 210 feet from alignment	76	<66	64	73.5	0.5	No	NA
Between Future Isabel Avenue and N. Livermore Avenue	C-ST9	P6	Residence south of I-580, 700 feet from alignment	63	<60	59	64.5	1.5	No	NA
Between N. Livermore Avenue and First Street	Estimated from S1	P7	Residence north of I-580, east of Livermore Avenue, 430 feet from alignment	68	<63	61.1	68.7	0.7	No	NA
Between N. Livermore Avenue and First Street	C-R39	P8	Residence north of I-580, near Las Colinas Road, 300 feet from alignment	69	<64	63	70.0	1.0	No	NA

Table 3.10-11
Alternative 1-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses (Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Traian Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approx Length of Impact
Between First St and Vasco Road	C-R48	P9	Residence north of I-580, east of First St, 120 feet from alignment	73	<66	62	73.3	0.3	No	NA
Between First St and Vasco Road	C-R55	P10	Residence north of I-580, east of First St,, 220 feet from alignment	71	<66	64	71.8	0.8	No	NA
Between Vasco Road and Greenville Road	Estimated from S21	P11	Residence north of I-580, assuming no noise, 280 feet from alignment	75	<66	63	75.3	0.3	No	NA
Between Vasco Road and Greenville Road	C-R62	P12	Mobile Homes south of I-580, 180 feet from alignment	72	<66	65	72.8	0.8	No	NA
Near Greenville Rd, On Aerial Structure	S15	P13	Hotel near Greenville on Southfront Road, 500 feet from alignment	66	<62	58	66.7	0.7	No	NA

Source: ERM, 2009.

Notes

NA=Not Applicable

C-XX represents existing noise information from Caltrans I-580 Eastbound HOV lane project; SXX represents noise monitoring conducted for BART to Livermore Extension EIR

When noise shielding such as sound barrier or natural berm is present, assumed predicted noise level reduced conservatively by 5 dBA. In some cases, a noise barrier is currently being built, but is not accounted for in above table for conservatism. Except for P4 and P9, assumed no existing adequate noise shielding.

Assumed speed of BART train was at design speed of 80 mph except for aerial structure where design speed is 40 mph.

Table 3.10-12
Alternative 1-Peak Noise Levels in 2035
Predicted Peak-Hour (Leq(hr)) Noise Level at Nearest Receptors Sensitive to Peak-Hour Noise Levels from BART Trains (Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 3 Land Uses)	Existing Noise Level (dBA, Lhr)	Acceptable Noise (Lhr) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (Lhr) (Train noise only)	Future Noise Level with Train Noise at Receptor (Lhr)	Increase in Noise Level (Lhr)	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between El Charro Road and Airway Boulevard	S1	SP1	Las Positas Golf Course south of I-580, 180 feet from alignment	65	<66	62	66.8	1.8	No	NA
Between Airway Boulevard and Portola Avenue	S1	SP2	Park south of I-580 at Sutter Street, 170 feet from alignment	65	<66	62	66.8	1.8	No	NA
Between N. Livermore Avenue and First Street	S8	SP3	Kindercare north of I-580 and west of First Street, 600 feet from alignment	53	<60	56.7	58.4	5.4	No	NA
Between Vasco Road and Greenville Road	S17	SP4	Northfront Park off I-580, east of Vasco Road, 250 feet from alignment	65	<66	60.5	66.4	1.4	No	NA

Source: ERM, 2009.

Notes:

NA = Not Applicable

C-XX represents existing noise information from Caltrans I-580 Eastbound HOV lane project; SXX represents noise monitoring conducted for BART to Livermore Extension EIR

The Greenville East Station, which would be located on an aerial structure generating additional noise, would have a crossing on the south side of the station. The nearest receptor is a hotel about 1,400 feet to the west and was measured to have day-night noise level of 66 dBA. At this existing noise level, the acceptable day-night noise level contribution from BART trains would be less than 62 dBA. The predicted day-night noise level contribution from BART trains at this location is estimated to be 61 dBA, which would result in a net increase of 1.2 dBA. Thus, the increase in noise levels near the two proposed stations is expected to be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Similar to Alternative 1, Alternative 1a has two aboveground stations (Downtown Livermore Station and Greenville East Station) and about 13.2 miles of track. However, after traveling along I-580 from Hacienda Drive to El Charro Road, the alignment departs I-580 and travels parallel to El Charro Road until reaching the UPRR right of way. At this point, the alignment follows the UPRR tracks to the north until reaching the Greenville East Station. Tables 3.10-13 and 3.10-14 show the existing noise levels, the upper limit on acceptable noise levels under FTA Guidelines, and the predicted noise level for this alternative in 2035. Table 3.10-13 lists predicted noise in residential areas where day-night noise levels are critical, and Table 3.10-14 shows noise at parks and schools where peak-hour noise levels are important. The predicted noise levels presented in these tables do not consider the additional noise from switches and horns near the stations. These additional impacts near the stations are discussed further below.

Noise from Trains. Table 3.10-13 and Table 3.10-14 show that portions of Alternative 1a that do not travel along I-580 are estimated to have potentially significant impacts to nearby sensitive receptors (also shown in Figure 3.10-7). These portions of the alignment are in areas that have lower existing noise levels compared to areas near the freeways and so the criteria for significant impacts are more stringent.

All predicted 2035 hourly noise levels are less than significant at the nearby facilities that would be sensitive to peak-hour noise levels, except at Doolan Park in Downtown Livermore. The peak-hour noise level is predicted to be 61 dBA near Doolan Park, which is just at the level that would be considered significant.

Table 3.10-13
Alternative 1a-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses
(Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Train Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between Hacienda Dr. and Santa Rita Road	No sensitive receptors adjacent to alignment on this segment									
Between Santa Rita Road and El Charro Road	Estimated from S1	P1	Residences south of I-580, 160 feet from alignment	77	<66	65	77.3	0.3	No	NA
Between I-580 and E. Stanley Boulevard on El Charro Road (Aerial)	Estimated from Staples Ranch EIR	P14	Northern Ranch along El Charro, 100 feet from alignment	65	<61	71.4	72.3	7.3	Yes	500
Between I-580 and E. Stanley Boulevard on El Charro Road (Aerial)	Estimated from Staples Ranch EIR	P15	Southern Ranch along El Charro, 100 feet from alignment	55	<56	71.4	71.5	16.5	Yes	500
Between Isabel Avenue and N. Murrieta Boulevard on E. Stanley Boulevard	S4	P16	Residences north of E. Stanley Boulevard, 200 feet from alignment	57	<57	64.4	65.4	8.4	Yes	4000
Between Isabel Avenue and N. Murrieta Boulevard on E. Stanley Boulevard	S13	P17	Residences south of E. Stanley Boulevard, 280 feet from alignment	67	<63	63.0	68.5	1.5	Yes	4000

Table 3.10-13
Alternative 1a-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses
(Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Train Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between N. Murrieta Boulevard and Adelle on E. Stanley Boulevard	Estimated from S12	P18	Residences north of Railroad, 50 feet from alignment	62	< 59	71	71.4	9.4	Yes	2500
Between N. Murrieta Boulevard and Adelle on E. Stanley Boulevard	Estimated from S12	P19	Apartment south of Railroad, 150 feet from alignment	60	< 58	66	66.8	6.8	Yes	1000
Between Adelle and N. Livermore Avenue (No Aerial)	Estimated from S12	P20	Residences north of Railroad, 400 feet from alignment	52	< 55	61	62.0	10.0	Yes	1500
Between Adelle and N. Livermore Avenue (No Aerial)	Estimated from S12	P21	Residences south of Railroad, 150 feet from alignment	57	< 57	66	66.1	9.1	Yes	1500
Between N. Livermore Ave and First Street (No Aerial)	S5	P22	Residences south of First Street, 450 feet from alignment	65	< 61	58	65.8	0.8	No	NA
Between N. Livermore Ave and First Street (No Aerial)	S7	P23	Residences north of Railroad, 110 feet from alignment	62	< 59	65	66.2	4.2	Yes	1000
Between First Street and N. Mines Road	Estimated from S12	P24	Residence south of Railroad, 280 feet from alignment	56	< 56	63	64.0	8.0	Yes	3000

Table 3.10-13
Alternative 1a-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses
(Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Train Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between First Street and N. Mines Road	Estimated from S12	P25	Residence south of Railroad, 100 feet from alignment	64	<61	67	69.0	5.0	Yes	
Between First Street and N. Mines Road	Estimated from S12	P26	Residence north of Railroad (on Trevarno Road), 400 feet from alignment	52	<55	61	61.7	9.7	Yes	500
Between N. Mines and Candy Court	S14	P27	Residences along Shawna, 130 feet from alignment	61	<59	66	64.4	3.0	Yes	2500
Between Candy Court and Vasco Road along Patterson Pass Road	Estimated from S16	P28	Residences south of Patterson Pass Road, 430 feet from alignment	61	<59	61.1	64.1	3.1	Yes	4000
Between Candy Court and Vasco Road along Patterson Pass Road	Estimated from S16	P29	Residences south of Patterson Pass Road, 930 feet from alignment	58	<57	57.8	59.7	2.7	Yes	

Source: ERM, 2009.

Notes

NA=Not Applicable.

Assumed no existing adequate noise shielding for values presented above. Either no sound wall was in place or sound wall did not completely shield upper floors.

Table 3.10-14
Alternative 1a-Peak Noise Levels in 2035
Predicted Peak-Hour (Leq(hr)) Noise Level at Nearest Receptors Sensitive to Peak-Hour Noise Levels from BART Trains (Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 3 Land Uses)	Existing Noise Level (dBA, Lhr)	Acceptable Noise (Lhr) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (Lhr) (Train noise only)	Future Noise Level with Train Noise at Receptor (Lhr)	Increase in Noise Level (Lhr)	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between El Charro Road and Airway Boulevard	S1	SP1	Las Positas Golf Course south of I-580, 180 feet from alignment	65	<66	62	66.8	1.8	No	NA
Between Airway Boulevard and Portola Avenue	S1	SP2	Park south of I-580 at Sutter Street, 170 feet from alignment	65	<66	62	66.8	1.8	No	NA
Between N. Livermore Avenue and First Street	S8	SP3	Kindercare north of I-580 and west of First Street, 600 feet from alignment	53	<60	56.7	58.4	5.4	No	NA
Between Vasco Road and Greenville Road	S17	SP4	Northfront Park off I-580, east of Vasco Road, 250 feet from alignment	65	<66	60.5	66.4	1.4	No	NA

Table 3.10-14
Alternative 1a-Peak Noise Levels in 2035
Predicted Peak-Hour (Leq(hr)) Noise Level at Nearest Receptors Sensitive to Peak-Hour Noise Levels from BART Trains (Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 3 Land Uses)	Existing Noise Level (dBA, Lhr)	Acceptable Noise (Lhr) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (Lhr) (Train noise only)	Future Noise Level with Train Noise at Receptor (Lhr)	Increase in Noise Level (Lhr)	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between Isabel Avenue and N. Murrieta Boulevard on E. Stanley Boulevard	S13	SP5	Oak Knoll Pioneer Memorial Park, 320 feet from alignment	55	<61	59.4	60.9	5.9	No	NA
Between Livermore Ave and First Street (No Aerial)	S6	SP6	Junction Avenue Middle School to north, 500 feet from alignment	56	<61	55	58.7	2.4	No	
Between Livermore Ave and First Street (No Aerial)	S6	SP7	Doolan Park to north, 1200 feet from alignment	56	<61	61.2	62.4	6.1	Yes	500

Source: ERM, 2009.

Note: NA= Not Applicable

Noise from Stations. The Downtown Livermore Station is at grade and is anticipated to have a switch west of the station; therefore, the noise near this station would be attributed to tracks, switches, and horns. Residences are located within 50 feet of the switch and the day-night noise attributable to the tracks, switches, and horns would be more than 80 dBA, well above the least restrictive significance threshold of 66 dBA. The Greenville East Station would have slightly lower impact than Alternative 1, because the tracks approach the station from the south where there are fewer sensitive receptors. The increase in noise levels at this station is expected to less than significant.

Overall, sensitive receptors along approximately 28,000 feet of the alignment would be exposed to potentially significant noise impacts.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b is similar to Alternative 1a except that, near Candy Court (about 5,000 feet west of Vasco Road), the alignment departs the UPPR right of way and instead parallels the SPRR tracks until reaching the Greenville East Station. This alternative has two aboveground stations (with Greenville East Station located on an aerial structure) and about 13.2 miles of track. The impacts from noise associated with the BART trains under this alternative would be identical to those under Alternative 1a, except along the segment between Candy Court and the Greenville East Station. Sensitive receptors are not adjacent to the alignment between Candy Court and the Greenville East Station and so, unlike Alternative 1a, Alternative 1b would not impact receptors along this segment. Alternative 1b would thus significantly impact residences and users of Doolan Park in Livermore.

Sensitive receptors along approximately 24,500 feet of this alignment would be exposed to potentially significant BART train noise impacts, which is less than under Alternative 1a. Figure 3.10-8 illustrates where there are potentially significant noise impacts from BART trains.

Alternative 2 – Las Positas. Alternative 2 has two at-grade stations and about 10.0 miles of track. Alternative 2 is identical to Alternative 1 between Hacienda Drive and North Livermore Avenue and has the same less-than-significant noise impacts along this segment. East of North Livermore Avenue, the alignment transitions to an aerial structure and primarily follows Las Positas Road until reaching the UPRR right of way. At that point, the alignment runs along the south side of the UPRR tracks, bringing the BART alignment slightly closer to the residences along Patterson Pass Road (unlike Alternative 1a, which parallels the UPRR tracks to the north). The alignment ends near Vasco Road at the Vasco Road Station.

This alternative has unique noise impacts between North Livermore Avenue and Vasco Road compared to the other alternatives, which are presented in Table 3.10-15. Unlike Alternative 1a, Alternative 2 has a station and switches to the east of the station near Vasco Road. The additional noise from horns sounding as the BART trains approach the station and from the BART trains crossing the switches would increase noise levels in the area. As result, Alternative 2 would have significant noise impacts from the BART trains between Candy Court and Vasco Road.

Overall, sensitive receptors along roughly 6,500 feet of this alignment would be exposed to potentially significant noise impacts. Figure 3.10-9 illustrates where these effects may occur.

Alternative 2a – Downtown–Vasco. Alternative 2a has two at-grade stations (Downtown Livermore and Vasco Road Station) and about 12.0 miles of track. This alternative is identical to Alternatives 1a and 1b from Hacienda Drive up until about Candy Court near Patterson Pass Road. After this point, instead of remaining at grade to the north of the UPRR tracks, the alignment crosses the UPRR tracks via an aerial structure and then returns to grade at the Vasco Road Station south of the UPRR tracks.

Between Hacienda Drive and Candy Court, the noise impacts under Alternative 2a would be identical to those under Alternatives 1a and 1b – significantly affecting residences and park uses in Livermore. Additionally, with the alignment moving from the north to the south of the UPRR tracks and thus closer to sensitive receptors along Patterson Pass Road, noise levels would be higher along this road. Also, a portion of the BART tracks would be in an aerial structure, which can have noise levels about 4 dBA higher than at-grade tracks. Therefore, not only would the sensitive receptors along Patterson Pass Road potentially experience significant impacts, as under Alternatives 1a and 1b, but the noise levels are expected to be higher under Alternative 2a.

Alternative 2a would result in potentially significant BART train noise impacts for sensitive receptors along roughly 28,000 feet of the alignment. Figure 3.10-10 shows where there effects may occur.

Alternative 3 – Portola. Alternative 3, with about 7.2 miles of track, has the Isabel/I-580 Station, which is below grade (but not covered), and the Downtown Livermore Station, which is underground. Railroad switches would be located north of the Downtown Livermore Station, in the subway.

Table 3.10-15
Alternative 2-Average Noise Levels in 2035
Predicted Day-Night (L_{dn}) Noise Level from BART Trains Associated with Category 2 Uses
(Not Including Contribution from Switches and Horns at Stations)

Segment	Monitoring Point ID	Predicted Noise ID	Representative Area of Existing Noise (Category 2 Land Uses)	Existing Noise Level (dBA, L_{dn})	Acceptable Noise (L_{dn}) (Moderate Impact, see Table 3.10-5)	Noise Level Generated by Alternative at Receptor (L_{dn}) (Train noise only)	Future Noise Level with Train Noise at Receptor (L_{dn})	Increase in Noise Level (L_{dn})	Noise at Sensitive Receptors Exceeding Threshold?	Approximate Length of Impact
Between N. Livermore Avenue and First Street (Aerial Structure)	C-R39	P30	Residence north of I-580, near Las Colinas Road, 400 feet from alignment	69	<64	65	70.6	1.6	Yes	500
Between I-580 and First St along Las Positas Road (Aerial Structure)	C-LT4	P31	Residences south of Las Positas Road\, 75 feet from alignment	65	<61	73	73.4	8.4	Yes	2000
Between Las Positas Road and Shelley Street along Patterson Pass Road (Aerial Structure)	Estimated from S16	P32	Residences south of Patterson Pass Road, 350 feet from alignment	61	<59	66	67.2	6.2	Yes	2000
Between Shelley Street and Vasco Road along Patterson Pass Road (at Grade Structure)	Estimated from S16	P33	Residences south of Patterson Pass Road, 330 feet from alignment	58	<57	62.3	63.4	5.4	Yes	2000

Source: ERM, 2009.

Notes:

C-XX represents existing noise information from Caltrans I-580 Eastbound HOV lane project; SXX represents noise monitoring conducted for BART to Livermore Extension EIR.

Assumed no existing adequate noise shielding for values presented above. Along alignment, there were no sound walls in place, sound wall did not completely shield upper floors, or wall consisted of only a wood fence.

This alternative is identical to the Alternative 1 and 2 segment between Hacienda Drive and just west of the Isabel/I-580 Station. From east of Isabel/I-580 Station to south of the Downtown Livermore Station, the BART trains would travel in a subway and therefore would have less-than-significant impacts to aboveground receptors along this segment. Therefore, overall, Alternative 3 would have a less-than-significant BART train noise impact.

Alternative 3a – Railroad. Alternative 3a has two stations and about 7.9 miles of track. The two stations include the Isabel/Stanley Station which is at grade and the Downtown Livermore Station which is an aerial structure. This alternative is identical to Alternatives 1a and 1b from Hacienda Drive and Western Avenue west of the Downtown Livermore Station, except that Alternative 3a includes the Isabel/Stanley Station. Thus, the noise impacts along this portion of Alternative 3a are identical to those under Alternatives 1a and 1b, except that the horns from the Isabel/Stanley Station (which does not have a nearby railroad switch) would increase noise levels more at the nearest sensitive receptors about 2,000 feet from the station. These sensitive receptors were already found to be exposed to significant levels of noise from the BART trains even without the contribution from horns.

East of Western Avenue, the alignment for Alternative 3a is similar to those for Alternatives 1a and 1b but, instead of at-grade tracks, the tracks would be on an aerial structure up to and past the Downtown Livermore Station. The aerial may add approximately 4 dBA to the noise generated by BART trains traveling at grade. In addition, a railroad switch is located west of the Downtown Livermore Station, further increasing noise levels in the area. Impacts along this segment were considered potentially significant under Alternatives 1a and 1b; therefore, with noise levels increasing even further, impacts would also be potentially significant under Alternative 3a for residences and users of the Doolan Park in Livermore.

Alternative 3a would result in potentially significant BART train noise for sensitive receptors along roughly 16,000 feet of the alignment. Figure 3.10-12 illustrates where these impacts may occur.

Alternative 4 – Isabel/I-580. Alternative 4 would only have one at-grade station and about 5.2 miles of track. The station would be the Isabel/I-580 Station and, unlike the other stations, would have railroad switches located west of the station.

The noise impacts would be identical to those for Alternatives 1 and 2 between Hacienda Drive and the Isabel/I-580 Station, except for immediately at the station. Even though the switches would increase noise levels, horns would only be used for eastbound BART trains because this is the last station on the line. Considering these elements, the predicted noise level at the residential receptors located more than 1,000 feet southeast of the station would experience day-night noise levels of about 58 dBA from the BART trains. Considering that the existing noise level at this sensitive receptor is 64 dBA, the BART train noise would result in a 1 dBA increase from existing levels. Noise levels of less than 61 dBA from the BART trains (or a 1.8

dBA increase) would be considered less than significant. Therefore, Alternative 4 is not expected to have any significant noise impacts from BART trains.

Alternative 5 – Quarry. Alternative 5 is identical to Alternative 3a up to the Isabel/Stanley Station. While Alternative 3a continues to Downtown Livermore, Alternative 5 stops at the Isabel/Stanley Station. Therefore, impacts from Alternative 5 would be similar to those for Alternative 3a between Hacienda Drive and Isabel Avenue. Impacts at two residences along El Charro Road may be potentially significant. Figure 3.10-14 illustrates the location of the potentially significant noise impacts from noise associated with the BART trains for Alternative 5.

MITIGATION MEASURES: The following measure would reduce the significant noise impact from BART cars for Alternatives 1a, 1b, 2, 2a, 3a, and 5. This measure can typically achieve up to a 10 dBA reduction in BART train noise and would be expected to reduce impacts to less-than-significant levels for these alternatives, along most of the alignment. However, there are portions of the alignment that may require more than a 10 dBA reduction in noise levels, as identified below:

- South of Las Positas Road between I-580 and First Street (Alternative 2)
- Along El Charro Road between I-580 and East Stanley Boulevard (Alternatives 1a, 1b, 2a, 3a, 5)
- North of East Stanley Boulevard between North Murrieta Boulevard and Adelle Street (Alternatives 1a, 1b, 2a, 3a)
- Near Downtown Livermore Station (Alternatives 1a, 1b, 2a, 3a)

The mitigation strategies described below would substantially reduce or avoid impacts related to BART train noise; however, sufficient information is not available at the program level to conclude with certainty that mitigation is feasible or if the mitigation would reduce this impact to a less-than-significant impact in all circumstances. Therefore, for purposes of this programmatic EIR, the impact is considered potentially significant and unavoidable. (PSU)

NO-1.1 *Install Noise Attenuation Measures (Alternatives 1a, 1b, 2, 2a, 3a, 5).* BART shall require the installation of noise attenuation measures that would reduce BART train noise so that noise levels indicated on Table 3.10-5 are not exceeded, where feasible. A variety of measures are available to attain these noise standards, including barriers that interrupt the transmission of noise between BART operations and the receptor and modifications to the BART vehicles or tracks. If sound walls are used, their overall height would depend on their location relative to the source and receptors and on the relative location between the source and receptors. Depending on the particular circumstances and topography at the location of the noise exposure, sound walls can be between about 5 feet to 15 feet high and be made of solid materials. It is generally desirable to interrupt the line of sight between the noise source and the receiver in order to sufficiently attenuate the

noise. The specific set of measures that would effectively reduce noise levels would be identified during the later more detailed project-level studies.

It is noted that if the noise attenuation measure involves the construction of a sound wall, the walls could have a visual impact for nearby visually sensitive land uses. The visual impact of potential sound walls and possible mitigation measures are discussed further in Section 3.5, Visual Quality, of this document.

NO-2 Noise from Maintenance Facilities

Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a would have a maintenance facility where the movement of BART railcars and maintenance activities would generate noise at nearby receptors. The maintenance facilities are expected to store at most 190 BART railcars, of which 140 would be used on a daily basis. The analysis below conservatively assumes that 28 trains (with five railcars each) would be moved in and out of the maintenance facility on a daily basis. The shorter alignments may need to handle fewer cars, but, for the purposes of this program-level EIR, all alternatives with maintenance facilities are conservatively assumed to handle 28 trains per day. A more detailed description of the impacts of noise from the operation of maintenance facilities associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new operational noise impacts.

Alternative 1 – Greenville East. Alternative 1 has a maintenance facility (Greenville Yard) north of I-580 and west of Greenville Avenue that would occupy about 119 acres. This facility would be across the street from residential receptors along Laughlin Road. Given a distance from the center of the maintenance facility footprint to these sensitive receptors (about 1,000 feet), the predicted day-night noise level from activities at the maintenance facility is estimated to be 57 dBA. At these homes, the existing noise levels are about 62 dBA, which would have a significance criterion of 59 dBA. With estimated noise from the maintenance facility being 57 dBA, the predicted noise levels from the maintenance facility are less than significant. However, given the uncertainty of where the primary maintenance activities would occur within the footprint, and the close proximity of the receptors to the boundary of the footprint, it is assumed for the purposes of this program-level EIR that noise impacts from the maintenance facility may be significant. This impact will need to be reevaluated at the project-level EIR when more detailed information is available.

Alternative 1a – Downtown-Greenville East via UPRR. The maintenance facility for Alternative 1a is located in the same location as the facility for Alternative 1 and would be

similarly designed. Therefore, noise impacts would be similar to Alternative 1 (potentially significant).

Alternative 1b – Downtown-Greenville East via SPRR. The maintenance facility for Alternative 1b is located in the same location as that for Alternatives 1 and 1a, and would be similarly designed. Noise impacts would be similar to the previous two alternatives (potentially significant).

Alternative 2 – Las Positas. The maintenance facility for Alternative 2 would cover about 52 acres and be located east of the Vasco Road Station. The nearest sensitive receptor is a residence more than 2,000 feet to the southwest of the facility. At 2,000 feet, the predicted day-night noise level would be about 51 dBA (resulting in a net increase of 0.8 dBA from existing levels), well below the 57 dBA significance criteria for the nearest residence (which is based on an existing day-night noise level of 58 dBA).

Alternative 2a – Downtown–Vasco. The maintenance facility for Alternative 2a is located at the same location as that for Alternative 2. The impacts to the nearest sensitive receptor would be the same as for Alternative 2 (less than significant).

Alternative 3 – Portola. Alternative 3 would include the 47-acre Portola/Railroad Yard, east of the underground Downtown Livermore Station and about 200 feet north of existing homes. At this distance, the facility may generate day-night noise levels of 71 dBA (resulting in a net increase of 7.8 dBA from existing levels), and would exceed a significance criteria of 61 dBA (based on an existing day-night noise level of 64 dBA). Therefore, noise impacts form the maintenance facility would be potentially significant.

Alternative 3a – Railroad. The maintenance facility for Alternative 3a would be built at the same location as Alternative 3, so that the noise impacts from the facility would also be potentially significant.

Alternative 4 – Isabel/I-580. Alternative 4 would not include a full-scale maintenance facility and only rudimentary train inspections would be conducted on the rail tracks east of the Isabel/I-580 Station within the freeway median. The limited activities on the rail tracks are expected to result in less-than-significant noise impacts to sensitive receptors located more than 200 feet to the south. This alternative would require that maintenance activities are conducted elsewhere at an existing yard in the greater BART network. Given the location of the other yards in BART's network (Concord, Richmond, Daly City, and Hayward), the existing yard features that attenuate noise (that include walls or indoor shops), and the surrounding land uses, it is not expected that the additional noise to maintain this alternative's railcars would result in a significant noise impact.

Alternative 5 – Quarry. Similar to Alternative 4, Alternative 5 would not have a full-scale maintenance facility and only rudimentary train inspection would be conducted on the tailtracks east of the Isabel/Stanley Station. The limited activities on the tailtracks are expected to result

in less-than-significant noise impacts to sensitive receptors located more than 200 feet to the north and south. Similar to Alternative 4, noise impacts where the maintenance would be performed is also expected to be less than significant.

MITIGATION MEASURES: The following measure is expected to reduce the significant noise impact from maintenance activities to less-than-significant levels for Alternatives 1, 1a, 1b, 3, and 3a. (LTS)

NO-2.1 *Install Noise Attenuation Measures Around Maintenance Yards (Alternatives 1, 1a, 1b, 3, 3a).* BART shall require the installation of noise attenuation measures or other equivalent measures around the maintenance facilities so that noise levels indicated on Table 3.10-5 are not exceeded. The specific set of measures that would effectively reduce noise levels would be identified during the later more detailed project-level studies.

NO-3 Noise from Ventilation Shafts

The BART Facility Standards require tunnels to have ventilation shafts with fans. This mechanical equipment associated with the ventilations shafts would generate noise that could adversely affect nearby land uses. Only Alternative 3 would have a tunnel of sufficient length that would require ventilation shafts. All other alternatives would have no impact from ventilation shafts. A more detailed description of the impacts of noise from ventilation shafts associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Ventilation shafts would not be anticipated under the No Build Alternative, and no impacts would result.

Alternative 1 – Greenville East. The need for ventilation shafts is not anticipated under Alternative 1 since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 1a – Downtown-Greenville East via UPRR. The need for ventilation shafts is not anticipated under Alternative 1a since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 1b – Downtown-Greenville East via SPRR. The need for ventilation shafts is not anticipated under Alternative 1b since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 2 – Las Positas. The need for ventilation shafts is not anticipated under Alternative 2 since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 2a – Downtown-Vasco. The need for ventilation shafts is not anticipated under Alternative 2a since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 3 – Portola. Unlike all other alternatives, Alternative 3 would require ventilation shafts for the subway section under Portola Avenue. However, the exact location of the shafts is unknown. Preliminary estimates suggest seven shafts may be needed between the I-580/Isabel Station and the Downtown Livermore Station along Portola Avenue. Sensitive receptors are located between 50 and 100 feet from the proposed alignment along Portola Avenue. An unshielded ventilation shaft may generate day-night noise levels between 66 and 72 dBA at these distances with the corresponding significance criterion between 59 dBA and 63 dBA (based on an existing noise level of 67 dBA at 50 feet and 62 dBA at 100 feet). Also, Portola Park may be as close as 50 feet to a ventilation shaft and the Junction Avenue Middle School may be about 130 feet from a ventilation shaft. The peak hour noise level may reach 62 dBA at 50 feet and 59 dBA at 130 feet. The existing hourly average noise level at a distance of 50 feet and 130 feet is about 56 dBA and 49 dBA, respectively. To remain less than significant, the noise levels would need to be less than 61 dBA and 59 dBA at 50 feet and 130 feet, respectively. These predicted day-night and hourly noise levels exceed the significance thresholds, and noise impacts from these ventilation shafts would be potentially significant.

Alternative 3a – Railroad. The need for ventilation shafts is not anticipated under Alternative 3a since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 4 – Isabel/I-580. The need for ventilation shafts is not anticipated under Alternative 4 since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

Alternative 5 – Quarry. The need for ventilation shafts is not anticipated under Alternative 5 since the alignment would not involve an extended below-ground stretch, and no noise impacts from this ancillary facility would result.

MITIGATION MEASURES. The following mitigation measure would reduce the significant noise impact from ventilation shafts to less than significant for Alternative 3 (LTS).

NO-3.1 *Install Noise Shielding at Ventilation Shafts (Alternative 3).* BART shall design the ventilation shafts with adequate shielding so that noise levels indicated on Table 3.10-5 are not exceeded. This measure would be consistent with the BART Facility Standards regarding need to install sound attenuation devices to reduce fan noise levels. The specific set of measures, including vent shaft design and use of sound absorption materials, that would effectively reduce noise levels would be identified during the later more detailed project-level studies.

NO-4 Noise from Substations

BART Facility Standards require that traction power substations be installed in close proximity to tracks, approximately every 1.5 miles. Substations on their own may generate noise levels between 70 dBA at 50 feet and 58 dBA at 200 feet. Since these substations would be sited near the BART tracks, noise from the substations would add to noise generated from BART trains traveling on the tracks (track, switches, and horns). Although, the substations would be built to BART Facility Standards which would reduce noise from substations, at this programmatic-level, the locations of these substations are not known and it is possible that they could be located near sensitive receptors.

A more detailed description of the impacts of noise from substations associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new operational noise impacts.

Alternative 1 – Greenville East. With 11.5 miles of track and a substation every 1.5 miles, Alternative 1 may have more than seven substations along its alignment. While Alternative 1 is primarily along I-580, which has high background noise levels (65 to 80 dBA), the substations could be sited near sensitive receptors and affect the level of noise exposure. Given the uncertainty of the siting of traction power substations, noise impacts are conservatively assumed to be potentially significant.

Alternative 1a – Downtown-Greenville East via UPRR. The Alternative 1a alignment is longer than that of Alternative 1 and may have more than eight substations. Not only would this alignment have more substations, the alignment would also runs through areas with lower background noise levels than Alternative 1. Therefore, noise impacts at locations near substations may be greater for Alternative 1a than Alternative 1. As a result, this alternative would have potentially significant impacts from traction power substation noise.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b is similar to Alternative 1a and would also likely have eight substations. However, east of Candy Court, the tracks are further away from the residences along Patterson Pass Road compared to the tracks for Alternative 1a. Therefore, noise impacts to sensitive receptors are assumed to be potentially significant but may impact fewer receptors than Alternative 1a.

Alternative 2 – Las Positas. With 10.0 miles of track, Alternative 2 may have more than six substations. While it would have fewer substations than Alternative 1, the alignment for Alternative 2 would pass through areas that have lower existing noise levels than the

predominantly freeway alignment of Alternative 1. Overall, noise impacts are expected to be similar or slightly greater than under Alternative 1, and would result in a potentially significant impact.

Alternative 2a – Downtown–Vasco. Alternative 2a is estimated to have more than seven substations over 12.0 miles of track. The alignment of this alternative is similar to that of Alternatives 1a and 1b, with the primary difference being that this alignment stops at the Vasco Road Station. Therefore, noise impacts at locations near substations for Alternative 2a are expected to be slightly lower than the impacts for Alternatives 1a and 1b. Nevertheless, noise impacts from traction power substations are assumed to still be potentially significant because their siting is unknown at this point.

Alternative 3 – Portola. With 7.2 miles of track, Alternative 3 may have five substations. Because this alignment runs through Downtown Livermore, noise impacts from traction power substations are anticipated to be potentially significant.

Alternative 3a – Railroad. Alternative 3a has 7.9 miles of track and, with substations every 1.5 miles, may have five or more substations along its alignment. This alternative follows an alignment similar to that of Alternatives 1a and 1b, but ends at the Downtown Livermore Station. Having fewer substations, Alternative 3a is expected to have fewer noise impacts at locations near substations than Alternatives 1a and 1b; however, there would be still a potentially significant impact at the other traction power substation locations.

Alternative 4 – Isabel/I-580. Alternative 4 runs strictly within the median of I-580, which has generally higher noise background than other locations within the study area. At 5.2 miles, this alternative may need three to four substations and so may have the least impact from substation noise of all the alternatives. However, given the uncertainty of the exact location for the substations, noise impacts near substations are conservatively assumed to be potentially significant for this Program EIR.

Alternative 5 – Quarry. With 5.5 miles of track, this alternative would have a similar number of substations as Alternative 4, and the alignments are similar between Hacienda Drive and El Charro Road. While Alternative 4 continues in the median of I-580, Alternative 5 veers to the southeast along El Charro Road, where it passes two residences. As a result, Alternative 5 may have slightly greater substation noise impacts than Alternative 4.

MITIGATION MEASURES: The mitigation described below, along with Mitigation Measures NO-1.1 and NO-3.1, would substantially reduce or avoid this impact. In fact, it is expected that the noise from only the substation can be reduced to less-than-significant levels. However, considering the substations may be located near tracks and sensitive receptors, the combined noise from the trains and substations may result in significant noise levels. Sufficient information is not available at this program-level analysis to conclude with certainty that mitigation would reduce the total impact to a less-than-significant level in all circumstances.

Therefore, for purposes of this Program EIR, the impact is considered potentially significant and unavoidable. (PSU)

NO-4.1 *Reduce Noise at Substations*. BART shall design and locate substation buildings to reduce noise levels below the thresholds specified in Table 3.10-5, where feasible. If it is not possible to site the traction power substations away from sensitive receptors, then other measures to reduce the noise shall be considered. A variety of standard measures exist including the use of barriers, enclosures, sound absorption materials, and mufflers that would enable BART to attain the noise standards in Table 3.10-5. The specific set of measures that would effectively reduce noise levels would be identified during the later more detailed project-level studies.

NO-5 Noise from Local Traffic

Noise from on-road vehicles traveling to and from BART extension stations can impact sensitive receptors adjacent to those roads. Noise levels from on-road vehicles is a function of several factors including traffic volumes, types of vehicles, vehicle speeds, signal type at intersections, roadway configuration, and relative location of sensitive receptors. The level of impacts on nearby receptors would depend on the increase in noise levels relative to existing noise levels. For this program-level analysis, sufficient data are not available to accurately determine the level of impact. Subsequent project-level analysis would include a detailed assessment of noise levels from on-road vehicles. At this stage, it is possible to make general comparisons of the relative potential for noise impacts from the nine alternatives based on the changes in peak AM and PM peak hour traffic volumes that were evaluated at 37 intersections within the study area (see Section 3.2, Transportation, for traffic data). The evaluation below considers the potential increase in traffic volumes compared to the No Build Alternative. The higher the traffic levels, the greater the likelihood of potential noise impacts to nearby sensitive receptors. As discussed in the "Methodology" section, if overall traffic volumes at an intersection increase by 10 percent, noise levels are conservatively assumed to be potentially significant.

The BART extension alternatives would shift traffic patterns in the study area. In general, traffic volumes would likely decrease on portion of major roadway segments such as I-580 as more people are taking BART and therefore driving less on the roads (see Figure 3.2-5 and Figure 3.2-6 in Section 3.2, Transportation, for those roadways that experience less congestion in the future). However, certain roadways would experience an increase in traffic volumes, particularly on roadways used to access stations as people drive to the BART stations (see the arterials that are colored red in Figure 3.2-6).

In addition, portions of I-580 would need to be widened to accommodate the addition of BART in the median of I-580. This widening would be in addition to the I-580 widening that would result from addition of the high occupancy vehicle lanes. Widening of I-580 to accommodate a BART extension alternative would result in shifting the location of travel lanes closer to

sensitive noise receptors in some locations along I-580. This, in turn, may result in increases in noise levels experienced by these receptors. In two areas where the freeway right-of-way is particularly narrow, adjacent residential land uses may need to be acquired and existing sound walls would need to be relocated: in the City of Pleasanton, west of El Charro Road, and in the Springtown area. The west of El Charro Road residences would be affected by all of the BART extension alternatives; the Springtown residences would be affected by Alternative 1 only.

For purposes of comparison, Table 3.10-16 summarizes the number of intersections where either the peak AM or PM traffic volumes showed an increase in volumes. The table also lists the largest percent increase in total traffic volume between the peak AM and PM periods at selected intersections. These intersections are presented in this table because they showed one of the highest increases in either peak AM or PM for at least one alternative and may adversely affect sensitive receptors (e.g., residences and hotels)..

A more detailed description of the impacts of noise from local traffic during operation associated with each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new traffic noise impacts.

Alternative 1 – Greenville East. Of the 37 intersections analyzed in the traffic section, 17 show an increase in total traffic volumes during either the peak AM or PM periods.

Table 3.10-16 shows the increase in overall traffic at selected intersections, some of which would experience volume increases greater than 10 percent. Some of these intersections are near the Greenville East Station and may result in significant noise impacts at the nearby hotels.

In addition, I-580 would be widened to accommodate this alternative in the median, which would shift travel lanes further to the north and south. In locations where the travel lanes move closer to sensitive receptors, this alternative would result in a potentially significant noise impact for the nearby receptors.

For the purposes of this Program EIR, noise impacts from traffic along I-580 and along key roadways (see Table 3.10-16) are assumed to be potentially significant for Alternative 1.

Table 3.10-16
Number of Intersections with Increase in Total Peak AM or PM Traffic and Highest Percent Increase in Total Peak AM or PM Traffic Volumes at Selected Intersections

Alternative	Number of Intersections Where Either Peak AM or PM Traffic Volumes Increased	First Street/ Scott Street	First Street/ I-580 WB Ramp	First Street/ I-580 EB Ramp	Stanley Boulevard/ Isabel Avenue On Ramp	Greenville Road/I-580 WB Ramp	Greenville Road/I-580 EB Ramp	Southfront Road/ Greenville Road	Isabel Avenue/ I-580 WB Ramp	Isabel Avenue/ I-580 EB ramp
1 – Greenville East	17	decrease	0-10%	0-10%	**10-20%**	**10-20%**	**20-30%**	**20-30%**	0-10%	0-10%
1a – Downtown-Greenville East via UPRR	11	**10-20%**	**10-20%**	**20-30%**	**10-20%**	**10-20%**	**10-20%**	**20-30%**	decrease	decrease
1b – Downtown-Greenville East via SPRR	11	**10-20%**	**10-20%**	**20-30%**	**10-20%**	**10-20%**	**10-20%**	**20-30%**	decrease	decrease
2 – Las Positas	21	decrease	0-10%	0-10%	**10-20%**	0-10%	**10-20%**	**10-20%**	0-10%	0-10%
2a – Downtown–Vasco	15	**10-20%**	**10-20%**	**20-30%**	**10-20%**	0-10%	0-10%	**10-20%**	decrease	decrease
3 – Portola	10	**10-20%**	**10-20%**	**10-20%**	0-10%	decrease	decrease	decrease	**10-20%**	**10-20%**
3a – Railroad	11	**20-30%**	**10-20%**	**20-30%**	**20-30%**	decrease	decrease	decrease	decrease	decrease
4 – Isabel/I-580	10	decrease	0-10%	0-10%	**10-20%**	decrease	decrease	decrease	**20-30%**	**10-20%**
5 – Quarry	9	0%	0-10%	0-10%	**30-35%**	decrease	decrease	decrease	decrease	0%

Source: ERM, 2009.

Note: **Bold** values indicate where traffic volumes exceed 10% over No Build volumes and suggest a possibly significant noise impact.

Alternative 1a – Downtown-Greenville East via UPRR. For Alternative 1a, 11 of the intersections studied in the traffic analysis show an increase in total traffic volumes during either the peak AM or PM periods and would most likely result in an increase in noise levels. There are fewer intersections with increases in peak traffic volumes than under Alternative 1, but the percentage increases in traffic volumes at the intersections were generally higher under Alternative 1a for many of the 11 intersections. For example, Alternative 1 had three intersections with an overall increase in traffic volumes for either the peak AM or PM periods of greater than 15 percent (but less than 25 percent); however, Alternative 1a had five intersections with increases greater than 15 percent.

Table 3.10-16 shows the selected intersections that had traffic volume increases greater than 10 percent. The increase in traffic volumes at these intersections would likely be due to the additional vehicles traveling to the Downtown Livermore Station and Greenville East Station. The increase in traffic volumes may generate significant increases in noise levels at homes along First Street and the hotels near the Greenville East Station.

As with Alternative 1, portions of I-580 would be widened to accommodate BART in the median and result in shifting travel lanes closer to sensitive receptors. This may result in significant increases noise levels to these sensitive receptors depending on the number of vehicles and exact location of the travel lanes. About 1.7 miles of I-580 would be widened, thereby affecting fewer receptors along I-580 than Alternative 1, which would be widened about 10.7 miles.

Alternative 1b – Downtown-Greenville East via SPRR. The noise impacts from increased traffic volumes along local roads and widening of I-580 under Alternative 1b would be the same as Alternative 1a.

Alternative 2 – Las Positas. For Alternative 2, 21 intersections show an overall increase in traffic volumes during either the peak AM or PM periods, and would mostly likely result in an increase in noise levels. While more intersections under this alternative would have increases in total peak hour traffic than under Alternative 1a or 1b (but similar number to Alternative 1), the percentage increase in traffic levels were generally not as great as Alternative 1a or 1b.

Table 3.10-16 shows the selected intersections for Alternative 2 that had traffic volume increases greater than 10 percent. These intersections are near hotels or residences, which may experience a significant impact due to increases in traffic noise levels.

In addition, approximately 6.3 miles of I-580 would be widened and shift travel lanes, resulting in potential noise impacts for sensitive receptors adjacent to I-580. Alternative 2 may affect more receptors along I-580 than Alternative 1a and 1b but fewer than Alternative 1.

Alternative 2a – Downtown–Vasco. For Alternative 2a, 15 of the intersections studied in the traffic analysis show an overall increase in traffic volumes during either the peak AM or PM periods.

Table 3.10-16 shows the selected intersections for Alternative 2a that had traffic volume increases greater than 10 percent. The increase in traffic volumes at these intersections are likely due to the additional vehicles traveling to the Downtown Livermore Station and Vasco Road Station. The increase in traffic volumes may result in significant noise impacts for residences along First Street and near the Vasco Road Station.

Noise impacts from the widening of I-580 would be identical to Alternatives 1a and 1b.

Alternative 3 – Portola. Of the intersections analyzed, 10 show an overall increase in traffic volumes in either the peak AM or PM periods and would most likely expose receptors to an increase in noise levels.

Table 3.10-16 shows the selected intersections for Alternative 3 that had traffic volume increases greater than 10 percent. The increase in traffic volumes would result in potentially significant noise impacts for residences.

In addition, approximately 4.9 miles of I-580 would be widened, resulting in an overall increase in noise levels for sensitive receptors adjacent to I-580.

Alternative 3a – Railroad. For Alternative 3a, 11 of the intersections studied in the traffic analysis show an overall increase in traffic volumes during either the peak AM or PM periods. While this alternative affects fewer intersections than Alternatives 1, 2, and 2a, the percentage increases in traffic volumes at the intersections were generally higher for Alternative 3a for many of the 11 intersections. In particular, Alternatives 1, 2, and 2a had three, zero, and two intersections, respectively, with an overall increase in traffic volumes for either the peak AM or PM periods of greater than 15 percent; Alternative 3a had four intersections experience increases of greater than 15 percent.

Table 3.10-16 shows the selected intersections for Alternative 3a that had traffic volume increases greater than 10 percent. The increase in traffic volumes at these intersections are likely due to the additional vehicles traveling to the Isabel/Stanley Station and Downtown Livermore Station. The increase in traffic volumes would generate potentially significant noise impacts for homes along First Street and near Stanley Boulevard and Isabel Avenue.

Noise impacts from the widening of I-580 would be identical to Alternatives 1a, 1b, and 2a.

Alternative 4 – Isabel/I-580. Of the intersections analyzed, 10 show an overall increase in traffic volumes during either the peak AM or PM periods, and these intersections would mostly likely result in an increase in noise levels. Table 3.10-16 shows the selected intersections for Alternative 4 that had traffic volume increases greater than 10 percent.

In addition, approximately 5.2 miles of I-580 would be widened and shift travel lanes closer to sensitive receptors adjacent to I-580. This alternative would affect a number of receptors along I-580 similar to Alternative 3.

Alternative 5 – Quarry. For Alternative 5, nine of the intersections studied in the traffic analysis show an overall increase in traffic volumes during either the peak AM or PM periods. Table 3.10-16 shows the selected intersections for Alternative 5 that had traffic volume increases greater than 10 percent. All but one intersection had increases of 10 percent or less. The increase in traffic volumes at this intersection would likely be due to the additional vehicles traveling to the Isabel/Stanley Station. The increase in traffic volumes would result in potentially significant noise impacts for homes near Isabel Avenue and Stanley Boulevard. Compared to the other alternatives, Alternative 5 is expected to have fewer intersections significantly impacted by an increase in traffic volumes.

Potential noise impacts from the widening of I-580 would be identical to Alternatives 1a, 1b, 2a, and 3a.

MITIGATION MEASURE. The mitigation strategy described below would substantially lessen or avoid noise impacts from vehicular traffic; however, sufficient information is not available at the program level to conclude with certainty that mitigation would reduce this impact to a less-than-significant impact in all circumstances. Therefore, for purposes of this Program EIR, the impact is considered potentially significant and unavoidable. (PSU)

NO-5.1 *Install Noise Attenuation Measures Along Roadways.* BART shall require the installation of noise attenuation measures or other equivalent measures near impacted roadway segments where feasible. Such measures could include raising the height of existing walls and fences to interrupt the line of sight between the noise source and the receiver, reinforcing the walls so that they are solid and do not allow the transmission of noise, and constructing new sound barriers, which may include landscaped berms.

It is noted that if the noise attenuation measure involves the construction of a sound wall, the walls could have a visual impact for nearby visually sensitive land uses. The visual impact of potential sound walls and possible mitigation measures are discussed further in Section 3.5, Visual Quality, of this document.

NO-6 Vibration

The BART extension alternatives would generate groundborne vibration and noise that can annoy nearby sensitive receptors. In particular, locations where the BART trains cross a railroad switch can result in relatively high vibration levels. Railroad switches allow trains to cross from one track to another, and these switches have gaps that increase vibration levels as a vehicle crosses over the gaps.

Tables 3.10-17 and 3.10-18 show the distance at which vibrations levels are less than significant for surface tracks and subways. Groundborne vibration impacts are similar between above and below ground facilities; however, vibration can be stronger depending on the type of soil. To be conservative, more restrictive adjustments are made for the groundborne noise impacts. According to Tables 3.10-17 and 3.10-18, receptors less than 90 feet from the tracks

alone or less than 125 feet from railroad switches may be significantly impacted by groundborne vibration. Also, aerials structures generally have less vibration impacts and an adjustment of -10 VdB can be made for such structures.

Table 3.10-17
Predicted Vibration Levels from BART Operations At-Grade

Type of Impact	Location	Acceptable Level (VdB)	Distance from Centerline of Track					
			25 ft	50 ft	80 ft	90 ft	100 ft	125 ft
Groundborne Vibration (VdB)	Away from Switches	= < 72	**82**	**77**	**74**	72	71	70
	At Switches	= < 72	**92**	**87**	**80**	**77**	**75**	72
Groundborne Noise (VdB)	Away from Switches	= < 35	32	27	24	22	21	20
	At Switches	= < 35	**42**	**37**	30	27	25	22

Source: ERM, 2009.

Note: Numbers in **Bold** exceed criteria. Acceptable levels are from Table 3.10-6 for residences and buildings where people normally sleep. Institutional land uses have higher acceptable levels. An additional -10VdBA adjustment can be applied to aerial structures.

Table 3.10-18
Predicted Vibration Levels from BART Operations Below Ground

Type of Impact	Location	Acceptable Level (VdB)	Distance from Centerline of Track				
			80 ft	90 ft	100 ft	125 ft	150 ft
Groundborne Vibration (VdB)	Away from Switches	= < 72	**74**	72	71	70	68
	At Switches	= < 72	**80**	**77**	**75**	72	69
Groundborne Noise (VdB)	Away from Switches	= < 35	**39**	**37**	**36**	35	33
	At Switches	= < 35	**45**	**42**	**40**	**37**	34

Source: ERM, 2009.

Note: Numbers in **Bold** exceed criteria. Acceptable levels are from Table 3.10-6 for residences and buildings where people normally sleep. Institutional land uses have higher acceptable levels.

A more detailed description of vibration impacts for each alternative is provided below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new vibration impacts.

Alternative 1 – Greenville East. Alternative 1 runs above ground and has switches near the Greenville East Station. The determination of vibration impacts would be based on Table 3.10-17, which shows that vibration impacts may be significant for receptors within 90 feet of the tracks for locations away from switches and within 125 feet of the tracks for locations near switches. The closest sensitive receptor along this alignment is about 120 feet at locations away from switches and 1,400 feet for locations near switches. Thus, vibration impacts would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Alternative 1a runs above ground and has switches near the Greenville East Station and Downtown Livermore Station. According to Table 3.10-17, vibration impacts may be significant if receptors are within 90 feet of the tracks. Potentially significant vibration impacts would occur in two locations. On the northern side of the alignment paralleling East Stanley Boulevard between North Murrieta Boulevard and Adelle Street, homes are about 50 feet from the BART tracks. According to Table 3.10-17, such receptors would experience less-than-significant groundborne noise, but potentially significant groundborne vibration impacts. In addition, near the Downtown Livermore Station (which has nearby switches), receptors are about 50 feet from the proposed alignment and may experience annoyance that would be considered significant groundborne noise and vibration impacts.

With regard to potential building damage from vibration, there are buildings in Downtown Livermore that are 50 feet or more from the alignment. However, vibration impacts to these structures are not expected to be significant. FTA identifies a threshold for damage to structures of between 90 and 102 VdB, depending on the building's susceptibility to damage. Table 3.10-17 illustrates that the threshold of 90 VdB for fragile buildings is not met at distances of 50 feet or more. Therefore, operational vibration impacts from the risk of damage to buildings due to BART train operations is considered less than significant.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would have vibration impacts similar to Alternative 1a since the alignments are virtually the same, except that Alternative 1b has tracks that are farther away from sensitive receptors located along Patterson Pass Road. The areas of potentially significant vibration impacts identified under Alternative 1a also apply to Alternative 1b and could result in the annoyance of sensitive receptors.

Alternative 2 – Las Positas. For a portion of its alignment, Alternative 2 would be elevated above Las Positas Road, and switches are proposed near the Vasco Road Station. The nearest sensitive receptor away from switches is about 75 feet (west of First Street), and the nearest sensitive receptor near switches is more than 1,000 feet away. Other segments are more than 120 feet away from sensitive receptors. According to Table 3.10-17, groundborne vibration impacts may be potentially significant at the receptor located about 75 feet from the alignment for at-grade structures. However, at this particular location, the tracks would be in an aerial guideway which would result in lower vibration impacts (-10 VdB adjustment) than an at-grade structure. As a result, vibration impacts would be less than significant at this particular receptor.

Alternative 2a – Downtown–Vasco. For a portion of its alignments, Alternative 2a would be elevated above ground, and switches are proposed near both the Downtown Livermore Station and Vasco Road Station. Vibration impacts are potentially significant at the same locations and at the same magnitude as those identified for Alternatives 1a and 1b. Receptors 50 feet from the alignment between North Murrieta Boulevard and Adelle Street may be significantly impacted by groundborne vibration, and receptors 50 feet from the switches near the Downtown Livermore Station may be significantly impacted by groundborne vibration and noise. Vibration impacts to the nearby buildings would not result in physical damage, and the effects would be similar to those described for Alternative 1a (less than significant).

Alternative 3 – Portola. Alternative 3 would have vibration impacts similar to Alternatives 1 and 2 for the segment between Hacienda Drive and Portola Avenue. However, the alignment proposed for Alternative 3 would be underground along Portola Avenue up to the Downtown Livermore Station (which has nearby switches). According to Table 3.10-18, away from switches, groundborne vibration impacts may be significant if the receptors are less than 90 feet away and groundborne noise impacts may be significant if the receptors are less than 125 feet away. Because distances to receptors along portions of Portola Avenue vary from 50 feet to 75 feet, groundborne vibration and groundborne noise are potentially significant along this segment and may annoy sensitive receptors. Groundborne vibration or groundborne noise impacts during operations would not be sufficiently severe to cause damage to structures.

Alternative 3a – Railroad. The alignment of Alternative 3a between Hacienda Drive and Downtown Livermore Station would be similar to Alternatives 1a, 1b, and 2a. Vibration impacts are potentially significant at the same locations and at the same magnitudes as identified for Alternatives 1a, 1b, and 2a, except near the Downtown Livermore Station. This portion of the alignment would be in an aerial guideway, so that potential vibration impacts would be lowered by 10 VdB. Even though the aerial guideway would reduce vibration levels, the proximity of receptors to the alignment may result in potentially significant and annoying vibration impacts. Vibration levels would not, however, be great enough to damage nearby buildings, and the vibration impacts would be similar to those described for Alternatives 1a and 2a.

Alternative 4 – Isabel/I-580. The alignment for Alternative 4 would run in the median of I-580, and switches would be proposed near the Isabel/I-580 Station. The closest sensitive receptor along this alignment is 150 feet, which, according to Table 3.10-17, would not experience significant levels of vibration.

Alternative 5 – Quarry. A portion of his alternative would be elevated above I-580 and parts of El Charro Road, and switches would be proposed near the Isabel/Stanley Station. The closest receptor to the alignment away from switches is 100 feet and the closest receptor near switches is 2,500 feet. Based on Table 3.10-17, at these distances, vibration impacts would be less than significant.

MITIGATION MEASURE. The following measure would apply to Alternatives 1a, 1b, 2a, 3, and 3a and would reduce the potential annoyance from vibration. However, sufficient information is not available at this program-level analysis to conclude with certainty that mitigation would reduce this impact to a less-than-significant impact in all circumstances. Therefore for purposes of this Program EIR, the impact is considered potentially significant and unavoidable. (PSU)

NO-6.1 *Conduct a Site-Specific Detailed Vibration Study and Employ Vibration-Reducing Practices (Alternatives 1a, 1b, 2a, 3, 3a).* A detailed vibration study shall be conducted that considers site-specific soils and other conditions, building construction types, etc., to determine locations where vibration levels may exceed the levels identified in Table 3.10-17 for at-grade segments and Table 3.10-18 for underground segments. Once those locations are identified, one or more of the following measures, or equally effective measures, would be implemented depending on the results of the study where feasible.

- Install ballast mats;
- Use resiliently supported ties;
- Locate switches farther away from residences; or
- Carry out rail grinding and wheel truing maintenance on a regular basis.

Effect of UP Commuter Access Principles

The change in the alignment for Alternatives 1a, 1b, 2, 2a, and 3a to comply with the UP Commuter Access Principles has the effect of shifting BART train noise north of the existing tracks and thereby increasing noise exposure and impacts for sensitive receptors on the north side of the tracks. By the same token, the shift also results in greater separation from, and less noise impacts to, sensitive receptors on the south side of the tracks.

Similarly, the shift of the BART guideway to the north under certain alternatives would also relocate the traction power substations north of the existing tracks, thereby increasing noise exposure and impacts for sensitive receptors near the traction power substations. As noted above for train noise, the shift also results in greater separation from, and less noise impacts to, sensitive receptors on the south side of the tracks. Because the siting of the substations is not known at this time and could be near sensitive receptors, the same potentially significant impact identified for these alternatives earlier would apply to them assuming compliance with the UP principles.

Cumulative Analysis

For the cumulative noise analysis, development miles away can affect noise along the BART extension alternatives corridor by increasing traffic on I-580 or along roadways that provide access to the proposed stations. Consequently, the cumulative traffic noise analysis considers the vehicular noise from the alternatives plus vehicular traffic noise increases on I-580 and local roadways as a result of

other foreseeable development in Alameda County. Other foreseeable development would include growth anticipated by the City of Livermore General Plan, Livermore Downtown Specific Plan, Staples Ranch Specific Plan, and El Charro Specific Plan. Foreseeable development in Livermore would also include the Brisa and Arroyo Vista Neighborhood Plans. The eastbound and westbound I-580 HOV lane projects would also contribute to noise along the I-580 corridor.

NO-CU-7 Cumulative Operational Noise Impacts

The analysis below examines cumulative noise levels along I-580 and off I-580 in Livermore. Other projects besides the BART extension alternatives that contribute cumulative noise along I-580 are the Caltrans I-580 HOV lane projects that take into account growth and development in the region including growth in Livermore. Cumulative noise levels off I-580 from other projects are primarily based on General and Specific Plans that account for growth within Livermore.

Along I-580, growth due to increased development in Alameda County would increase vehicle traffic along I-580, which may further increase noise levels. The EIR for the I-580 Eastbound and Westbound HOV lane projects predicted noise levels for a future year of 2035. The EIR generally predicted an increase of peak-hour noise level of 0 to 2 dBA, compared to existing conditions, with areas near the First Street and Vasco Road on- and off-ramps having increases of between 4 and 7 dBA, compared to existing conditions. Without the I-580 HOV lane projects, day-night noise levels along I-580 are assumed to increase by approximately the same amount. The FTA Guidelines, as shown on Figure 3.10-5, allow a cumulative day-night noise increase of 1 dBA from existing noise levels of 65 dBA or greater (typical for noise levels near I-580) before such increases are considered significant. With predicted noise levels from the I-580 HOV lane projects exceeding this incremental threshold, impacts from just the HOV lane projects and background traffic are expected to be cumulatively significant.

The noise from BART trains that run along I-580 would add to the significant cumulative traffic noise impact along I-580. Impact NO-1 predicted noise levels from the BART trains along I-580 to be incrementally less than significant (based on FTA Guidelines) when compared to existing noise level, with noise level increases of less than 1 dBA. However, when considered in context with noise level increases associated other cumulative projects, including the I-580 HOV lane projects, the noise level increase would be greater than the FTA thresholds, and BART's contribution would be cumulatively considerable for residents along I-580.

For areas away from I-580, the Livermore General Plan EIR expects rail traffic along the UPRR line would not increase in 2025 over current levels. However, the Livermore General Plan EIR predicts CNEL noise levels would generally increase within Livermore due to increases in traffic volumes (typically, day-night average noise levels are within 1 dBA of the CNEL). The increased traffic volumes would be from new developments in the area including, among other developments, the Brisa and Arroyo Vista Neighborhoods.

These neighborhoods are located near the alignments for Alternative 1, 1a, 1b, 2, and 2a. More specifically, the Brisa Neighborhood would be located east of Vasco Road and bisected by Brisa Street. The Arroyo Vista Neighborhood is east and north of Las Positas Road and south of Arroyo Vista Road. Both areas are designed as Urban High Residential in the General Plan which would be consistent with the current plans for the neighborhoods.[8,9] Both these developments would increase traffic within Livermore, especially near these two neighborhoods. Near the Brisa Neighborhood, existing residential receptors are located to the southwest, west of Vasco Road, and south of Patterson Pass Road. Near the Arroyo Vista Neighborhood, existing residential receptors are located to the southwest, west of First Street, and south of Las Positas Road. The increased traffic may raise noise levels especially for these nearby receptors, which would add to the cumulative noise levels in the areas.

According the Livermore General Plan, CNEL noise levels are expected to increase by about 4 to 5 dBA along Las Positas Road and Patterson Pass Road with buildout of the Livermore General Plan. In addition, CNEL noise levels are predicted to increase by 1 dBA along Stanley Boulevard between Isabel Avenue and Murrieta Boulevard. Along Portola Avenue, the Livermore General Plan EIR expects CNEL noise levels to increase by 2 to 3 dBA. However, the EIR predicts noise levels would actually decrease along First Street between South Livermore Avenue and Inman Street. Existing noise levels along these roadways were estimated in the Livermore General Plan to range from 64 to 70 dBA CNEL. At these noise levels, the allowed increase in cumulative noise levels is about 1 dBA. As such, cumulative noise in Livermore from growth accounted for in the Livermore General Plan would be significant.

Away from I-580, noise from BART trains associated with the BART extension alternatives would accumulate with noise level increases anticipated in the Livermore General Plan. As noted under Impact NO-1, the BART extension alternatives are estimated to have significant impacts on their own. Accordingly, noise from the BART extension alternatives would have be cumulatively considerable. The additional increase in noise from substations, maintenance facilities, and local increase in traffic would contribute to the cumulatively significant impacts.

While all alternatives would have a cumulatively considerable noise impact, Alternatives 4 and 5 are expected to contribute the least to the cumulative impacts because those alternatives are shorter and would impact fewer sensitive receptors.

MITIGATION MEASURE. Mitigation Measures NO-1.1, 2.1, 3.1, and 4.1 would reduce noise levels from the proposed alternatives and would require the installation of noise attenuation measures or other equivalent measures where feasible. However, portions of the alignment already have sound barriers in place that would not contribute to reducing

[8] City of Livermore, *Brisa Neighborhood Plan*, February 26, 2007.

[9] City of Livermore, *Arroyo Vista Neighborhood Plan*, July 2, 2007.

traffic-related noise compared to current conditions. In addition, the increase in noise near the proposed stations may not be possible to mitigate depending on affected locations (e.g., location of sound wall not feasible). Therefore, for purposes of this Program EIR, the contribution of the alternatives to cumulative noise may not be mitigated to less than significant and the result would be a potentially significant and unavoidable cumulative noise impact. (PSU)

NO-CU-8 Cumulative Vibration Impacts

Within the study area, sources of operational vibration that could cumulate include increased heavy vehicle operation along major roadways and increased train operations along the UPRR and SPRR rights-of-way. Growth in the study area would primarily increase the number of passenger vehicles in the area. While heavy-duty trucks with rubber tires can increase vibration levels on roadways, vibration from rubber-tire vehicles alone do not typically result in significant vibration for residences located along roadways. While some of the alternatives would run parallel to or within the UPRR and SPRR rights-of-way, which can generate significant levels of vibration, the Livermore General Plan does not expect rail operations to increase. In combination with vibration from operation of the BART extension alternatives, however, cumulative vibration from these operations could significantly affect nearby sensitive receptors, such as residences in Downtown Livermore.

Alternatives 1a, 1b, 2a, 3, and 3a would have the largest contribution to increased vibration. The vibration impacts from these alternatives combined with the small increase from growth in vibration-related activities are anticipated to in a potentially significant cumulative vibration impact.

MITIGATION MEASURE. Mitigation Measure NO-6.1 would reduce the vibration contribution from Alternatives 1a, 1b, 2a, 3, and 3a. However, sufficient information is not available at the program level to conclude with certainty that mitigation would reduce the contribution to a less-than-considerable level in all circumstances. Therefore, for purposes of this Program EIR, the contribution of Alternatives 1a, 1b, 2a, 3, and 3a is assumed to remain cumulatively considerable the impact would remain potentially significant and unavoidable. (PSU)

3.11 AIR QUALITY

Introduction

This section considers the air quality implications of the BART extension alternatives in eastern Alameda County. The county is part of the nine-county San Francisco Bay Area Air Basin (SFBAAB). While overall air quality in the air basin is generally good, the area does not achieve State and federal standards for certain pollutants.

As noted in some public responses to the NOP, enhanced transit service typically offers regional air quality benefits by reducing the amount of vehicle traffic on the roads. However, transit projects can increase local automobile congestion around station areas and activities at maintenance yards (e.g., solvent cleaning and fueling of non-revenue, passenger carrying, BART equipment) that can result in elevated air emissions and localized pollutant concentrations. This air quality analysis is conducted to quantify the regional and localized pollutant emission changes with the BART extension alternatives and to compare these changes to air quality standards established by local, State, and federal air quality regulatory agencies and to significance thresholds recommended by those agencies.

Existing Conditions

Climate and Meteorology

The primary factors that determine air quality are the locations of air pollutant sources and the amount of pollutants emitted from those sources. Meteorological and topographical conditions are also important factors. Meteorological conditions, such as wind speed, wind direction, and atmospheric stability determine the movement and dispersion of air pollutants and the topographical conditions influence and often govern air motion and mechanical turbulence in the lower atmosphere. For example, large topographical features such as mountains, hills, and valleys may divert and channel wind through valleys.

Bay Area Climate. The San Francisco Bay Area's location in the middle latitudes and on the west coast of the North American continent places it in the relatively rare Mediterranean-type climate. This climate is influenced by a zone of high atmospheric pressure that is centered over the northeastern Pacific Ocean and lasts much of the year. This high-pressure zone keeps storms from affecting the Bay Area in the summer, then weakens and shifts southward in the winter, allowing the passage of winter storm systems. The predominant winds during most of the year are out of the west.

Local Topography and Meteorology. The Livermore Valley is a sheltered, inland valley near the eastern border of the air basin monitored by the Bay Area Air Quality Management District (BAAQMD). The western side of the valley is bordered by 1,000- to 1,500-foot hills with two gaps connecting the valley to the central Bay Area, the Hayward Pass and Niles Canyon. The eastern side of the valley also is bordered by 1,000- to 1,500-foot hills with one major passage to the San Joaquin

Valley, the Altamont Pass, and several secondary passages. To the north lie the Black Hills and Mount Diablo. A northwest-to-southeast channel connects the Diablo Valley to the Livermore Valley. The southern side of the Livermore Valley is bordered by mountains approximately 3,000 to 3,500 feet high.

During the summer months, temperature inversions, which occur when warm air sits above cold air, form a low ceiling or a lid that causes the air movement to be weak and pollutants to become trapped and concentrated. Maximum summer temperatures in the Livermore Valley range from the high 80s to the low 90s, with extremes in the 100s. At other times in the summer, a strong Pacific high-pressure cell from the west, coupled with hot inland temperatures, causes a strong onshore pressure gradient, which is a significant change in the pressure over a relatively short distance that produces a strong afternoon wind. With a weak temperature inversion, air moves over the hills around the Altamont Pass with ease, dispersing pollutants.

In the winter, with the exception of an occasional storm moving through the area, air movement is often dictated by local conditions. At night and early morning, especially under clear, calm, and cold conditions, gravity drives cold air downward. The cold air drains off the hills and moves into the gaps and passes. On the eastern side of the valley, the prevailing winds blow from north, northeast, and east out of the Altamont Pass. Winds are light during the late night and early morning hours. Winter daytime winds sometimes flow from the south through the Altamont Pass to the San Joaquin Valley. Average winter maximum temperatures range from the high 50s to the low 60s, while minimum temperatures are from the mid-to-high 30s, with extremes in the high teens and low 20s. Air pollution potential is high in the Livermore Valley, especially for photochemical pollutants in the summer and fall. High temperatures increase the potential for the buildup of ozone. The valley not only traps locally generated pollutants, but receives ozone and ozone precursors from San Francisco, Alameda, Contra Costa, and Santa Clara counties because of the wind patterns that move pollutants from these areas to the Livermore Valley. On northeasterly wind flow days, most common in the early fall, ozone may be carried west from the San Joaquin Valley to the Livermore Valley.

During the winter, the sheltering effect of the valley, its distance from moderating water bodies, and the presence of a strong high-pressure system contribute to the development of strong, surface-based temperature inversions. Pollutants such as carbon monoxide and particulate matter (PM), generated by motor vehicles, fireplaces, and agricultural burning, can become concentrated.[1]

Air Pollutants and Local Air Quality

Federal and State Ambient Air Quality Standards. Existing air quality conditions in the study area can be characterized in terms of the ambient air quality standards that the State and the federal government have established for several different pollutants known as "criteria" pollutants. These standards have been set to protect public health. The criteria pollutants include ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_X), sulfur oxides (SO_X), inhalable particulate matter less than 10

[1] BAAQMD, CEQA Guidelines Assessing the Air Quality Impacts of Projects and Plans, Appendix D, Pages D-11 to D-12, December 1999.

microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$), and lead. For each criteria pollutant, those areas having pollutant levels less than the standards are called attainment areas (that is, these areas attain the air quality standard), and those with pollutant levels greater than the standards are called nonattainment areas (that is, these areas do not attain the air quality standard). The attainment status of the SFBAAB is presented in Table 3.11-1 and discussed below.

The United States Environmental Protection Agency (USEPA) has designated the SFBAAB as nonattainment for the federal 8-hour O_3 standard and the 24-hour $PM_{2.5}$ standard. The USEPA has designated the SFBAAB as unclassified for PM_{10}, and in attainment of the federal CO[2], NO_X, and SO_X, standards. The State has designated the SFBAAB as serious nonattainment of the State O_3 standards and nonattainment of the State PM_{10} and $PM_{2.5}$ standards. The SFBAAB has also been designated as being in attainment of the State CO, NO_X, and SO_X standards. These designations are based on the latest changes in the ambient air quality standards. For example, the USEPA lowered the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$, and the annual standard to 15.0 $\mu g/m^3$ in 2006. Former EPA Administrator Johnson signed a final rule on December 22, 2008 making attainment status designations for the 35 $\mu g/m^3$ standard. This rule designates the Bay Area as nonattainment for the 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ standard. The nonattainment designation was issued by the EPA on October 8, 2009 and became effective in November 2009, 30 days after publication of the regulation. In June 2005, the USEPA revoked the previous 1-hour O_3 standard and now has the 8-hour O_3 standard. USEPA recently reduced the federal 8-hour ozone standard to 0.075 ppm, effective on May 27, 2008. State proposals for attainment designations for this standard were due to EPA by March 12, 2009, and EPA must finalize the designations by March 12, 2010. California has proposed that the San Francisco Bay Area would remain nonattainment for the 8-hour federal ozone standard.

Ambient Concentrations. The existing air quality conditions in the study area can be characterized by monitoring data collected in the region. The BAAQMD maintains one pollutant-monitoring station in the City of Livermore. The Livermore Station is within the center of the study area and is representative of the area, since there are no topographical features that would affect the study area differently from the monitoring station. Data from this station for years 2005 through 2007 are summarized in Table 3.11-2. As seen from this data, some violations of the State O_3 and PM_{10} standards and federal $PM_{2.5}$ standards in the study area occurred during the last 3 years.

[2] The SFBAAB was previously designated as a CO nonattainment area. Since the area was redesignated, it is subject to federal Clean Air Act requirements for maintaining attainment.

Table 3.11-1
State and National Criteria Air Pollutant Standards, Effects, and Sources

		State Standard[a]		National Standard[b]			
Pollutant	**Averaging Time**	**Concentration**	**Attainment Status**	**Concentration**	**Attainment Status**	**Pollutant Health and Atmospheric Effects**	**Major Pollutant Sources**
Ozone (O_3)	1-Hour 8-Hour	0.09 ppm 0.070 ppm[c]	N N	(c) 0.075 ppm	(c) N	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases and NO_X react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial industrial mobile equipment.
Carbon Monoxide (CO)	1-Hour 8-Hour	20 ppm 9.0 ppm	A A	35 ppm 9 ppm	A A	Classified as a chemical asphyxiate, CO interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
Nitrogen Dioxide (NO_2)	1-Hour Annual	0.18 ppm 0.030 ppm	A A	— 0.053 ppm	A A	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
Sulfur Dioxide (SO_2)	1-Hour 24-Hour Annual	0.25 ppm 0.04 ppm —	A A	— 0.14 ppm 0.030 ppm	 A A	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Particulate Matter (PM_{10})	24-Hour Annual	50 $\mu g/m^3$ 20 $\mu g/m^3$	N N	150 $\mu g/m^3$ —	U	May irritate eyes and respiratory tract, decreases in lung capacity, cancer, and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
Fine Particulate Matter ($PM_{2.5}$)	24-Hour Annual	— 12 $\mu g/m^3$	 N	35 $\mu g/m^3$(d) 15 $\mu g/m^3$	N A	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning. Also formed from photochemical reactions of other pollutants, including NO_X, $S0_2$, and organics.

Table 3.11-1
State and National Criteria Air Pollutant Standards, Effects, and Sources

		State Standard[a]		National Standard[b]			
Pollutant	**Averaging Time**	**Concentration**	**Attainment Status**	**Concentration**	**Attainment Status**	**Pollutant Health and Atmospheric Effects**	**Major Pollutant Sources**
Lead	Monthly Quarterly	1.5 $\mu g/m^3$ —	A	— 1.5 ug/m^3	A	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.

Source: BAAQMD internet site http://www.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, accessed December 2008.

Notes:

A = Attainment

N = Nonattainment

U = Unclassified (insufficient data collected to determine classification; generally indicates low concern for the pollutant levels)

ppm = parts per million

$\mu g/m^3$ = micrograms per cubic meter

a. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe CO, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that California Air Resources Board determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the State standard.

b. National standards other than for ozone, particulates, and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.08 ppm or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentile is less than 65 $\mu g/m^3$.

c. The federal 1-hour ozone standard was revoked on June 15, 2005.

d. USEPA lowered the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006. USEPA issued attainment status designations for the 35 $\mu g/m^3$ standard on October 8, 2009, and has designated the Bay Area as nonattainment for the 35 $\mu g/m^3$ $PM_{2.5}$ standard.

Table 3.11-2
Ambient Air Quality in the BART to Livermore Extension Study Area
(from the Livermore Air Quality Monitoring Station)

	Livermore		
	2005	**2006**	**2007**
Ozone (O_3)			
Maximum 1-hour concentration (ppm)	**0.120**	**0.127**	**0.120**
No. Days > CAAQS (1-hour) of 0.09 ppm	6	13	2
Maximum 8-hour concentration (ppm)	**0.090**	**0.101**	**0.091**
No. Days > NAAQS (1-hour) of 0.075 ppm	1	5	1
Carbon Monoxide (CO)			
Maximum 1-hour concentration (ppm) BAAQMD data	3.4	3.3	3.3
No. Days > CAAQS (1-hour) of 20 ppm BAAQMD data	0	0	0
Maximum 8-hour concentration (ppm)	1.79	1.79	1.83
No. Days > NAAQS and CAAQS (8-hour) of 9.0 ppm	0	0	0
Nitrogen Dioxide (NO_2)			
Maximum 1-hour concentration (ppm)	0.072	0.064	0.052
No. Days > CAAQS (1-hour) of 0.25 ppm and 0.18 ppm[a]	0	0	0
Annual Average Concentration (ppm)	0.014	0.014	0.013
Particulate Matter (PM_{10})			
Maximum 24-hour concentration ($\mu g/m^3$)	**49.4**	**69.2**	**74.8**
Average arithmetic mean concentration ($\mu g/m^3$)	18.8	21.8	19.8
Average geometric mean concentration ($\mu g/m^3$)			
No. Days > NAAQS (24-hour) of 150 $\mu g/m^3$	0	0	0
No. Days > CAAQS (24-hour) of 50 $\mu g/m^3$	0	3	2
Particulate Matter ($PM_{2.5}$)			
Maximum 24-hour concentration ($\mu g/m^3$)	**55.6**	**51.5**	**54.9**
Average arithmetic mean concentration ($\mu g/m^3$)	10.2	11.1	9.0
No. Days > NAAQS (24-hour) of 35 $\mu g/m^3$	0	0	0

Source: California Air Resources Board, *Summaries of Air Quality Data*, 2005, http://www.arb.ca.gov/adam/cgi-bin/db2www /adamtop4b.d2w/start.
EPA Air Data, accessed October 16, 2008, *http://www.epa.gov/air/data/geosel.html*.
BAAQMD Air Data, accessed October 16, 2008, http://gate1.baaqmd.gov/aqmet/aq.aspx.

Notes:

Values in **bold** exceed the air quality standard.

CAAQS = California Ambient Air Quality Standards

NAAQS = National Ambient Air Quality Standards

ppm = parts per million

$\mu g/m^3$ = micrograms per cubic meter

N/A = data not available

a. The CAAQS for NO_2 were updated in February 2007 to 0.18 ppm for the 1-hour averaging period and 0.03 ppm for the annual averaging period, as indicated in Table 3.11-1. The monitored ambient NO_2 values in this table include data from the years 2005 and 2006 before the CAAQS for NO_2 were updated.

Pollutants of Concern. The pollutants of greatest concern in the study area are O_3, PM_{10}, $PM_{2.5}$, and CO. SO_X is no longer considered a problem pollutant in the State, because the ambient levels are fairly low, and the State has attained this standard for some time. SO_X emissions have decreased substantially over the past 30 years due to improved industrial source controls and use of natural gas instead of fuel oil for electricity generation. In addition, SO_X emissions from mobile sources have decreased due to lower sulfur content in fuels. While the NO_2 standard has not been a problem in the Bay Area, NOx emissions are of concern as a precursor to O_3. Reactive organic gases (ROGs) are not criteria pollutants, but their emissions are of concern as ROG are also precursors to O_3.

The SFBAAB does not meet attainment standards for either the O_3, PM_{10}, or $PM_{2.5}$ State standards or the O_3 federal standard. Although the SFBAAB is in attainment of both State and federal CO standards, CO is a pollutant of concern because the number of motor vehicles and vehicle miles traveled in the area continue to grow, and the potential for elevated levels of CO remains. Greenhouse gases (GHGs) are a concern due to their effect on the Earth's climate.

Ozone. O_3 is a respiratory irritant and oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. O_3 is a severe eye, nose, and throat irritant. It also attacks synthetic rubber, textiles, and other materials. O_3 causes extensive damage to plants by leaf discoloration and cell damage.

O_3 is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. O_3 precursors, which include ROG and NO_X, react in the atmosphere in the presence of sunlight to form O_3. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, O_3 is primarily a summer air pollution problem. ROG and NO_X are emitted by mobile sources and by stationary combustion equipment.

Inhalable Particulate Matter. Particulates can damage human health and retard plant growth. Health concerns associated with suspended PM focus on those particles small enough to reach the lungs when inhaled, causing respiratory disease and lung damage. Particulates also reduce visibility and corrode materials. The federal and State ambient air quality standards for PM apply to two classes of particulates: $PM_{2.5}$ and PM_{10}.

Carbon Monoxide. CO is a gas that is essentially inert to plants and materials, but can have significant effects on human health. CO is a public health concern, because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches and nausea to death. CO is formed as the result of incomplete combustion of fuels such as gasoline, diesel, and wood. Motor vehicles generate most of the CO emissions, and the emissions levels are highest at lower temperatures, such as during startup due to less efficient combustion at lower temperatures.

Greenhouse Gases. The Earth's climate is changing because human activities, primarily the combustion of fossil fuels, are altering the chemical composition of the atmosphere through the buildup of GHGs. GHGs allow the sun's radiation to penetrate the atmosphere and warm the Earth's surface, but do not let the infrared radiation emitted from the Earth to escape back into outer space. As a

result, global temperatures are predicted to increase over the century. In particular, if climate change remains unabated, surface temperatures are expected to increase anywhere from 1.4 to 5.8 degrees Fahrenheit by the end of the century.[3] Not only would higher temperatures directly affect the health of individuals through greater risk of dehydration, heat stroke, and respiratory distress, the higher temperatures may increase ozone formation, thereby worsening air quality. Rising temperatures could also reduce the snowpack, which would increase the risk of water shortages. Higher temperatures along with reduced water supplies could reduce the quantity and quality of agricultural products. In addition, there could be an increase in wildfires and a shift in distribution of natural vegetation throughout the State. Global warming could also increase sea levels and coastal storms resulting in greater risk of flooding.[4]

Emissions of carbon dioxide (CO_2) are the leading cause of global warming, with other pollutants such as methane, nitrous oxide, and hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride also contributing. The magnitude of impact on global warming differs among the GHGs. For example, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride have a greater "global warming potential" than CO_2. In other words, these other GHGs have a greater contribution to global warming than CO_2 on a per mass basis. However, CO_2 has the greatest impact on global warming, because of the relatively large quantities of CO_2 emitted into the atmosphere. For example, BAAQMD estimates that CO_2 made up about 91 percent of the total emission of the six gases listed above in 2007 in the Bay Area.

In the Bay Area, GHG emissions are mainly from combustion of fossil fuels such as gasoline, diesel, and natural gas used in mobile sources and energy-generation-related activities. In particular, BAAQMD estimated that transportation, industrial/commercial, and power plants made up 41 percent, 34 percent, and 15 percent, respectively, of the total GHG emissions in the Bay Area. Seventeen percent of these emissions originate in Alameda County.

Nationally, according to the Fourth U.S. Climate Action Report,[5] total U.S. emissions rose by 15.8 percent from 1990 through 2004, with fossil fuel combustion being the largest source of CO_2. This growth trend is in part due to a significant growth in emissions from transportation activities and electricity generation. The U.S. Climate Action Report provided projections of GHG emissions under a Full Implementation of Climate Programs and Measures scenario (an optimistic scenario). Under this scenario, the total CO_2 emissions from 2000 to 2020 are projected to increase by 17 percent. However, nitrous oxide emissions are expected to decline during this period under this scenario

Globally, CO_2 concentrations, which ranged from 265 parts per million (ppm) to 280 ppm over the last 10,000 years, only began rising in the last 200 years to current levels of 365 ppm, a 30 percent increase.

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3 BAAQMD internet site: http://www.baaqmd.gov/pln/climatechange.htm, Accessed on August 31, 2009.

4 California Energy Commission (CEC), 2006, *Our Changing Climate Assessing the Risks to California: The 2006 Summary Report from the California Climate Change Center*.

5 Office of Global Change, US Department of State. Fourth U.S Action Climate Report to the UN Framework Convention on Climate Change, 2006 (USEPA Internet site: http://www.state.gov/documents/organization/89652.pdf).

Toxic Air Contaminants (TACs). TACs are pollutants that may result in an increase in mortality or serious illness or that may pose a potential hazard to human health. Health effects of TACs include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that lead to death. TACs do not have ambient standards below which no adverse health effects are assumed.

Significant sources of TACs in the environment are industrial processes, such as petroleum refining, chemical manufacturing, electric utilities, metal mining/refining and chrome plating; commercial operations, such as gasoline stations and dry cleaners; and transportation activities, particularly diesel-powered vehicles, including trains, buses, and trucks. In 1998, the California Air Resources Board (CARB) identified PM from diesel-powered engines as a TAC. Compared to other air toxics that the CARB has identified and regulated, diesel particulate matter (DPM) emissions are estimated to be responsible for about 70 percent of the total ambient air toxics risk. On a statewide basis, the average potential cancer risk associated with these emissions is over 500 potential cases per million.[6]

The BAAQMD measures ambient levels of TACs at several air quality monitoring stations in the region. The station nearest the study area is in the City of Livermore. Table 3.11-3 summarizes monitored concentrations of carcinogenic TACs for 2003, the most recent year for which data are available, and the carcinogenic health risks from exposure to these concentrations. In addition, concentration data for certain compounds not measured at the Livermore station are also listed below, as measured at the CARB monitoring location in Fremont, California. The combined cancer risk of benzene and 1,3-butadiene, which are emitted principally from motor vehicle exhaust, is 81.9 chances in 1 million. This represents over half of the total cancer risk (154.chances in 1 million) for the Livermore station as shown in Table 3.11-3. These risks can be compared with the Bay Area average of 143 chances in 1 million.[7] However, the risks do not represent the total risk associated with TACs, principally due to the fact that not all components contained in DPM are considered. There is growing evidence that exposure to emissions from diesel-fired engines (about 95 percent of which come from mobile diesel sources) may result in cancer risks that exceed those attributed to the measured TACs.

The BAAQMD has estimated that the carcinogenic health risks from exposure to DPM in 2003 in the Bay Area region was about 500 to 700 in 1 million.[8] Most of the DPM risks are from exposure to exhaust from diesel trucks where the emission sources can be relatively close to receptors at businesses and residences near freeways. For example, Caltrans estimated that approximately three percent of the vehicles on I-580 in Livermore were trucks with 2 or more axles in 2007.[9] Many of these trucks are diesel powered and contribute to DPM risks.

6 California Air Resources Board, *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles,* October 2000.

6 BAAQMD, *Toxic Air Contaminants 2003 Annual Report,* 2007.

8 BAAQMD, *Toxic Air Contaminants 2003 Annual Report*, 2007.

9 Caltrans, Annual Average Daily Truck Traffic on the California State Highway System, September 2008.

Table 3.11-3
Ambient Concentrations of Carcinogenic TACs
Measured in the BART to Livermore Extension Study Area
by the BAAQMD and CARB in 2003

Compound	Concentration (ppb)	Concentration ($\mu g/m^3$)	Unit Risk[a] (per $\mu g/m^3$)	Cancer Risk (Chances in 1 million)
Livermore - BAAQMD Station[1]				
Benzene	0.39	1.27	2.90E-05	36.8
1,3-Butadiene	0.12	0.27	1.7E-04	45.1
Carbon Tetrachloride	0.11	0.70	4.20E-05	29.6
Chloroform	0.02	0.1	5.30E-06	0.5
Methylene Chloride	0.27	0.96	1.00E-06	0.96
Ethylbenzene	0.12	–	2.5E-06	
Ethylene Dibromide	0.01	0.08	7.10E-05	5.5
Ethylene Dichloride	0.05	0.21	2.10E-05	4.3
MTBE	0.46	1.69	2.60E-07	0.44
Perchloroethylene	0.02	0.14	5.90E-06	0.83
Trichloroethylene	0.03	–	2.00E-06	
Vinyl Chloride	0.15	0.39	7.80E-05	30.4
CARB – Fremont Station[2]				
Acetaldehyde	0.69	–	2.7E-06	
Benzene	0.356	1.16	2.90E-05	33.6
1,3-Butadiene	0.078	0.17	1.7E-04	29.3
Carbon Disulfide	0.76	–	No cancer info	
Carbon Tetrachloride	0.096	0.61	4.20E-05	25.8
Chloroform	0.033	0.17	5.30E-06	0.88
ortho-Dichlorobenzene	0.16	–	No Info	
para-Dichlorobenzene	0.16	–	No info	
cis-1,3-Dichloropropene	0.05	–	No info	
trans-1,3-Dichloropropene	0.05	–	No info	
Ethyl Benzene	0.18	–	2.5E-06	
Formaldehyde	2.15	–	6.0E-06	
MTBE	0.40	1.65	2.60E-07	0.4
Methylene Chloride	0.30	1.06	1E-06	1.06
Perchloroethylene	0.039	0.273	5.90E-06	1.61
Trichloroethylene	0.042	0.231	2.00E-06	0.46
Chromium (Hexavalent)	N/A	4.5E-05	1.5E-02	0.7
PAHs[b]	N/A	5.23E-04	1.1E-03	0.6

Source:
1. BAAQMD, Toxic Air Contaminants 2003 Annual Report, 2007.
2. California Air Resources Board Annual Benzene Summary for Fremont-Chapel Way, Data for 2003

Notes:
ppb = parts per billion.
$\mu g/m^3$ = micrograms per cubic meter.
N/A = particulate toxics are measured in terms of $\mu g/m^3$ rather than ppb.

a. Unit Risk is the probability of contracting cancer if one is continually exposed to an average concentration of 1 $\mu g/m^3$ of the specific substance over a period of 70 years, i.e., an average person's lifetime. Multiplying the Unit Risk of a compound by its concentration in $\mu g/m^3$ gives its cancer risk per million.

b. PAHs are polycyclic aromatic hydrocarbons, and represent the sum of the following species collected as PM_{10}: benzo(a)pyrene, benzo(b)f1uoranthene, benzo(g,h,i)perylene, benzo(k)f1uoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

Sensitive Receptors

Sensitive receptors are locations where individuals with increased sensitivity to the health effects of air pollutants, such as children, hospital patients, and the elderly are usually present. Sensitive receptors include schools, nursing homes, and hospitals. Section 3.3, Land Use, contains a figure showing the land uses within the study area including the location of sensitive receptors.

Applicable Policies and Regulations

Federal Clean Air Act. The federal Clean Air Act (CAA), enacted largely in its current form in 1970 and amended in 1977 and 1990, establishes the framework for federal air pollution control. The act directed the USEPA to establish the ambient air quality standards described in Table 3.11-1. An area that does not meet the federal standard for a pollutant, as shown in Table 3.11-1, is called a "nonattainment" area for that pollutant. For federal nonattainment areas, the federal CAA requires states to develop and adopt State Implementation Plans (SIPs), which are air quality plans showing how air quality standards will be attained. The SIP, which is reviewed and approved by the USEPA, must demonstrate how the federal standards will be achieved. Failing to submit an SIP or secure approval (for example, if the SIP fails to demonstrate attainment of the pertinent air quality standards) could lead to denial of federal funding and permits for improvements such as highway construction. In cases where a SIP deficiency or failure to submit is not corrected by the state, the USEPA is directed to prepare a Federal Implementation Plan. In California, SIPs are prepared and adopted by the local or regional air districts (in the Bay Area, by the BAAQMD) and are reviewed and submitted to the USEPA by CARB.

Federal Transportation Air Conformity. The federal CAA and EPA regulations specify requirements for ensuring that federal transportation plans, programs, and projects conform to the SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS). This means that transportation plans, programs, or projects cannot be approved unless projected emissions from these activities are within the transportation emissions budget contained in the SIP and do not cause localized violations of air quality standards. Regional Transportation Plans (RTPs) and Transportation Improvement Programs (TIPs) include highway or transit improvement projects that require funding or approval from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA). The emissions of nonattainment pollutants and precursors are calculated for all projects in the RTP and TIP, and that total emissions level is compared to the transportation emissions budget included in the SIP. A conformity determination is not required in connection with preparation or approval of this Program EIR, since a specific alternative is not being adopted as a project at this time. Since BART receives federal funds for many of its projects, and because a BART extension in the I-580 corridor will be a "regionally significant" project, a limited conformity determination will at least be needed at the project-level analysis. Specifically, before approving an alternative, BART must determine that the alternative either comes from a conforming RTP and TIP, is included in the air quality analysis for the current conforming RTP and TIP even if not strictly included in the RTP and TIP, or is included in a new air

quality analysis showing that the current RTP and TIP would still conform if the alternative is implemented.

California Clean Air Act. The California CAA of 1988 focuses on attainment of the California Ambient Air Quality Standards (CAAQS), which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards. Responsibility for achieving California standards is placed on the CARB and local air pollution control districts through district-level air quality management plans.

The California CAA requires designation of attainment and nonattainment areas with respect to CAAQS. The California CAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates State air quality standards for CO, SO_X, NO_X, or O_3. These Clean Air Plans are specifically designed to attain these standards and must achieve an annual 5 percent reduction in district-wide emissions of each nonattainment pollutant or its precursors, or provide for the implementation of all feasible emission control measures. No locally prepared attainment plans are in place for areas that violate the State PM_{10} standards, because attainment plans are not required for those areas. This is discussed further below.

The California CAA requires that the State air quality standards be met as expeditiously as practicable, but, unlike the federal CAA, does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The role of the CARB is to establish State air quality standards, maintain oversight authority in air quality planning, develop programs for reducing emissions from motor vehicles, develop air emission inventories, collect air quality and meteorological data, and approve SIPs.

Local Air Quality Management Programs. The BAAQMD has jurisdiction over air quality issues within the SFBAAB. Responsibilities of air districts include permitting stationary sources, maintaining emissions inventories, maintaining air quality monitoring stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by the California Environmental Quality Act (CEQA).

The BAAQMD prepares air quality plans with control measures for nonattainment pollutants. It prepares updates to O_3 attainment plans, which are plans designed to attain the federal O_3 standard, and it prepares triennial updates to Clean Air Plans, which are designed to attain State standards.

The BAAQMD has prepared both federal and State air quality plans to bring the SFBAAB into attainment with federal and State O_3 standards. The Bay Area does not attain either the federal or State O_3 standards. Currently, there are two plans for the Bay Area:

- 2001 Ozone Attainment Plan, which describes the Bay Area's strategy for compliance with the federal 1-hour O_3 standard. Although the USEPA revoked the federal 1-hour O_3 standard on June 15, 2005, the emission reduction commitments in the plan are still being carried out by the BAAQMD.

- The Bay Area 2005 Ozone Strategy, which is the Bay Area's current, adopted plan describing the strategy for compliance with the State 1-hour O_3 standard and is the most current triennial update to the 1991 Clean Air Plan. BAAQMD is currently working on the 2009 Clean Air Plan, which will not only update the 2005 Ozone Strategy, but will also evaluate how O_3 control measures would impact emissions of PM, toxic air contaminants, and GHGs.

The Bay Area also does not attain the State PM_{10} standard. There is not currently a PM_{10} plan in place, but there is a schedule for adoption of PM_{10} emission control measures to help attain the standard, as mandated by SB 656. In 2003, the California Legislature enacted SB 656, codified as Health and Safety Code Section 39614, to reduce public exposure to PM_{10} and $PM_{2.5}$ (collectively referred to as PM). SB 656 requires that CARB, in consultation with local air pollution control and air districts, develop and adopt by January 1, 2005, a list of the most readily available, feasible, and cost-effective control measures that could be used by CARB and the air districts to reduce PM. The goal is to make progress toward attainment of State and national PM standards.

The proposed control measures are to be based on rules, regulations, and programs existing in California as of January 1, 2004, to reduce emissions from new, modified, and existing stationary, area, and mobile sources. SB 656 requires CARB and the air districts to adopt implementation schedules for appropriate CARB and air district measures. Finally, no later than January 1, 2009, CARB must prepare a report describing actions taken to fulfill the requirements of the legislation as well as recommendations for further actions to assist in achieving the State PM standards. According to CARB staff, this report is currently under management review. The bill requirements sunset on January 1, 2011, unless extended.[10]

Toxic Air Contaminants. TACs do not have ambient standards below which no adverse health effects are assumed. TACs from mobile sources are regulated by the CARB and the USEPA. The CARB has responsibility for control of emissions from most mobile sources. All new diesel-powered, on- and off-road motor engines and vehicles sold in California are required to meet both federal and State emissions certification requirements. Heavy-duty diesel vehicles that travel in California but are registered in other states are subject only to federal emissions certification standards.[11] CARB has adopted Air Toxic Control Measures (ATCMs) to control TAC emissions from various specific types of sources and activities. The BAAQMD enforces ATCMs applicable to stationary sources, and has also adopted a permit rule (Regulation 2, Rule 5) for stationary sources of TAC emissions that exceed certain thresholds. A new BART maintenance yard or new emergency generators included in an adopted alternative will have to comply with these requirements as applicable to yard activities.

CARB's *Air Quality and Land Use Handbook: A Community Health Perspective* identifies high traffic freeways and roads as a source of TACs that could present a potentially significant health risk and recommend that local land use agencies provided for specific "buffer zones" between these sources and nearby sensitive receptors. CARB studies show that air pollution levels can be significantly higher

[10] BAAQMD, http://www.baaqmd.gov/pln/pm/, accessed June 23, 2008.

[11] California Air Resources Board (CARB), *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*, October 2000.

within 500 feet of high traffic freeways or roads (greater than 100,000 vehicles per day for an urban roadway or 50,000 vehicles per day for a rural roadway) and then diminish rapidly outside of that 500-foot buffer. Therefore, CARB recommends a 500-foot screening distance for new sensitive land uses proposed near a high traffic freeway or road to determine if a detailed analysis is required. The basis for CARB's advisory recommendation of 500 feet is traffic-related studies of the additional cancer and non-cancer health risks attributable to proximity to roadways. For the purposes of this EIR, the extension alternatives would not directly construct new residential uses within 500 feet of a freeway; however, transit-oriented development may occur around the proposed stations within 500 feet of I-580. Section 5, Program Merits, provides more information about how CARB's guidelines for residential development within 500 feet of a freeway could affect future development around the stations along I-580.

GHG Emissions. Federal and State legislation, regulations, and guidance documents have been promulgated over the past five years and continue to evolve. While there are no specific standards that need to be met in terms of GHG emissions, considerable recent work has been devoted to determining appropriate thresholds and targets to be achieved, as described below.

Federal Regulatory Actions. In April 2007, in *Massachusetts* v. *U.S. Environmental Protection Agency,* the U.S. Supreme Court held that carbon dioxide is an "air pollutant" as defined under the federal Clean Air Act, and that USEPA must follow the pertinent Clean Air Act criteria in determining whether to regulate emissions of CO_2 and other GHGs. In response to that decision, and as directed by the Court, USEPA announced initiation of an effort to determine whether to propose an "endangerment finding" with regard to the impacts of GHG emissions from new motor vehicles. In April 2009, USEPA issued a proposed endangerment finding that GHGs from new motor vehicles contribute to air pollution and may endanger public health or welfare. USEPA has taken public comment on this issue and will likely issue a final determination in late 2009 or early 2010. If USEPA makes a final endangerment finding, it will then determine whether to regulate GHG emissions from new motor vehicles.

During the Bush Administration, USEPA rejected California's application for a Clean Air Act preemption waiver needed to allow California to implement the state's GHG emissions standards for new motor vehicles. In January 2009, President Obama directed EPA to re-assess whether it should grant California's waiver application. On February 12, 2009, EPA published a Federal Register notice proposing to approve the California waiver, and in March 2009, it held public hearings on the matter. On June 30, 2009, EPA granted California's waiver request.

In June 2009, the U.S. House of Representatives passed the "American Clean Energy and Security Act of 2009." This bill would, among other things, establish a national "cap and trade" system for reducing GHG emissions, and potentially affect transportation planning in order to reduce transportation-related GHG emissions. As of July 2009, the Senate is considering similar legislation.

California Policies, Regulations and Laws. Assembly Bill (AB) 1493, enacted in 2002, directs the California Air Resources Board (CARB) to develop and implement regulations that achieve the "maximum feasible reduction" of GHG emissions from passenger vehicles, light-duty trucks, and other

noncommercial vehicles. Pursuant to AB 1493, in 2004 CARB approved regulations limiting the amount of GHGs released from motor vehicles. On March 6, 2008, EPA published a Federal Register notice of its decision denying California's request for Clean Air Act preemption waiver needed to allow California to implement its state motor vehicle GHG emission standards. California sued EPA seeking reversal of that decision. As noted above, on February 12, 2009, EPA published a Federal Register notice proposing to approve the California waiver, and in March 2009, it held public hearings on the matter. On June 30, 2009, EPA granted California's waiver request.

On June 1, 2005, Governor Schwarzenegger signed Executive Order S-3-05 which established the following GHG emission reduction targets:

- By 2010, reduce GHG emissions to 2000 emission levels
- By 2020, reduce GHG emissions to 1990 emission levels
- By 2050, reduce GHG emissions to 80 percent below 1990 levels

A Climate Action Team (CAT) was formed to implement GHG emission reduction programs and to report on progress made to meet the emission reduction targets. CAT is led by the Secretary of California Environmental Protection Agency and consists of representatives from the Business, Transportation and Housing Agency, the Department of Food and Agriculture, the Resources Agency, the Air Resources Board, the Energy Commission, and the Public Utilities Commission. A progress report on meeting the targets is issued every two years starting with the report issued in March 2006.

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, was signed into law by Governor Schwarzenegger, codifying the state's goal to reduce statewide GHG emissions to 1990 levels by the year 2020. This reduction will be accomplished through a statewide cap on GHG emissions that will be phased in starting in 2012. AB 32 directs CARB to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels, in order to achieve the cap level of emissions by 2020.

Under AB 32, GHGs are defined as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The regulatory steps established in AB 32 require CARB to adopt early action measures to reduce GHGs; adopt mandatory reporting rules for significant sources of GHGs; and adopt a scoping plan indicating how emission reductions will be achieved via regulations, market mechanisms; and other actions.

AB 32 required CARB, by January 1, 2008, to determine the statewide GHG emissions inventory that existed in 1990 and to approve an equivalent statewide GHG emissions limit, to be achieved by 2020. On December 6, 2007, CARB approved a 1990 statewide GHG emission level of 427 million metric tons of carbon dioxide equivalent. CARB estimated that without any reduction measures, 2020 emission levels would be 600 million metric tons of carbon dioxide. Based on these estimates, California GHG emissions need to be reduced by about 173 million metric tons of carbon dioxide equivalent to meet the cap for 2020.[12]

[12] CARB website, http://www.arb.ca.gov/cc/inventory/1990level/1990level.htm, accessed June 18, 2008.

To help achieve these reductions, CARB has identified several early action measures, classified as either discrete or non-discrete. Discrete early action measures are regulations that would be adopted and enforceable by January 1, 2010. The other early action measures must be initiated between 2007 and 2012 and may be regulatory or non-regulatory. CARB evaluated over 100 possible measures and on October 25, 2007 approved nine discrete action measures and 35 additional measures. These measures are expected to reduce GHGs by 42 million metric tons of carbon dioxide equivalent by 2020, which is about 25 percent of the needed reduction.

AB 32 also required that CARB adopt a Scoping Plan by January 1, 2009, indicating how emissions reductions will be achieved via regulations, voluntary actions, monetary and nonmonetary incentives, market mechanisms, and other actions. CARB adopted the final Scoping Plan in November 2008. Among the various measures included to achieve the targeted GHG emission reductions by 2020, the Scoping Plan identifies reductions of approximately 2 million metric tons of CO_2 equivalent from local and regional government actions, including regional level transportation planning to establish preferred land use and transportation scenarios that meet the recommended targets while addressing housing needs and other goals.

Since the passage of AB32 and adoption of the Scoping Plan, CARB has adopted approximately ten measures to control GHG emissions. Examples of these measures include:

- Require the use of technologies to improve the efficiency of certain heavy-duty vehicles;
- Develop requirements to ensure tire pressures on older vehicles are properly maintained; and
- Reduce carbon intensity of transportation fuels in California by at least 10 percent by 2020.

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an important environmental issue that requires analysis under CEQA. This bill requires the Governor's Office of Planning and Research (OPR) to prepare and develop guidelines for the feasible mitigation of GHG emissions, or the effects of GHG emissions, by July 1, 2009. On April 13, 2009, OPR submitted to the Secretary of Natural Resources its proposed amendments to the state CEQA Guidelines for GHG emissions. While the proposed amendments establish the criteria lead agencies should apply in determining a GHG significance threshold level, the proposal does not specify numeric threshold levels and leaves that determination to each agency. The California Resources Agency formally proposed GHG-related amendments to the CEQA Guidelines on July 3, 2009, with comments due by August 27, 2009. Final CEQA Guidelines are expected in 2010.

The California Air Pollution Control Officers' Association (CAPCOA) has published guidance on addressing GHG emissions from CEQA projects. The purpose of the guidance is to serve as a resource for public agencies as they establish procedures for reviewing GHG emissions from projects under CEQA. The CAPCOA guidance presents three approaches for thresholds to determine whether GHG emissions are significant: (1) no threshold, (2) threshold set to zero, and (3) threshold at some value greater than zero. The CAPCOA guidance discusses the advantages and disadvantages of each but does not specify a threshold that should be used in all CEQA analyses.

The transportation sector contributes approximately 40 percent of the GHG emissions in California, with automobiles and light trucks alone contributing almost 30 percent. While substantial reductions to GHG emissions from automobiles and light trucks can be achieved through new vehicle technology and by the increased use of low carbon fuel, the legislature determined that these reductions will not be enough to achieve the state's AB 32 GHG emission reduction goals and that it will therefore be necessary "to achieve additional significant GHG reductions from changed land use patterns and improved transportation." To implement this concept, on September 30, 2008, Governor Schwarzenegger signed into law SB 375. SB 375 melds regional transportation and local land use planning in an effort to achieve GHG emission reductions from automobiles and light trucks by using transportation and land use planning to implement "smart growth" principles, thereby reducing vehicle trips and the resulting GHG emissions.

SB 375 creates a new regional planning mechanism – referred to as the sustainable communities strategy (SCS) – which promotes high density, transit-oriented development, and creates incentives for specifically defined, high-density development projects. The bill requires multiple State and regional agencies to work cooperatively to establish regional GHG emission reduction targets for the years 2020 and 2035. These targets must be adopted by CARB by September 30, 2010. The primary means by which the GHG reduction targets are to be met is through adoption of an SCS as an element of the regional transportation plans adopted by California's 18 metropolitan planning organizations. Each SCS must, among other things, analyze existing land use conditions; forecast expected population and employment growth; identify sufficient areas to accommodate the affected region's housing needs; and identify a transportation network to service the transportation needs of the region (California Government Code, Section 65080(b)(2)). Most importantly, the SCS must "set forth a forecasted development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, will reduce GHG emissions from automobile and light trucks to achieve, if there is a feasible way to do so, the GHG emission reduction targets approved by" the ARB (California Government Code, Section 65080(b)(2)(B)(vii)).

Impact Assessment and Mitigation Measures

Standards of Significance

The BART extension alternatives would have a significant air quality impact if they were to:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;

- Expose the public to TACS that would increase the probability of contracting cancer for the maximally exposed individual that exceeds 10 in one million; or
- Expose the public to non-carcinogenic TACS that would result in an acute and chronic Hazard Index greater than 1

Criteria Pollutants. To assist with identifying projects with significant impacts, the BAAQMD has recommended numerical significance criteria for air quality impacts for use by Lead Agencies.[13] The following quantifiable criteria are used in this Program EIR to define significance:

- Emissions of NOx, ROG, or PM_{10} exceeding 15 tons per year or 80 pounds per day; and
- Contribution to ambient CO concentration leading to an exceedance of the CAAQS of 9 ppm averaged over 8 hours or 20 ppm averaged over 1 hour, or the NAAQS of 9 ppm averaged over 8 hours or 35 ppm averaged over 1 hour.

Greenhouse Gases. The State has not yet identified significance thresholds for GHG emissions from projects. CARB released its draft interim CEQA threshold concepts for industrial, commercial, and residential projects for public comment in October 2008. As of the time of the publication of this Draft Program EIR, CARB has taken no further action on these draft concepts, and currently has no workshops or other related activities scheduled. The Office of Planning and Research released proposed amendments to the CEQA Guidelines that is aimed at providing guidance on addressing climate change impacts ("Draft GHG Guidelines"). These guidelines, however, do not identify specific numeric thresholds but instead encourage each agency to develop and publish identifiable thresholds of significance supported by substantial evidence. Final GHG Guidelines are expected in 2010.[14]

Locally, the BAAQMD does not have an adopted threshold of significance for GHG emissions. BAAQMD currently recommends that lead agencies quantify GHG emissions resulting from new development and apply all feasible mitigation measures to lessen the impact. The BAAQMD has drafted an updated CEQA guidance document entitled California Environmental Quality Act Draft Air Quality Guidelines that was released in September 2009.[15] The BAAQMD document evaluates a range of conceptual approaches toward developing GHG significance criteria. One of the primary objectives in updating the current CEQA Guidelines is to identify a GHG significance threshold, analytical methodologies, and mitigation measures to ensure new land use development meets its fair share of the emission reductions needed to address the cumulative environmental impact of GHG emissions. GHG CEQA significance thresholds evaluated in the BAAQMD document are intended to serve as interim levels during the implementation of the AB 32 Scoping Plan and SB 375, which will occur over a few years time. Until AB 32 and SB 375 have been fully implemented, or CARB adopts a recommended

[13] BAAQMD, *CEQA Guidelines Assessing the Air Quality Impacts of Projects and Plans*, Page 16, December 1999.

[14] http://ceres.ca.gov/ceqa/guidelines/, accessed August 31, 2009.

[15] BAAQMD, *California Environmental Quality Act Draft Air Quality Guidelines, ,*September 2009.

threshold, the BAAQMD is considering the development of interim GHG thresholds that lead agencies in the SFBAAB can use.

Regardless of the current absence of final adopted significance thresholds, and as demonstrated in the following analysis, the BART extension alternatives would provide a net air quality benefit with respect to GHG emissions due to a net reduction in passenger vehicle miles traveled that more than offsets the increase in greenhouse gas emissions from the additional BART trains.

For each air quality impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU), or potentially significant and unavoidable (PSU). For this section, AQ refers to Air Quality.

Methodology

Carbon Monoxide Hotspot Analysis. For this Program EIR, impacts of the BART extension alternatives on localized carbon monoxide in the study area are discussed qualitatively. A quantitative analysis will be performed at the project level when the intersections that may be affected by the selected alternative will be identified. The qualitative analysis provided here was based on the traffic data in Section 3.2, Transportation, of this EIR and discusses how the changes in the traffic volume could affect concentrations of carbon monoxide. The analysis also evaluates whether these changes would have the potential to increase CO concentrations above State or federal concentration standards. Project-level air quality analysis would follow the guidelines contained in the Transportation Project-Level Carbon Monoxide Protocol to determine if localized impacts would be significant.[16] In general, this protocol states that for projects in areas that previously were nonattainment for CO but have been re-designated as CO attainment areas (the so-called "maintenance areas"), such as the Bay Area, intersections experiencing congestion at level of service (LOS) E or F must be analyzed to evaluate CO concentrations for comparison to ambient air quality standards.

Greenhouse Gases. Impacts of GHGs were evaluated by calculating CO_2 emissions from vehicles under the No Build Alternative and then comparing the difference with each of the BART extension alternatives. CO_2 is the primary GHG emitted by fossil-fueled engines. Indirect CO_2 emissions for electricity use by BART trains and other BART-related activities were calculated from the energy data provided in Section 3.15, Energy, of this Program EIR and data from an LTK report prepared for BART, which provides the mass of CO_2 emitted per every kilowatt-hour consumed.[17] The CARB-approved motor vehicle emissions model EMFAC2007 and regional traffic data were used to calculate how much regional vehicular CO_2 emissions would change as a result of the BART extension alternatives. EMFAC2007 is software that provides the mass of CO_2 emitted for every vehicle mile traveled.

[16] *Transportation Project-Level Carbon Monoxide Protocol*, UC Davis, 1997.

[17] LTK Engineers Services, Final Report DMU and LRV Options for eBART, January 23, 2008.

Criteria Pollutants. Criteria pollutant emissions were calculated for on-road vehicles using the CARB-approved model EMFAC2007. This model provides the mass of criteria pollutant emissions per vehicle mile traveled. This information, along with traffic data provided in Section 3.2, Transportation, of this Program EIR, was then used to calculate daily criteria pollutant emissions for each extension alternative, including the No Build Alternative.

At the program level, criteria pollutant emissions from BART non-revenue operational activities have not been quantified, because sufficient information is not available on the type of equipment that would be used (i.e., the emergency generator horsepower, number of emergency generators required, etc.) to calculate the criteria pollutant emissions. Instead, this Program EIR qualitatively discusses criteria pollutant emissions from BART activities and maintenance.

TACs Health Risk Assessment. A risk assessment is not required for the electrically powered BART vehicles. However, a health risk assessment may be required at the project level to evaluate cancer probability and chronic and acute non-carcinogenic risks from exposure to emissions from diesel powered emergency generators. Currently, there is not sufficient information about the emergency generators to perform a health risk assessment. In addition, BAAQMD requires permits for diesel-powered generators that may, without any operating or control limits, have significant health risk impacts. Such permits would restrict toxic emissions from a generator so that such emissions have a less-than-significant impact on nearby receptors. Consequently, at this program-level analysis, the impacts of toxics are discussed qualitatively.

Environmental Analysis

Table 3.11-4 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, except for odor emissions and potential localized CO, the BART extension alternatives are anticipated to provide a net benefit to air quality. Odor emissions are expected to result in a less-than-significant impact. Through identified mitigation measures, all potentially significant impacts would be ameliorated to less-than-significant levels for all alternatives. An explanation of these conclusions is provided under the subsequent impact discussions.

AQ-1 Compliance with Clean Air Plan

The BART extension alternatives are not listed in the BAAQMD Bay Area 2005 Ozone Strategy,[18] which is the most recent clean air plan for the region. As a result, the BART extension to Livermore and any benefits associated with changes in VMT and air emissions are not currently accounted for in the strategy. The BART extension alternatives would have the effect of reducing VMT, which is the intent of many of the control measures listed in Table 13 of the Clean Air Plan. The reduction in VMT associated with each alternative is presented in

[18] http://www.baaqmd.gov/pln/plans/ozone/2005_strategy/adoptedfinal_vol1.pdf, accessed May 31, 2009.

Table 3.11-4
Summary Comparison for Operational Impacts to Air Quality in the BART to Livermore Extension Study Area

	Clean Air Plan Conformance		Odor Emissions		Localized CO Concentrations		Greenhouse Gas Emissions		Regional Criteria Pollutant and Ozone Precursor Emissions		Toxics	
Alternative	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?
No Build	S	No	NI	NA	NI	NA	S	No	S	No	NI	NA
1 – Greenville East	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
1a – Downtown-Greenville East via UPRR	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
1b – Downtown-Greenville East via SPRR	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
2 – Las Positas	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
2a – Downtown-Vasco	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
3 – Portola	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
3a – Railroad	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
4 – Isabel/I-580	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA
5 – Quarry	B	NA	LTS	NA	PS	Yes	B	NA	B	NA	LTS	NA

Significance Classification:

S = Significant PS = Potential Significant LTS = Less than Significant SU=Significant and Unavoidable NI = No Impact NA = Not Applicable

Table 3.11-5. The VMT data for each alternative are based on the same model that was used to obtain the ridership forecasts. The travel and ridership forecasts for the BART extension alternatives are based on the Alameda countywide travel demand model maintained by the Alameda County Congestion Management Agency (CMA). The traffic data include information about Alameda County, the entire Bay Area, and San Joaquin County. Information regarding this model is available in the Ridership Forecast document prepared by Dowling Associates for BART.[19]

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts associated with compliance with the Clean Air Plan. However, the reduction in vehicle miles traveled and the corresponding reduction in air emissions would not occur under the No Build Alternative. Thus, the vehicle miles traveled and air emissions would continue to increase consistent with current trends. As a result of this increase, there would be a significant air quality impact under the No Build Alternative.

Table 3.11-5
Daily VMT Reductions
under the BART to Livermore Extension Program

Alternative	Daily VMT Reductions relative to No Build
No Build	None
1 – Greenville East	687,877
1a – Downtown-Greenville East via UPRR	742,836
1b – Downtown-Greenville East via SPRR	742,836
2 – Las Positas	742,494
2a – Downtown-Vasco	860,211
3 – Portola	704,246
3a – Railroad	633,485
4 – Isabel/I-580	404,159
5 – Quarry	620,992

Source: Wilbur Smith Associates, 2009; Dowling, 2009.

Notes: The VMT data includes data for the entire Bay Area and San Joaquin County. The total traffic data also considers the impact of Park-and-Ride/Kiss-and-Ride drive access to BART vehicle trips.

[19] Dowling Associates, *BART to Livermore Extension Program EIR Ridership Forecast*, July 8, 2009, Pages 5-9.

All BART Extension Alternatives. As shown in Table 3.11-5, all of the BART extension alternatives would reduce daily VMT and therefore support implementation of the Clean Air Plan and attainment of the State ozone standard. The degree of benefit corresponds to the amount of the VMT reduction. Thus, Alternatives 1a, 1b, and 2a would represent the greatest beneficial effect. While offering less VMT reduction, Alternatives 4 and 5 would still have a beneficial effect in advancing the goals of the Bay Area Clean Air Plan.

AQ-2 Odor Emissions

Typical sources of odor include wastewater treatment facilities, landfills, refineries, and auto body shops. Normal BART service along the tracks and at the stations would not involve substances associated with these typical odor sources or activities that are typically associated with creating annoying odor. However, maintenance activities that are proposed for the yards may generate minor odors.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new odor-related impacts.

All BART Extension Alternatives. BART extension alternatives would not involve activities or substances that are normally expected to result in odor emissions that would annoy a substantial number of sensitive receptors. Several stretches of the alternative alignments and several stations, such as the Downtown Livermore Station and the Vasco Station, are near sensitive receptors but they would not be adversely affected because of the absence of odor sources associated with electric BART revenue vehicles. While an emergency generator running on diesel may be installed along the alignment, the generator would only run during periodic maintenance (likely a few hours a month) and during emergency conditions.

Maintenance activities at the proposed yard may include the movement of electric BART revenue vehicles, washing and cleaning of BART revenue vehicles, operation of an oil-water separator, wipe cleaning using solvents, lubricant application, fueling of mobile or portable diesel powered equipment, and other maintenance-related activities on revenue and non-revenue vehicles. The operation of oil-water separators and machine shop equipment and cleaning of the BART revenue-vehicles can generate localized odors that are typically only noticeable by workers near these sources. BART has received odor complaints from neighbors near an old car wash used at the existing BART Concord Yard. BART replaced the old car wash system and has not received any complaints from the new car wash system. Odor impacts are expected to be less than significant, not only because the odors are localized but also because the maintenance yard associated with the two-station extension alternatives (Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a) are not surrounded by large populations of sensitive

receptors except for the Portola/Railroad Yard. Properly designed and maintained equipment and operations would not likely result in odors affecting the sensitive receptors around the Portola/Railroad Yard associated with Alternatives 3 and 3a.

In the event that there are reports of odors affecting sensitive receptors from equipment, BART would investigate in an attempt to prevent another occurrence of odors being generated that would annoy off-site sensitive receptors. Therefore, the activities performed in the maintenance yard are not expected to generate significant odors that would impact a substantial number of off-site receptors.

AQ-3 Localized CO

Overall, the BART extension alternatives are expected to reduce emissions from automobiles in the region due to a reduction in VMT, as reported earlier in Impact AQ-1. However, because the BART extension alternatives would also attract local traffic to the stations and parking areas, they could potentially increase local congestion and delays which are primary sources of CO.

Intersections that experience one of the following conditions may result in potentially significant CO impacts: (1) intersections that operate at LOS D or better under the No Build Alternative but at LOS E or LOS F under one of the BART extension alternatives, and (2) intersections that operate at LOS E or LOS F under the No Build Alternative but the delay time through the intersection would increase under one of the BART extension alternatives.

No Build Alternative. Under the No Build Alternative, there would be two intersections in the study area operating at LOS F and two intersections operating at LOS E in the AM peak hour, and four intersections in the study area operating at LOS F and four intersections operating at LOS E in the PM peak hour.

The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Impacts within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new localized pollutant impacts.

All BART Extension Alternatives. Table 3.11-6 summarizes the number of intersections where there may be LOS conditions in 2035 that may result in significant increases in localized pollutant concentrations. In addition, the parking lots at the stations may also experience significant levels of localized pollutant concentrations from moving and idling automobiles. During subsequent project-level analysis, these impacts will need to be analyzed using refined traffic data and localized air dispersion models to determine if the projected emissions would cause an exceedance of the NAAQS or CAAQS.

Table 3.11-6
Summary Comparison for Localized CO Impacts
under the BART to Livermore Extension Program

Alternative	Number of Congested Intersections suggesting Elevated Concentrations of CO
No Build	None
1 – Greenville East	6 in the AM (Airway Blvd/Isabel Ave, Hacienda Dr/ Dublin Blvd, Portola Ave/Murrieta Blvd, Greenville Road/ I-580 EB ramp, Greenville Road/ I-580 WB ramp, Isabel Avenue/I 580 WB Ramp) and 4 in the PM (Airway Blvd/Isabel Ave, First St/I-580 WB Ramp, Hacienda Dr/ Dublin Blvd, Stanley Blvd/Valley Ave)
1a –Downtown-Greenville East via UPRR	3 in the AM (First Street/Scott Street, Hacienda Drive/Dublin Blvd, Greenville Road/I-580 EB ramp) and 5 in the PM (First Street/ Scott Street, Hacienda Dr/Dublin Blvd, Stanley Blvd/Valley Ave, First Street/I-580 WB Ramp, Hacienda Drive/I-580 EB Ramp)
1b –Downtown-Greenville East via SPRR	3 in the AM and 5 in the PM – same intersections as Alternative 1a
2 – Las Positas	4 in the AM (Airway Blvd/Isabel Avenue, Hacienda Drive/Dublin Blvd, Portola Ave/Murrieta Blvd, Isabel Avenue/I-580 WB Ramp) and 7 in the PM (Airway Blvd/Isabel Ave, Hacienda Dr/Dublin Blvd, Vasco Road/Las Positas Road, Vasco Road/Brisa Street, Stanley Blvd/Valley Ave, First Street/I-580 WB Ramp, Hacienda Drive/I-580 EB Ramp)
2a –Downtown-Vasco	1 in the AM (First St/Scott St) and 6 in the PM (First St/Scott St, Hacienda Drive/Dublin Blvd, Vasco Road/Brisa St, Stanley Blvd/ Valley Ave, First Street/I-580 WB Ramp, Hacienda Drive/I-580 EB Ramp)
3 – Portola	4 in the AM (Portola Ave/Livermore Ave, First St/Scott St, Hacienda Drive/Dublin Blvd, Isabel Ave/I-580 WB Ramp) and 5 in the PM (First St/Scott St, First St/I-580 WB Ramp, Hacienda Dr/Dublin Blvd, Stanley Blvd/Valley Ave, Hacienda Drive/I-580 EB Ramp)
3a –Railroad	5 in the AM (Murrieta Blvd/Stanley Blvd, Portola Ave/Livermore Ave, Vasco Rd/Las Positas Rd, First St/Scott St, Hacienda Dr/Dublin Blvd) and 6 in the PM (Airway Blvd/Isabel Avenue, First Street/Scott Street, Hacienda Dr/Dublin Blvd, Stanley Blvd/Valley Ave, First Street/I-580 WB Ramp, Hacienda Drive/I-580 EB Ramp)
4 – Isabel/I-580	6 in the AM (Airway Blvd/Isabel Avenue, Portola Ave/Murrieta, Portola Ave/Livermore Ave, Isabel Avenue/I-580 WB Ramp, First St/Scott St, Hacienda Dr/Dublin Blvd) and 4 in the PM (Airway Blvd/Isabel Avenue, Hacienda Dr/Dublin Blvd, Stanley Blvd/Valley Ave, First Street/I-580 WB Ramp)
5 – Quarry	4 in the AM (Airway Blvd/Isabel Ave, Murrieta Blvd/Stanley Blvd, First St/Scott St, Hacienda Dr/Dublin Blvd) and 6 in the PM (Airway Blvd/Isabel Ave, Murrieta Blvd/Stanley Blvd, First St/I-580 WB Ramp, Hacienda Dr/Dublin Blvd, Stanley Blvd/Valley Ave, Hacienda Drive/I-580 EB Ramp)

Alternatives 1, 3a or 4 would affect more intersections in the AM peak hour (five to six intersections) than the other extension alternatives. In the PM peak hour, Alternatives 2, 2a, 3a or 5 would cause the greatest number of intersections (six to seven intersections) in the study area to operate at LOS E or worse. Alternatives 2 and 3a would result in the greatest total number of intersection (eleven) that could result in potentially significant levels of localized pollutant concentrations. Since all of the BART extension alternatives would increase the number of intersections experiencing high levels of congestion, relative to the No Build Alternative, all of them have a potentially significant localized air quality impact.

MITIGATION MEASURE. As described in Section 3.2, Transportation, this Program EIR recommends mitigation measures to reduce delay at particular intersections. These mitigation measures include changes in lane configuration and signalization improvements that would improve LOS at each of the intersections. These improvements would reduce congestion and delay at significantly affected intersections and thus also reduce impacts from CO. Mitigation measures may also be used to reduce CO levels in parking structures. These mitigation measures include limiting the potential queues in entrances and exits and design features to ensure proper ventilation. While these mitigation measures are expected to be effective for reducing localized CO concentrations based on current information, further evaluation of these mitigation measures may be necessary at the project-level when more information about specific design features and current circumstances affecting these intersections is available. (LTS)

AQ-4 Greenhouse Gas Emissions

GHG emissions, evaluated as CO_2 emissions, were calculated from passenger VMT associated with the BART extension alternatives, as well as from VMT associated with No Build Alternative, for the year 2035. The CO_2 emissions from electricity provided to BART vehicles, stations, and yard operations for each of the extension alternatives were also calculated and added to the emissions associated with VMT under the BART extension alternatives to obtain total emissions for each alternative. For the No Build Alternative, the CO_2 emissions from VMT in the study area are presented. Emissions for all of the extension alternatives are lower than the No Build Alternative, resulting in a net reduction in CO_2. This reduction is attributable to the decrease in passenger VMT with the transit improvements under the BART extension alternatives and would be a program benefit. These emissions are discussed below and summarized in Table 3.11-7.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Air quality impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. However, the reduction in vehicle miles traveled and the corresponding reduction in CO_2 emissions would not occur under the No Build Alternative.

Table 3.11-7
Greenhouse Gas (CO_2) Emissions Associated with the BART Extension Alternatives (Year 2035)

Alternative	Emissions Source	CO_2e (lbs/day)[a,b]
No Build Alternative	Passenger Vehicle Travel in the study area	**290,265,822**
1 – Greenville East	Passenger Vehicle Travel in the study area	289,675,442
	Total BART Electricity Use	160,686
	Total	289,836,128
	Difference Relative to No Build Alternative	**-429,694**
1a – Downtown-Greenville East via UPRR	Passenger Vehicle Travel in the study area	289,630,030
	Total BART Electricity Use	176,319
	Total	289,806,348
	Difference Relative to No Build Alternative	**-459,473**
1b – Downtown-Greenville East via SPRR	Passenger Vehicle Travel in the study area	289,630,030
	Total BART Electricity Use	172,134
	Total	289,802,164
	Difference Relative to No Build Alternative	**-463,658**
2 – Las Positas	Passenger Vehicle Travel in the study area	289,625,500
	Total BART Electricity Use	146,376
	Total	289,771,876
	Difference Relative to No Build Alternative	**-493,946**
2a – Downtown-Vasco	Passenger Vehicle Travel in the study area	289,518,386
	Total BART Electricity Use	155,914
	Total	289,674,300
	Difference Relative to No Build Alternative	**-591,522**
3 – Portola	Passenger Vehicle Travel in the study area	289,662,082
	Total BART Electricity Use	120,643
	Total	289,782,724
	Difference Relative to No Build Alternative	**-483,098**
3a – Railroad	Passenger Vehicle Travel in the study area	289,726,986
	Total BART Electricity Use	126,825
	Total	289,853,811
	Difference Relative to No Build Alternative	**-412,010**
4 – Isabel/I-580	Passenger Vehicle Travel in the study area	289,931,926
	Total BART Electricity Use	72,467
	Total	290,004,393
	Difference Relative to No Build Alternative	**-261,429**
5– Quarry	Passenger Vehicle Travel in the study area	289,722,908
	Total BART Electricity Use	74,048
	Total	289,796,956
	Difference Relative to No Build Alternative	**-468,866**

Source: ERM, 2009.

Notes:

a. The CO_2 emission factor for mobile sources (grams/mile) was obtained from the California Air Resources Board's software EMFAC2007. The change in the vehicle miles traveled was provided by Wilbur Smith Associates and Dowling Associates, electronic communication with ERM, May 4 and 6, 2009.

b. The CO_2 emission factor for the energy consumption from BART activities (grams/kilowatt-hour) was obtained from the LTK Energy and Emissions Report (January 25, 2008) and the energy consumption data were obtained from Section 3.15, Energy, of this EIR. The Total BART Electricity Use is the electricity used for BART trains and maintenance activities as shown in Table 3.15-10.

Thus, the increase in emissions from the increase in vehicle miles traveled and CO_2 emissions would continue at the projected rate and result in a significant impact under the No Build Alternative.

All BART Extension Alternatives. Because the BART extension alternatives would reduce vehicle miles traveled relative to the No Build Alternative, the improvement in transit service to Livermore under all build alternatives would reduce motor vehicle CO_2 emissions in the study area. Even with the additional CO_2 emissions associated with the generation of electricity needed for BART operations, the net effect would be fewer GHG emissions than under the No Build Alternative (see Table 3.11-7). As a result, all of the BART extension alternatives would have a beneficial effect on GHG emissions and climate change.

Alternatives 2 and 2a would yield the greatest reduction in CO_2 emissions (493 – 592 thousand pounds per day) and thus be most beneficial in terms of GHG effects. Even the shortest BART extension alternative (the one-station extension under Alternative 4) would reduce CO_2 emissions by about 261 thousand pounds per day.

AQ-5 Regional Criteria Pollutant and Ozone Precursor Emissions

Criteria pollutant and ozone precursors (ROG, NO_x, CO, and PM_{10}) emissions were calculated from passenger VMT associated with the BART extension alternatives, as well as from vehicle miles traveled associated with No Build Alternative, for the year 2035. These emissions are discussed below and summarized in Table 3.11-8.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Air quality impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new regional emission impacts. However, the reduction in vehicle miles traveled and the corresponding reduction in air emissions would not occur under the No Build Alternative. Thus, the vehicle miles traveled and associated emissions would increase at the projected rate and result in a significant criteria pollutant impact under the No Build Alternative.

All BART Extension Alternatives. The ozone precursor and CO emissions calculated for each BART extension alternative would be less than the emissions projected for the No Build Alternative. As a result, the BART to Livermore Extension program is anticipated to have beneficial effects with respect to regional criteria pollutant emissions. Alternatives that result in the greatest reduction in vehicles miles traveled are most successful at reducing net emissions of ozone precursor and CO. Overall, Alternatives 2a and 3 have the most beneficial effect with respect to regional criteria pollutants.

Table 3.11-8
Regional Criteria Pollutant Emissions
associated with the BART Extension Alternatives[a] (Year 2035)

	Passenger Vehicle Emissions			
	NO_x (lb/day)	**ROG (lb/day)**	**CO (lb/day)**	**PM_{10} (lb/day)**
No Build Alternative	135,744	20,256	507,855	26,969
1 - Greenville East	135,477	20,211	506,770	26,913
Difference Relative to No Build Alternative	**-267**	**-46**	**-1,086**	**-56**
1a –Downtown-Greenville East via UPRR	135,457	20,207	506,684	26,909
Difference Relative to No Build Alternative	**-287**	**-50**	**-1,171**	**-60**
1b –Downtown-Greenville East via SPRR	135,457	20,207	506,684	26,909
Difference Relative to No Build Alternative	**-287**	**-50**	**-1,171**	**-60**
2 – Las Positas	135,454	20,207	506,681	26,909
Difference Relative to No Build Alternative	**-290**	**-49**	**-1,174**	**-60**
2a –Downtown-Vasco	135,405	20,199	506,490	26,899
Difference Relative to No Build Alternative	**-339**	**-57**	**-1,366**	**-70**
3 – Portola	135,471	20,209	506,744	26,912
Difference Relative to No Build Alternative	**-273**	**-47**	**-1,111**	**-57**
3a –Railroad	135,501	20,214	506,860	26,918
Difference Relative to No Build Alternative	**-243**	**-42**	**-996**	**-51**
4 – Isabel/I-580	135,595	20,229	507,229	26,937
Difference Relative to No Build Alternative	**-149**	**-27**	**-627**	**-32**
5– Quarry	135,497	20,215	506,867	26,918
Difference Relative to No Build Alternative	**-247**	**-41**	**-989**	**-51**

Source: ERM, 2009.

Notes:

a. The criteria pollutant emission factors for mobile sources (grams/mile) were obtained from the California Air Resources Board's software EMFAC2007 which account for fleet turnover and improved pollution control. The change in the vehicle miles traveled was provided by Wilbur Smith Associates and Dowling Associates.

AQ-6 Toxic Air Contaminant Emissions

The maintenance facilities would be used for routine vehicle fueling (for non-revenue vehicles), washing, and mechanical maintenance. The maintenance facilities may use solvents during vehicle maintenance and repair. The revenue vehicles are electric powered and would not directly generate toxic emissions, and the other activities would not result in a substantial amount of toxic emissions. Emergency diesel generators may be installed along the alignment and would likely be the highest source of toxic emissions (diesel particulate matter) associated with the BART extension alternatives.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Air quality impacts associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new toxic emission impacts.

All BART Extension Alternatives. The BART extension alternatives are not expected to have sources that would generate substantial amount of air toxics. BAAQMD permits would be required for any diesel emergency generators or solvents used at any maintenance facility that may, without operational limits or controls, generate significant levels of air toxics. If necessary, the BAAQMD permit would impose operational limits or emission controls to reduce toxic emissions to acceptable levels. As such, impacts from TAC emissions associated with any of the BART extension alternatives would be less than significant.

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in substantial changes to proposed BART to Livermore Extension operations (e.g., number of trains, schedule, frequency, etc.), the regional vehicle miles traveled, or local congestion, all factors that contribute to and/or affect the air emissions associated with the BART extension alternatives. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the air quality analysis or conclusions presented earlier in this section.

Cumulative Analysis

Cumulative air quality impacts occur on two scales: localized and regional. Localized impacts occur immediately downwind of the source of air pollutants, such as with CO impacts near congested intersections. In this instance, the geographic area for the cumulative analysis is the immediate area around the stations. Regional impacts occur some distance downwind of the source due to the formation of other reactive pollutants, such as O3. Ozone precursors (ROG and NOx) are emitted

from mobile sources and then form O3 in the presence of sunlight at some distance downwind from the source. This is why ROG, NOx, and O3 impacts are typically expressed in terms of emissions and not concentrations. In this instance, the cumulative context is much larger and encompasses the entire county. The foreseeable development assumed in this cumulative analysis reflects the travel demand model used and described in Section 3.2, Transportation, of this Program EIR.

AQ-CU-7 Cumulative Localized CO

The qualitative CO hot spot analysis presented in Impact AQ-4 above was based on traffic increases from both the BART extension alternatives and from forecasted regional traffic growth. The discussion showed that a number of intersections may experience localized pollutant concentrations that could potentially exceed the CAAQS and NAAQS. However, mitigation measures identified in Section 3.2, Transportation, would reduce congestion and delays at the affected intersection and be expected to result in CO concentrations below ambient standards. Therefore, the cumulative impact to CO would be less than significant.

AQ-CU-8 Cumulative Regional Criteria Pollutant and Greenhouse Gas Emissions

The BART extension alternatives would result in a net reduction in regional emissions and thus have no impact and would not contribute to a cumulative impact from regional criteria pollutants or GHGs. As discussed above under Impacts AQ-5 and AQ-6, passenger VMT would decrease with implementation of the BART extension alternatives. Under cumulative conditions, with the BART extension alternatives included, regional VMT are predicted to decrease. The traffic analysis performed for the BART extension alternatives accounted for regional forecasted growth, including development around the proposed alignments. The regional decrease in VMT results in a reduction in criteria pollutants in the region. In addition, the reduction in GHG attributable to this decrease in cumulative regional VMT is expected to more than offset the increase in GHG from providing electricity and power to BART and BART station activities. Table 3.11-7 summarizes GHG emissions and Table 3.11-8 summarizes ozone precursor emissions (ROG and NO_X), and other criteria pollutant emissions (CO and PM_{10}). The result is a net air quality benefit under cumulative conditions through the reduction of passenger vehicle trips.

The BART extension alternatives have some of the same effect as several of the transportation control measures identified in the 2005 Bay Area Ozone Strategy. The alternatives have the effect of reducing the air basin's emissions thus achieving attainment of ambient air quality standards. This analysis is consistent with the intent of the 2005 Bay Area Ozone Strategy and shows how the BART extension alternatives would help to reduce regional emissions.

AQ-CU-9 Impact of Climate Change on BART Extension Alternatives

Heat Waves. As a result of global increases in GHGs, by 2065, California's annual temperatures are predicted to increase. Historically, high temperatures have caused BART delays and system malfunctions across the system. Much of BART's failure during such heat waves is attributed to out-of-date control boxes and switches that malfunction at high heat. Newer technologies and the increased heat dissipation rates for aboveground installations should make the BART extension alternatives less susceptible to heat-related problems. Malfunctions as a result of higher temperatures may still occur but would likely result in only temporary delays in proposed service. Heat waves also lead to increases in wildfire risk and intensity, which are expected to rise in California.[20] However, as described in Section 3.12, Public Health and Safety, the area surrounding the extension alternatives is primarily developed as transportation corridors, residential and commercial buildings, and study area is not zoned as a State fire hazard zone. Therefore, risks from increased wildland fires are not expected. Impacts from the increased temperature to proposed BART service are expected to be less than significant.

Flooding. There are several floodplains traversed by the extension alternatives. The increase in temperature through the end of this century is expected to result in rising sea levels, increasing severe winter storms (particularly during El Nino winters), and earlier snowmelt runoff. While the risk of flooding is minor because BART would most likely be required to be above flood zones and would be on an embankment, retained fill, or aerial through potential flood zones, these factors are likely to increase the flooding risk.[21] Flooding of the proposed system would delay or halt normal operations. Depending on the severity and duration of the flood, operations could be halted for long periods and potentially on a permanent basis.

MITIGATION MEASURES. Given the potential severity of heat waves and flooding from climate change, mitigation measures are not available that would reduce the impacts to less-than-significant levels. Impacts are considered cumulatively significant and unavoidable. (SU)

AQ-CU-10 Cumulative Toxic Air Contaminants

Diesel particulate matter emissions (a toxic air contaminant) from existing mobile diesel vehicles in the study area could combine with future emissions from the BART extension alternatives, potentially resulting in cumulative significant air toxic impacts to residences and businesses along the alignments. Mobile diesel vehicles include on-road sources (e.g., heavy-duty diesel trucks, transit buses that are part of the county bus system, and various

[20] Fried, J.S., M.S. Torn, and E. Mills, 2004, *The Impact of Climate Change on Wildfire Severity: A Regional Forecast of Northern California*, Climatic Change, 64(1-2), pp. 169-191.

[21] Hayhoe, K., et al, 2004: *Emissions Pathways, Climate Change, and Impacts on California*, Proceedings of the National Academy of Sciences, 101(34), pp. 12422-12427.

medium-duty goods delivery trucks) and off-road sources (e.g., freight trains and ACE commuter rail) that may increase in the study area from cumulative growth.

The significance criteria used in Impact AQ-6 for air toxic emissions is the increased probability of contracting cancer exceeding 10 in one million. This is the threshold used for permitting stationary sources and also the value below which public notification of cancer risk is not required under the AB 2588 Hot Spots program.[22] This value can be considered a level at which the contribution would not be expected to be cumulatively considerable. Similarly, the toxic impacts from the BART extension alternatives discussed in Impact AQ-6 are expected to be below the 10 in one million threshold, and so their contribution is not anticipated to be cumulatively considerable.

In addition, both the USEPA and CARB have regulations that are intended to control existing diesel emissions and further reduce future diesel emissions and thereby reduce cumulative impacts resulting from future growth. In addition to those identified in the "Applicable Policies and Regulations" section, examples of other programs designed to reduce diesel particulate emissions from mobile sources include:

- **State Standards for Diesel Fuel (13 CCR Section 2281).** This rule prohibits the sale or supply of diesel fuel for use in on-road motor and certain off-road vehicles , unless the diesel fuel meets a sulfur content, by weight, no greater than 15 parts per million by weight. This would allow new vehicles to be designed with emission control technology that would meet the USEPA's emission standards for 2007 and subsequent model-year heavy-duty on-road engines and vehicles. In addition, this would allow the installation of control technology on existing on-road and off-road engines.

- **State In-Use On-Road Diesel Vehicle Regulation (13 CCR Section 2025).** This state rules requires fleet owners of on-road heavy-duty diesel fueled vehicles to reduce emissions from their fleets starting in 2010. Requirements would be phased in through the end of 2022.

- **Carl Moyer Memorial Air Quality Standards Attainment Program (CARB).** The Carl Moyer program provides grant funding to applicants (e.g. trucking companies, vehicle fleets, school buses, etc.) to replace old diesel engines with newer, cleaner-than-required diesel engines. The Carl Moyer program accelerates the turnover of old highly-polluting engines, reduces the costs to the regulated community, and speeds the commercialization of advanced emission controls.

With these regulations and program, the contribution of the BART extension alternatives is not anticipated to be cumulatively considerable.

[22] *Assembly Bill 2588, the Air Toxics Hot Spots Information and Assessment Act of 1987, requires public notification if modeled cancer risk exceeds 10 in one million.*

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3.12 PUBLIC HEALTH AND SAFETY

Introduction

This section identifies hazards that may exist in the study area, and the potential for the hazards to adversely affect public health and/or safety. Potential hazards along the BART extension alternatives have been analyzed in two groups, which are described below:

- Soil and Groundwater Contamination – Hazardous materials releases into soil and groundwater have occurred at sites near the proposed alternatives, so exposure to contaminated soil and groundwater could occur during operation. Exposure to hazardous materials sites, or at proposed stations and maintenance facilities, and the accidental release of hazardous materials during operation, are analyzed in this section. Additional analysis is provided regarding accidental release of hazardous materials in proximity (within one-quarter miles) to school sites.

- System Safety – System safety refers to the prevention of harmful incidents to riders, employees, or other members of the public near proposed operations, structures, or facilities. Potential incidents or accidents analyzed in this section include:

  - Interference with existing evacuation routes/plans, and routes/plans that would be established under the project;
  - Events related to the Livermore Municipal Airport;
  - Wildland fires;
  - Electromagnetic Fields (EMF); and
  - Train Collisions.

Environmental Data Resources, Inc. (EDR) conducted a search of various databases of known contamination within one-half miles of the BART extension alternatives. This database search serves as the primary source of information for this analysis. The database search included the National Priority List (NPL), also known as Superfund Sites, the CERCLIS database (also known as CERCLA database), and lists maintained by the Department of Toxic Substance Control (DTSC) and the Regional Water Quality Board (RWQCB). These and other sources are referenced in the footnotes of this section of the Program EIR.

No concerns or questions related to public health and safety raised during the scoping period or in response to the NOP. Responses to concerns or questions related to traffic (automobile, bicycle, and pedestrian) safety can be found in Section 3.2, Transportation, of this Program EIR.

Existing Conditions

Soil and Groundwater Contamination

The alignments and facilities for the BART extension alternatives are adjacent to industrial, commercial, residential, and agricultural areas within Alameda County, and the cities of Dublin, Pleasanton, and Livermore. Industrial facilities, research laboratories, manufacturing plants, dry cleaners, and agricultural uses exist within the vicinity of the study area, and are among the uses that may have resulted in potential soil and groundwater contamination due to accidental spills/leaks, intentional dumping, and use of pesticides.

Chapter 6.95 of the California Health and Safety Code sets forth regulations related to hazardous materials management and disposal and defines "hazardous materials" as:

> …any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. "Hazardous materials" include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment. (California Health and Safety Code, Division 20, Chapter 6.95, Section 25501(k).

In addition, hazardous materials are defined by the DTSC as materials that poses a significant present or potential hazard to human health and safety or the environment if released because of its quantity, concentration, or physical or chemical characteristics (26 CCR 25501). Common hazardous materials include petroleum hydrocarbons, pesticides, volatile organic chemicals, and certain metals.

Database Search. In order to identify the known and potentially significant hazardous material/hazardous waste sites in the study area, a number of selective databases that would list open cases and/or sites of known and significant hazardous materials and hazardous waste were queried. As stated previously, a review of federal, State, and local regulatory agency databases was conducted by EDR in February 2009 to identify sites within a one-half mile buffer zone on each side of the alternatives alignment. The database search resulted in a list identifying facilities permitted to use hazardous materials, as well as environmental cases and spill sites. Based on the database search by EDR, Table 3.12-1 provides the number of sites with known contamination within one-half miles of each alternative alignment. Additionally, Figure 3.12-1 depicts the locations of sites with known contamination. As shown in Figure 3.12-1, there are two known NPL (Superfund) sites within one-half miles of the alternatives: 1) at the Lawrence Livermore National Laboratory, just south of the proposed Vasco Yard, and 2) at the Hexcel Corporation, just east of the proposed Portola/Railroad Maintenance Yard.

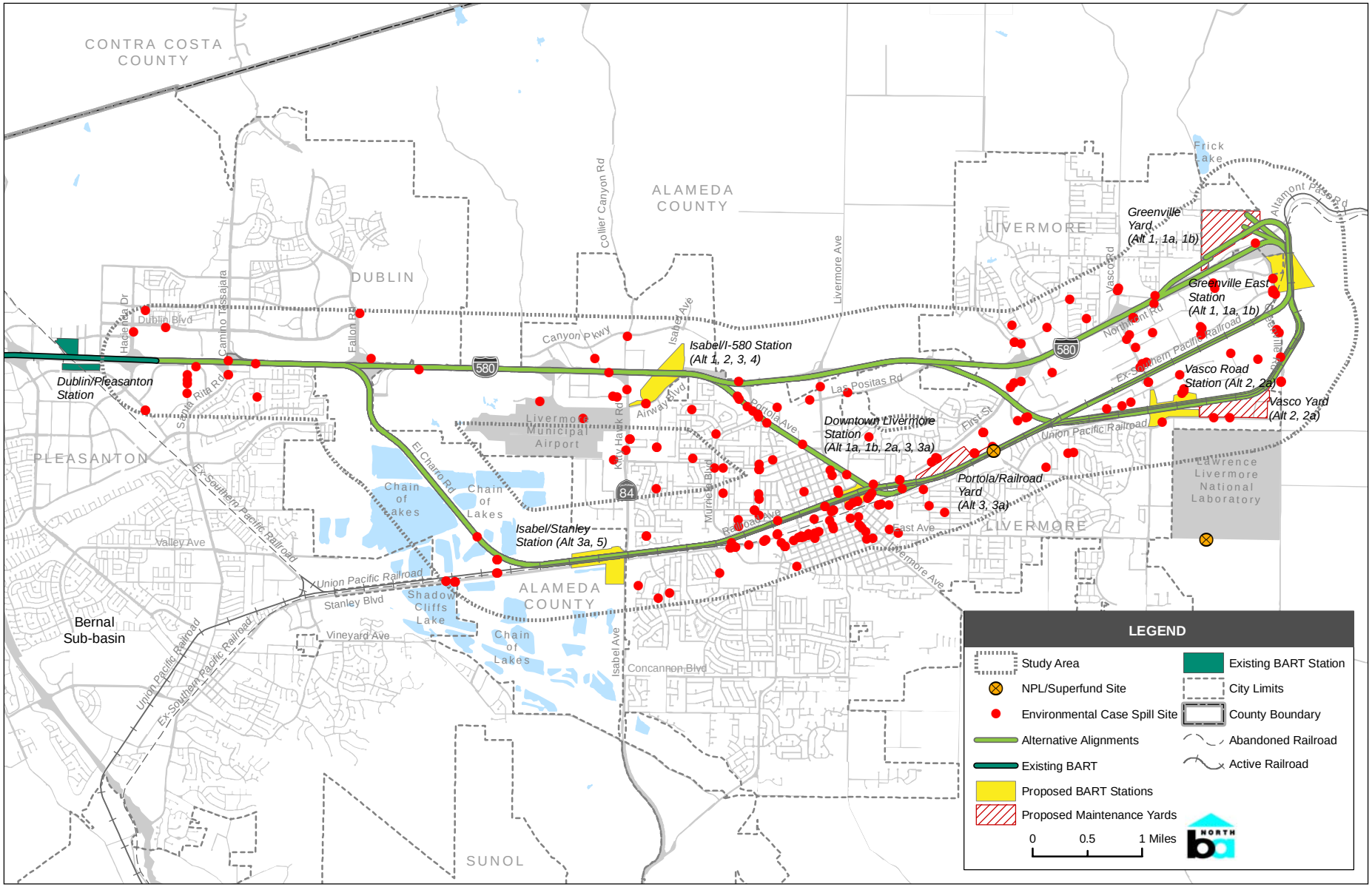
Table 3.12-1
Summary of Environmental Cases and Spill Sites within One-Half Miles of Study Area, by Alternative[a]

Name and Description of Regulatory Database[b]	Alternative									Total within Study Area[c]
	1	1a	1b	2	2a	3	3a	4	5	
Environmental Cases										
Spills, Leaks, Investigations, and Clean Up Program (CA SLIC)[d]	7	14	14	9	13	8	10	4	9	**17**
Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)[e]	0	3	2	1	3	0	2	0	0	**4**
Proposition 65 Records (NOTIFY 65)[f]	4	9	9	4	9	5	8	3	4	**9**
Solid Wastes Facilities and/or Landfills Sites (SWF/LF)[g]	1	3	3	0	2	1	2	0	1	**3**
Water Discharge System: California Water Resources Control Board (WDS)[h]	13	16	15	13	13	10	10	7	10	**26**
HIST FTTS[i]	2	2	2	2	3	1	1	1	1	**4**
FTTS[j]	3	3	3	3	3	2	2	2	2	**5**
LUST[k]	40	75	76	38	75	43	64	25	28	**90**
CORTESE[l]	32	57	57	30	57	33	47	18	19	**71**
ENVIROSTOR[m]	0	2	2	0	2	2	1	0	0	**3**
Sites Designated for No Further Action or Referred to Another Agency by Segment										
CERCLIS-NFRAP[n]	0	3	3	4	3	4	0	0	0	**4**
Reported Spills										
Emergency Response Notification System (ERNS)[o]	19	27	27	16	26	23	23	8	7	**52**
Hazardous Materials Incident Report System (HMIRS)[p]	1	3	3	2	3	1	2	1	2	**3**
California Hazardous Material Incident Report System (CHMIRS)[q]	42	72	70	42	69	44	56	22	23	**95**
NPL[r]	0	2	2	2	2	1	1	0	0	2

Source: EDR, Inc. 2009; PBS&J, 2009.

Notes:

a. This table summarizes the facilities located within the 0.5 buffer zone on either side of each alternative as identified by EDR, Inc. Hazardous sites located in multiple alternative are listed in each alternative.
b. The listed databases include all sites in the EDR, including closed cases.
c. These numbers represent the total amount of hazardous sites within a one-half mile radius from all alternative corridors, based on the EDR, Inc. search.
d. CA-SLIC = Sites with small to medium non-fuel contamination. Most are regulated under site cleanup requirements.
e. CERCLIS = Sites that are either proposed to or on the National Priorities List (NPL) and sites that are in the screening and assessment phase for possible inclusion on the NPL. Also known as CERCLA database.
f. NOTIFY 65 = Facilities that have reported a release that could threaten a drinking water source.
g. SWF/LF = An inventory of active, inactive, or closed solid waste disposal facilities or landfills in a particular state.
h. WDS = Sites that have been issues waste discharge requirements.
i. HIST FTTS = A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. This database is no longer updated.
j. FTTS = Tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-To-Know-Act) over the previous five years
k. LUST = An inventory of reported leaking underground storage tank incidents.
l. CORTESE = Identifies public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with USTs having a reportable release and all solid waste disposal facilities from which there is known migration
m. ENVIROSTOR = Database identifies sites that have known contamination or sites for which there may be reasons to investigate further.
n. CERCLIS-NFRAP = Sites that have been removed or archived from the inventory of CERCLIS sites.
o. ERNS = Records and stores information on reported releases of oil and hazardous substances.
p. HMIRS = Contains hazardous material spill incidents reported to the Department of Transportation.
q. CHMIRS = Information on reported hazardous material incidents, i.e. accidental releases or spills.
r. NPL = Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup.



Source: AECOM, May 4, 2009, EDR, 2009.

HAZARDOUS MATERIALS SITES IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.12-1

Aerially-Deposited Lead. Aerially-Deposited Lead (ADL) exists along major freeway routes due to emissions from vehicles powered by leaded gasoline. The California Department of Transportation (Caltrans) reports that total lead concentrations in soil adjacent to the freeways have typically ranged between 50 and 700 milligrams per kilogram (mg/kg). At sites where soil has not been disturbed, the aerially deposited lead is generally limited to the upper two feet of soil within unpaved shoulder and median areas.[1]

System Safety

As stated previously, system safety refers to the prevention of harmful incidents to riders, employees, or other members of the public near proposed operations, structures, or facilities associated with the BART extension alternatives. The following discussion describes the existing safety plans in place and other potential hazards that could occur in the study area.

Sensitive Receptors near BART Extension Alternatives. Operation of the alternatives would involve the routine transport, use, and disposal of hazardous materials, such as diesel fuel, paints, solvents, adhesives, caulks, and oils. The handling of hazardous materials during project operation becomes a consideration when sensitive receptors occur within the vicinity of the corridor. Sensitive receptors are individuals, such as children, who are especially vulnerable to exposure to hazardous releases. The schools and daycares within approximately one-quarter miles of the project corridor are listed in Table 3.12-2 and shown in Figure 3.12-2.[2] In addition to schools and daycares, major residential clusters, nursing homes, and hospitals also exist within one-quarter miles of the study area. For a complete description of uses in the study area, see Section 3.3, Land Use.

Airports. Portions of the BART extension alternatives would occur within one mile of the Livermore Municipal Airport. Specifically, alternative segments along I-580 (between Fallon Road and Portola Avenue), along El Charro Road, and along UPRR (between El Charro Road and Downtown Livermore) are within one mile of the airport. The Livermore Municipal Airport is adjacent to the Las Positas Golf Course and the Water Reclamation Plant and north of the Union Pacific Railroad, east of El Charro Road, south of I-580, and three miles northwest of the Downtown Livermore, at an elevation of 397 feet about mean sea level (msl).

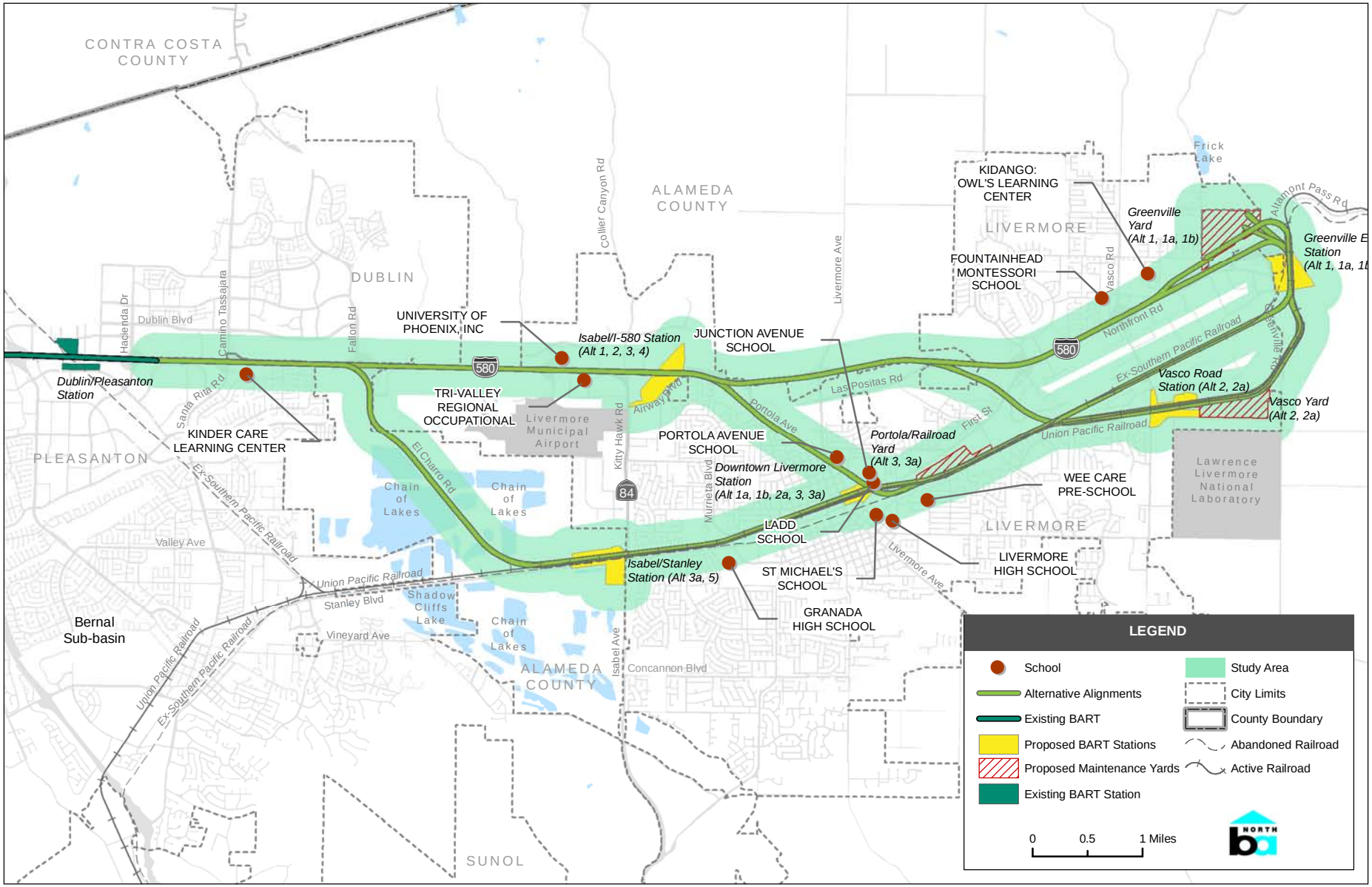
[1] California Department of Transportation, *Aerially Deposited Lead Site Investigation Report – Highway 51 Post Mile 1.07 To 3.68 Sacramento County, California*, July 2007.

[2] According to the Infrastructure and Public Services Element of the City of Livermore General Plan, the LVJUSD may open one new elementary school in 2009-2010, one new middle school in 2010-2011, and one new high school sometime in the future. However, the locations of these schools have not yet been determined and therefore these future schools are not included in the analysis.

Table 3.12-2
Schools within One-Quarter Miles of the BART to Livermore Extension Alternatives

School Name	Address	Approximate Distance from Project Corridor (ft)	Alternative Alignments
Kinder Care Learning Center	3760 Brockton Dr, Pleasanton	472	Alternatives 1, 1a, 1b, 2, 2a, 3, 3a, 4, and 5
University of Phoenix, Inc	2481 Constitution Dr, Livermore	430	Alternatives 1, 2, 3, and 4
Tri-Valley Regional Occupational	2600 Kitty Hawk Rd, #117, Livermore	161	Alternatives 1, 2, 3, and 4
Don Gasper De Portola Avenue School	2451 Portola Ave, Livermore	15	Alternative 3
Junction Avenue Middle School	298 Junction Ave, Livermore	Adjacent to the alignment	Alternative 3
Ladd School	2801 Ladd Ave, Livermore	232	Alternatives 1a, 1b, 2a, and 3a
		164	Alternative 3
Wee Care Pre-School	359 Jensen St, Livermore	873	Alternatives 1a, 1b, 2a, 3, and 3a
Granada High School	400 Wall St, Livermore	315	Alternatives 1a 1b, 2a, and 3a
Fountainhead Montessori School	949 Central Ave, Livermore	1250	Alternative 1
Kidango: Owl's Learning	860 Herman Ave, #101, Livermore	675	Alternative 1
St. Michael's School	345 Church St, Livermore	975	Alternatives 1a, 1b, 2a, 3, 3a
Livermore High School	600 Maple St, Livermore	275	Alternative 3
		730	Alternatives 1a, 1b, 2a, and 3a

Source: PBS&J, 2009.



Source: ESRI, 2007; Google Earth, 2009; AECOM, May 4, 2009; PBS&J, 2009.

SCHOOLS IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.12-2

The Livermore Municipal Airport, a Division of the Public Services Department, is owned and operated by the City of Livermore, and is situated on 643 acres of land. The airport is a general aviation airport that serves private, business, and corporate tenants and customers. The airport owns and operates a 45,000-gallon underground aviation fuel storage facility, dispenses fuel via four tank trucks, and maintains a 24-hour self-serve fuel island with two pumps. The facility has two parallel runways, 600 based aircraft, over 150,000 annual aircraft operations, and sells over 650,000 gallons of aviation fuel each year.[3]

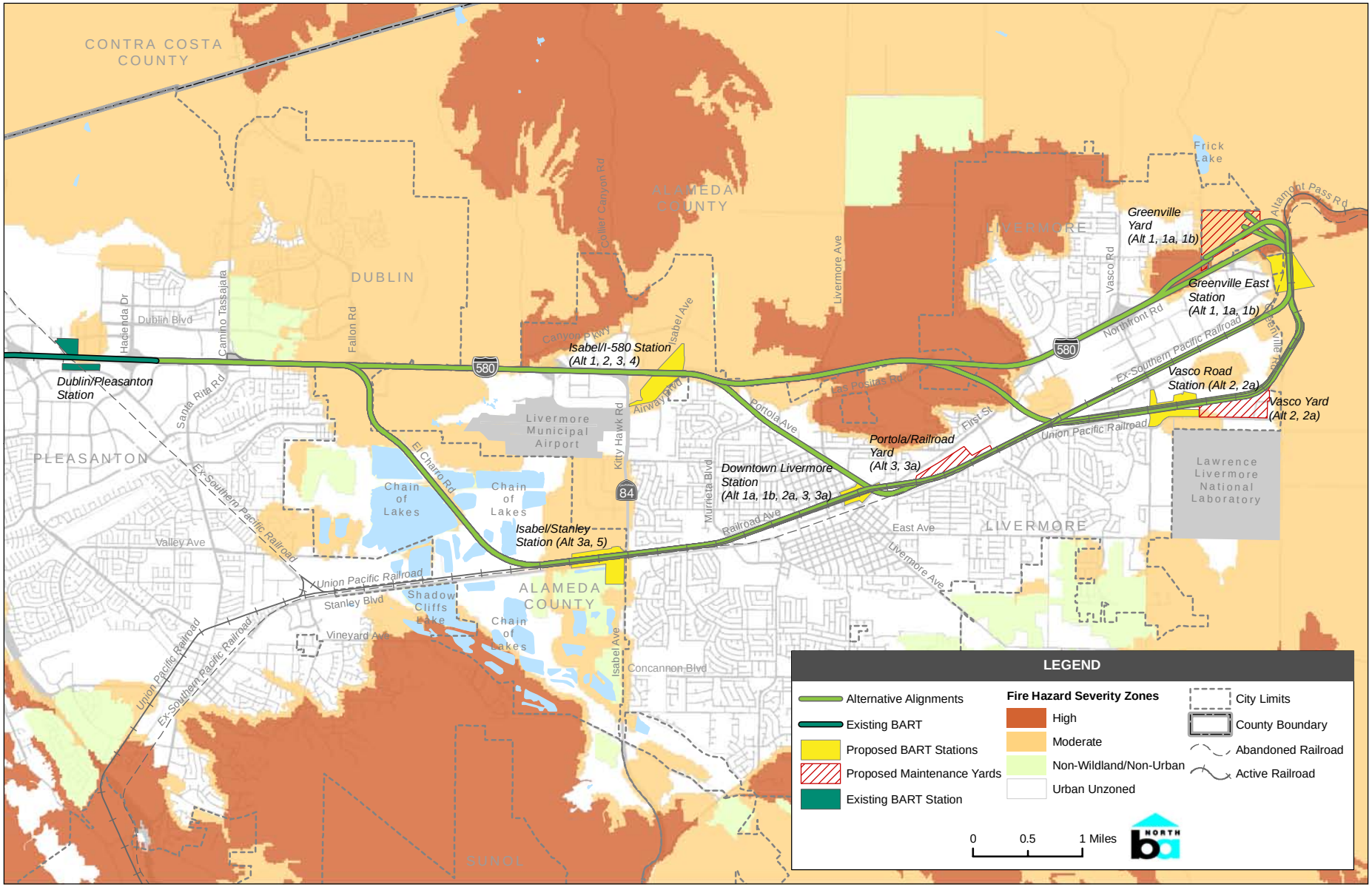
The Alameda County Airport Land Use Policy Plan (ALUPP) identifies a number of different zones around the Livermore Municipal Airport; these zones are defined to ensure that surrounding land uses are compatible with airport activities. The zones include but are not limited to the Airport Safety Zone, which encompasses an airport clear zone and an approach zone, and the Airport Protection Area (APA), wherein increased residential development is prohibited. The ALUPP and the Airport Safety Zone and APA of the Livermore Municipal Airport are described in more detail under "Applicable Policies and Regulations," later in this section.

Wildland Fires. The study area experiences long, dry summers with high wildland fire hazards. The risk of wildfire hazard is related to a combination of factors including winds, temperatures, humidity levels, and fuel moisture content. Steep slopes also contribute to fire hazard by intensifying the effects of wind, and making fire suppression difficult. Features in some parts of the study area, including highly flammable vegetation, warm and dry summers, rugged topography and occasional human presence create a situation that results in potential wildland fires.

To quantify this potential risk, the California Department of Forestry (CDF) has developed a Fire Hazard Severity Scale which utilizes three criteria in order to evaluate and designate potential fire hazards in wildland areas. The criteria are fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). As shown in Figure 3.12-3, some areas adjacent to the project alignments, such as the urbanized areas, are not zoned as a local fire hazard zone, according to the California Department of Forestry and Fire Protection California Fire Hazard Severity Zone Map.[4] However, many areas, including most land north of the I-580 corridor and to the east of the City of Livermore, are mapped as moderate- to high-fire hazard zones.

[3] Livermore, City of - Public Works Department, Airport Division. *Livermore Airport*. Available at: http://www.ci.livermore.ca.us/airport. Access on: May 27, 2009.

[4] California Department of Forestry and Fire Protection. 2007. *Alameda County Fire Hazard Severity Zoning, Draft*, November, Available at: http://frap.cdf.ca.gov/webdata/maps/alameda/fhsz_map.1.pdf. Accessed on: June 11, 2009.



Source: AECOM May 4, 2009.

WILDLAND FIRE HAZARD ZONES IN THE BART TO LIVERMORE AREA

FIGURE 3.12-3

Electromagnetic Fields. Electric and magnetic fields occur wherever there is a flow of electricity. Electric fields are caused by the voltage in a power line, while magnetic fields result from the current in the line. Collectively, these are known as electromagnetic fields (EMF). Sources of EMF include background levels in nature, high voltage electric power lines, and high voltage transformers, all of which occur within the study area. Other commonly known, human-made sources of EMF include household electronics, telecommunications, and electric motors.

Electromagnetic fields are described in terms of their frequency, or the number of times the EMF changes direction in space each second. Natural and human-generated EMFs encompass a broad frequency spectrum. In the United States, the electric power system operates at 60 Hertz (Hz), or cycles per second, meaning that the field reverses its direction 60 times per second. Depending on the configuration of the source, the strength of an EMF decreases in proportion to distance or distance squared, or even more rapidly. The rate of decrease and the distance at which impacts become insignificant depend on technical specifications, such as the source's geometric shape, size, height above the ground, and operating frequency. Therefore, it is not possible to define a characteristic distance for the extent of EMF effects that applies in general for all sources. Electric and magnetic field strengths decrease with distance from the source. Electric fields are shielded or weakened by materials that conduct electricity, including trees, buildings, and human skin. Magnetic fields, on the other hand, pass through most materials and are therefore more difficult to shield.

Health Implications. Currently, there is no scientific consensus that there are adverse effects caused by EMFs. While studies have raised suspicion about the link between EMF and certain health conditions, none have been able to definitively link EMFs and these health conditions. Numerous studies have been conducted on the link between childhood cancer and exposure to magnetic fields from 50 Hz and 60 Hz. For example, in 1979, Dr. Nancy Wertheimer and Dr. Ed Leeper conducted a study that suggested that children living near high current lines might be more susceptible to leukemia than those living near low current lines.[5] However, in the 30 years since this study was published, there has yet to be a demonstrated cause-and-effect relationship between leukemia and exposure to EMFs.[6] In fact, a recently (November 2008) released case-control study published by the American Journal of Epidemiology did not show any elevated risks of childhood leukemia associated with EMFs to children aged 0-14 years, who were diagnosed with leukemia between 1984 and 2003 and were registered at the German Childhood Cancer Registry.[7]Various industry, government, and scientific organizations with expertise in EMF technology have produced a range of voluntary standards that represent their best judgment of what levels are considered safe (presented below, under "Applicable Policies and Regulations"). The State Public Utilities Commission (PUC) and the State Department of Health

[5] Wertheimer, N., and E. Leeper. 1979. *Electrical Wiring Configurations and Childhood Cancer, American Journal of Epidemiology*. 109(3): 273-284,

[6] PG&E. *EMF Frequently Asked Questions*. Available at: http://pge.com/education_training/about_ energy/emf/ faqs/. Accessed on: August 31, 2009.

[7] Merzenich, Hiltrud; Schmiedel, Sven; Bennack, Sabrina; Bruggemeyer, Hauke; Philipp, Johannes; Blettner, Maria; Schuz, Joachim, *Childhood Leukemia in Relation to Radio Frequency Electromagnetic Fields in the Vicinity of TV and Radio Broadcast Transmitters, American Journal of Epidemiology*. 168(10):1169-1178, November 15, 2008.

Services (DHS) have not concluded that exposure to magnetic fields from utility electric facilities is a health hazard. Federal and State agencies have agreed that more research is needed.

BART Electrical System. BART receives alternating current (AC) power from PG&E to propel trains.[8] This power is delivered via two sets of parallel 34.5 kilo-volt (kV) transmission lines and circuit breakers to traction power substations throughout the entire system where the power is reduced and converted to 1,000 volts direct current (VDC). Direct current (DC) main and feeder circuit breakers then connect the 1,000 VDC to contact rails serving each vehicle in a train. For train control and station facilities, BART also receives from PG&E an additional 12 kV AC power, which it reduces to 480 volts (V). It should be noted that both the AC and DC voltages associated with the BART system are much lower than those typical of utility transmission lines, which normally carry between 115 kV and 765 kV.

Magnetic field measurements have been taken at traction power substations and on trains similar to those in use by BART. These measurements indicate that:

- The DC magnetic field at the BART Lafayette Substation, measured at the fence line, is generally the same order of magnitude as the local magnetic field of the Earth, which ranges from 300 to over 600 milligauss (mG), from the equator to poles, respectively. In the Bay Area, the earth has a natural static magnetic field of about 510 mG.[9] In comparison, average fields of typical household appliances, at a distance of 30 cm, are color television (7 mG), microwave (4 mG), analog clocks (15 mG), electric razors (20 mG [100 mG at 15 cm]), and hair driers (1 mG [300 mG at 15 cm]);[10]
- The 60 Hz AC magnetic field from a typical substation generally drops to ambient levels 14 feet from the fence line of the substations; and
- The DC magnetic field aboard trains varies, up to approximately three times greater than the Earth's magnetic field (400 mG at 110 cm from the vehicle floor;1,500 mG at floor level).[11]

Existing Train Operations. Several of the alternatives considered in this Program EIR are proposed to share existing rights-of-way with freight and passenger trains.

Altamont Commuter Express. Altamont Commuter Express (ACE) operates weekday peak period commuter rail service between Stockton and San Jose, and serves the Tri-Valley area at three stations: Pleasanton, Livermore (located in the City's downtown core), and Vasco Road. The Livermore ACE

[8] In alternating current (AC) the movement (or flow) of electric charge periodically reverses direction. An electric charge would for instance move forward, then backward, then forward, then backward, over and over again.

[9] Federal Railroad Administration. *Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports*. August 1993.

[10] Hafemeister, David. 1996. *Background Paper on "Power Line Fields and Public Health."* March 29. Available at: http://www.calpoly.edu/~dhafemei/background2.html. Accessed on: June 13, 2009.

[11] Federal Railroad Administration. *Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports*. August 1993.

Station functions as a regional transit hub and facilitates connections to nine bus routes as well as Amtrak California intercity bus service. Running primarily on tracks owned by freight railroads, ACE service is operated using diesel locomotive-powered trains.

Freight Trains. Rail freight through Livermore is served by the Union Pacific Railroad (UPRR). The east-west route originates in Oakland and ties to two major north-south routes in the San Joaquin Valley.

Applicable Policies and Regulations

Various federal and State agencies exercise regulatory authority over the use, generation, transport, and disposal of hazardous substances. The primary federal regulatory agency is the EPA. The primary State agency with similar authority and responsibility is the California Environmental Protection Agency (Cal-EPA), which may delegate enforcement authority to other local agencies with which it has agreements. The following section describes policies and regulations for the hazardous material and public safety issues related to hazardous materials sites and hazardous materials use during operation.

Resources Conservation and Recovery Act (RCRA). RCRA governs the disposal of solid and hazardous waste. Congress passed RCRA on October 21, 1976, to address the national problem with the growing volume of municipal and industrial waste. RCRA, which amended the Solid Waste Disposal Act of 1965, set national goals for protecting human health and the environment from the potential hazards of waste disposal, conserving energy and natural resources, reducing the amount of waste generated, and ensuring that wastes would be managed in an environmentally sound manner. The hazardous waste program, under RCRA Subtitle C, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal—in effect, from "cradle to grave." The underground storage tank (UST) program, under RCRA Subtitle I, regulates underground storage tanks containing hazardous substances and petroleum products. The EPA has primary responsibility for implementing RCRA, but individual states are encouraged to seek authorization to implement some or all RCRA provisions. California received authorization to implement RCRA in August 1992.

Entities regulated under RCRA as hazardous waste generators are divided into two categories: Large Quantity Generators (LQG), which are permitted to generate more than 1,000 kilograms (kg) of hazardous waste or over 1 kg of acutely hazardous waste per month, and Small Quantity Generators (SQG), which are permitted to generate more than 100 kilograms per month but less than 1,000 kilograms per month of non-acutely hazardous materials. As shown in Table 3.12-1, there are a total of five RCRA-LQG sites and 129 RCRA-SQG sites in the study area.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The CERCLA, also called the Superfund Act (42 USC 9601 et seq.), is intended to protect the public and the environment from the effects of prior hazardous waste disposal and new hazardous material spills. Under CERCLA, the EPA has the authority to seek the parties responsible for hazardous materials releases and to ensure their cooperation in site remediation. CERCLA also provides federal funding (the "Superfund") for the remediation of hazardous materials contamination. The Superfund

Amendments and Reauthorization Act of 1986 (SARA) amends some provisions of CERCLA and provides for a Community Right-to-Know program.

Pursuant to CERCLA, the EPA maintains a National Priorities List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remediation under the Superfund program. Sites are identified for listing on the basis of the EPA's hazard ranking system. As shown in Table 3.12-1, there are a total of four CERCLA (referred to as CERCLIS in the table) sites in the study area. Known Superfund sites occur in the Lawrence Livermore National Laboratory, which is located just south of the proposed Vasco Yard and existing Vasco Road Station. In addition, the Hexcel Corporation, which is a known Superfund site, is located east of the proposed Portola/Railroad Yard.

California Occupational Safety and Health Administration Standards. Worker exposure to contaminated soils, vapors that could be inhaled, or possibly groundwater containing hazardous levels of constituents would be subject to monitoring and personal safety equipment requirements that are established in California Occupational Safety and Health Administration (Cal-OSHA) regulations (Title 8) and specifically address airborne contaminants. The primary intent of the Title 8 requirements is to protect workers, but compliance with some of these regulations also would reduce potential hazards to non-construction workers and study area occupants because required site monitoring, reporting, and other controls would be in place. Workers who are in direct contact with soil or groundwater containing hazardous levels of constituents would perform all activities in accordance with a hazardous operations site-specific health and safety plan (HSP), as outlined in Cal-OSHA standards.

Chapter 6.5 Section 25503(a) of the California Health and Safety Code and Title 19 of the C.C.R. Section 2729, et seq. This code requires any business that handles a hazardous material or mixture containing a hazardous material in reportable quantities to establish and implement a Hazardous Materials Business Plan (HMBP) for emergency response to a release or threatened release of a hazardous material. The State's minimum reportable quantities are 500 pounds for a solid, 55 gallons for a liquid, and 200 cubic feet for a gas at standard temperature and pressure. Some acutely hazardous materials are reportable at much lower quantities.

Counties in California have different requirements and often require businesses to complete a short form of the HMBP even if they handle hazardous materials below the state's reportable quantities. Businesses typically submit their plans to local administering agencies (e.g., the county's Environmental Health Services Department). The business plan must identify the type of business, location, emergency contacts, emergency procedures, mitigation plans, and chemical inventory at each location. BART's System Safety Department prepares BART's HMBPs for facilities storing 55 gallons or more of hazardous materials.

California's Accidental Release Prevention Law. Certain chemicals that could be released to the environment and affect surrounding communities are regulated by California's Accidental Release Prevention Law. This State law and federal laws with similar provisions (i.e., the Emergency Preparedness and Community Right-to-Know Act [EPCRA] and the Clean Air Act) allow local oversight of both the State and federal programs. The State and federal laws are similar in their requirements; however, the California threshold planning quantities for regulated substances are lower

than the federal values. Local agencies may set lower reporting thresholds or add chemicals to the program. Beginning in 1997, the Accidental Release Prevention Law has been implemented by the State's Certified Unified Program Agencies (CUPA). Any business where the maximum quantity of a regulated substance exceeds the specified threshold quantities must register with the county health department as a manager of regulated substances. BART would be subject to this law due to the volume of regulated substances that the system uses.

Wildland-Urban Interface Code. Regulates the geographical area identified by the State as a "fire hazard severity zone" in accordance with the Public Resources Code, Sections 4201 through 4204, and the Government Code, Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. The purpose of the code is to provide minimum standards to increase the ability of a building to resist the intrusion of flame or burning embers being projected by a vegetation fire and contributes to a systematic reduction in conflagration losses through the use of performance and prescriptive requirements. Those BART facilities located within a moderate- to high-fire severity zone would be subject to the code.

Alameda County Water District. At sites where groundwater quality is threatened, the Alameda County Water District (ACWD) works with the Regional Water Quality Control Board (RWQCB) to oversee and provide guidelines for the investigation and cleanup of contaminated sites. The ACWD acts in a technical advisory capacity to the RWQCB and is not an enforcement agency. The ACWD provides technical oversight and remediation of groundwater cleanup sites, and submits closure recommendations to RWQCB when cleanups are completed.

Alameda County Department of Environmental Health, Hazardous Materials Division. The Hazardous Materials / Waste Program for waste generation was established by the County Board of Supervisors in 1985 and recognized by the State of California Department of Toxics Substances Control DTSC through a Memorandum of Understanding. The Alameda County Department of Environmental Health (ACDEH) CUPA is the administrative agency that coordinates and enforces numerous local, State, and federal hazardous materials management and environmental protection programs in the county. The ACDEH/CUPA conducts inspections to ensure proper handling and storage of hazardous materials in Alameda County and is the local enforcement agency for those portions of Alameda County that do not have an environmental health program implemented by a city. The ACDEH CUPA program has jurisdiction in the City of Dublin and the unincorporated areas of Livermore and Pleasanton.[12]

City of Livermore Environmental Health Department. In 1997, in response to Senator Charles Calderon's Senate Bill 1082, the County program, along with newly formed city-level programs, became certified by DTSC as "Unified Hazardous Waste and Hazardous Materials Management Regulatory Programs." Cities and the County then implemented the following programs within their geographic jurisdictional boundaries: hazardous waste generators and onsite treatment; aboveground

[12] Alameda County Environmental Health. *Hazardous Materials/Waste*. Available at: http://www.acgov.org/aceh/hazard/index.htm. Accessed on: May 28, 2009.

storage tanks; underground storage tanks; hazardous material release response plans and inventories; and risk management plans.

The Livermore-Pleasanton Fire Department is the local-level CUPA for the cities. As the CUPA, the Livermore-Pleasanton Fire Department verifies compliance with hazardous materials programs through inspections. The Livermore-Pleasanton Fire Department is responsible for underground storage tank installation oversight, including the review of locations and plans for design, secondary containment, tank tightness, corrosion protection, overspill protection, overfill protection, and monthly monitoring. It also reviews plans for primary and secondary piping and dispensers; location, design, leak, and crash protection; vapor recovery; and emergency shutoff systems.

Facilities housing aboveground storage tanks require inspections by the RWQCB and permits issued by the State Water Resources Control Board (SWRCB). Enforcement actions for violations are handled by the Alameda County District Attorney, the City Attorney, or an Administrative Enforcement Order process.

Local Emergency Plans. Both the cities of Livermore and Pleasanton have a local emergency plan. The 2005 Comprehensive Emergency Management Plan for the City of Livermore and the 2005 Comprehensive Emergency Management Plan for the City of Pleasanton addresses the city's respective responsibilities during emergencies associated with natural disasters, human-caused emergencies, and technological incidents. The Plans provide a framework for coordination of response and recovery efforts within the cities in coordination and with federal, State, and local agencies. In addition, the Plans establish an emergency organization to direct and control operations during a period of emergency by assigning responsibilities to specific personnel. BART would coordinate with the local jurisdictions in carrying out the plans and procedures outlined in Livermore's and Pleasanton's Comprehensive Emergency Management Plan.

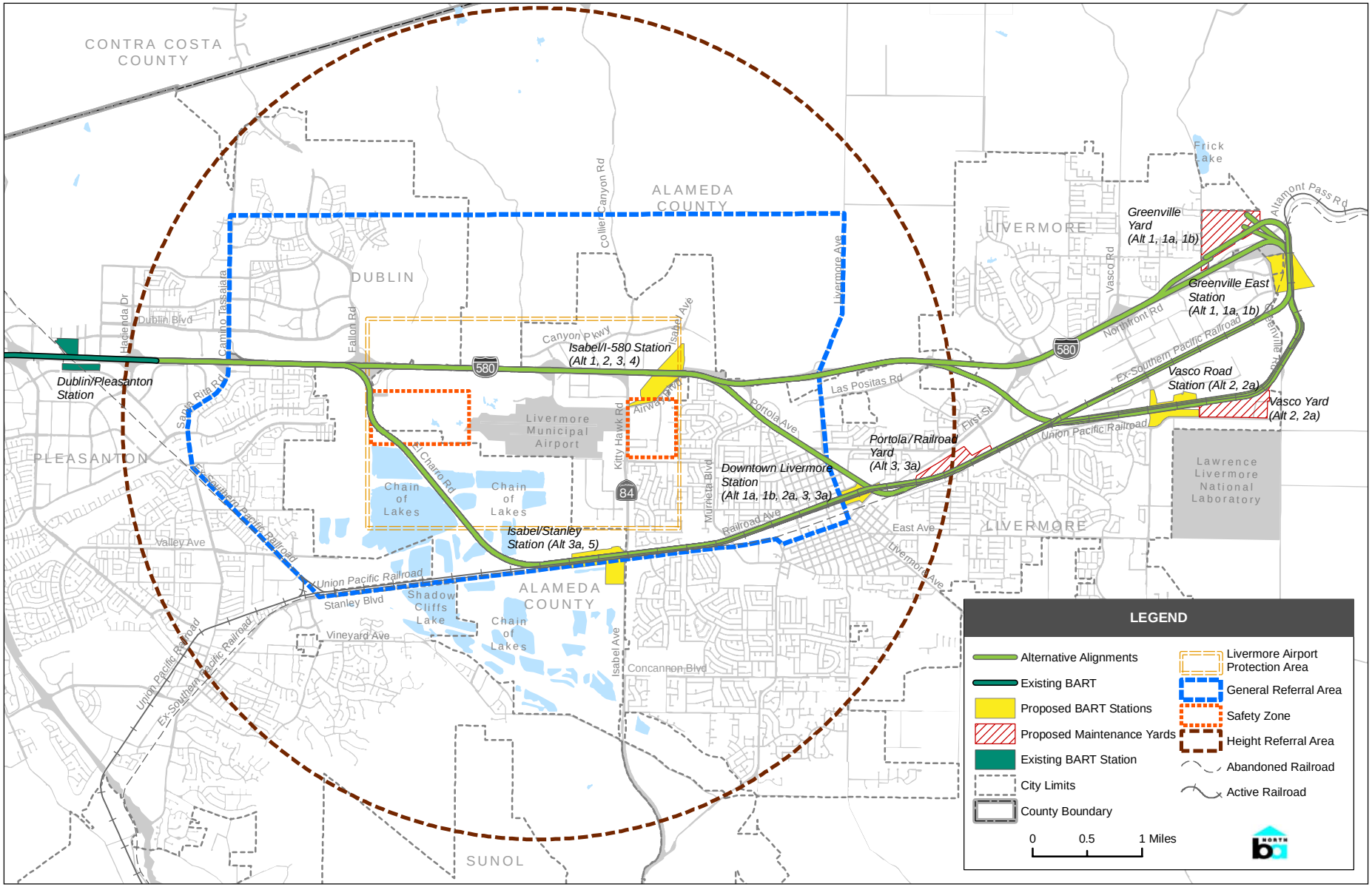
BART System Safety Regulations. The BART System Safety Department is in charge of BART's safety program and ensures that procedures are implemented throughout the entire BART District. The BART System Safety Department developed the BART System Safety Program Plan (SSPP), which outlines safety goals and objectives and describes the procedures that BART follows to identify, reduce, and control hazards throughout the system. Potential hazards could be caused by fires, broken equipment, and damaged software that could result in accidents to riders, employees, or other members of the public using or within the vicinity of the BART extension alternatives. BART's SSPP states that, "safety is the major consideration in all [BART] operations including planning, design, construction, testing, and maintenance of the rail transit system." The SSPP complies with the requirements of the California Public Utilities Commission (CPUC) General Order 164, *Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems*. The BART System Safety Department also evaluates the performance of the program and takes corrective measures to improve program implementation.

BART Emergency Plan. BART would respond to an accident by following procedures set forth in the BART Emergency Plan, which establishes standard operating policies and procedures that would be implemented by BART and other public safety agencies during an emergency that may occur within the BART system. The BART System Safety Department is responsible for managing accidents and hazardous materials cleanup, and ensuring that emergency plans are in place to respond during project operation. The plan applies to all BART personnel and is also used by outside public agencies such as local police and fire departments. Specific response procedures for a full range of foreseeable types of emergencies are addressed in the plan, including response procedures for train fires; derailments; injuries or deaths on the right-of-way (right-of-way); right-of-way intrusions; earthquakes; high winds; flooding; gas leaks and toxic spills; bomb threats; explosions; and hostage situations. The plan would be implemented through BART's Operations Control Center (OCC) when an emergency occurs, and would supersede all other plans, rules, and procedures that conflict. BART also has a Terrorism Response Plan, which is maintained by the BART Police Department.

Airport Regulations. As previously mentioned, portions of the BART extension alternatives would be located in the vicinity of the Livermore Municipal Airport, which has been depicted in Figure 3.12-4. As such, a portion of all of the BART extension alternatives would be subject to the airport-related policies and regulations described below.

Federal Aviation Administration Regulations Part 77 – Objects Affecting Navigable Airspace. The Federal Aviation Administration (FAA) has established baseline standards for determining what constitutes an obstruction for navigable airspace in 14 C.F.R. Part 77, as follows:

> 77.23 Standards for determining obstructions.
>
> (a) An existing object, including a mobile object, is, and a future object would be, an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:
>
> (1) A height of 500 feet above ground level at the site of the object.
>
> (2) A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 500 feet.



Source: Alameda County Airport Land Use Policy Plan, 1986, AECOM May 4, 2009.

LIVERMORE MUNICIPAL AIRPORT ZONES IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.12-4

(3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

(4) A height within an en route obstacle clearance area, including turn and termination areas, of a Federal airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.

(5) The surface of a takeoff and landing area of an airport or any imaginary surface established.

Objects that exceed these standards are typically presumed to be hazards to air navigation, although, as discussed below, if requested, the FAA will conduct a thorough review to evaluate the project in more detail before rendering a final determination. Projects that lie within FAA Part 77 areas are also subject to review by the FAA for their potential effects on aircraft safety, such as a project's potential light, glare, and visible plumes of air emissions that could distract aircraft operators. As noted above, an object that penetrates one of the Part 77 surfaces does not automatically mean that the FAA will make a final determination that it is a "hazard" to air navigation; a final determination is generally made after the FAA reviews the project in detail and conducts an analysis of other existing structures, aircraft procedures, layouts, and other factors affecting air navigation.

Caltrans Airport Land Use Planning Handbook. The California Department of Transportation Division of Aeronautics publishes the California Airport Land Use Planning Handbook (handbook) to provide compatibility planning guidance to Airport Land Use Commissions (ALUCs), their staffs and consultants, the counties, and cities having jurisdiction over airport area land uses, and airport proprietors. The handbook includes guidance for ALUCs on establishing airport safety compatibility policies for airports. The handbook is not binding, except as it may be adopted or incorporated by local governments. The handbook was completed in January 2002 and has not been incorporated by the Alameda County ALUC in its adopted airport safety zones; however, it is anticipated that the Alameda County ALUC will include this information in any future updates of the Livermore Municipal Airport safety zones.

The handbook provides examples of safety zones for different types of general aviation runways. As many as six safety zones are identified, depending on the size and activity level of the airport, and the guidelines in the handbook are not intended to cover every type of scenario. Rather, they provide guidance for ALUC's as they adopt their own standard for the airports within their jurisdictions. The handbook quantifies the level of aviation risk within the zones ranges from a low likelihood of an accident in regular traffic patterns (Zone 6), to very high risk in the immediate runway protection area (Zone 1). The Livermore Municipal Airport would be considered a medium general aviation runway under the handbook and, based on the example, the recommended safety zones would likely extend up

to 7,000 feet from the end of the runway. Portions of all of the alignment alternatives, and the Isabel/I-580 and Isabel/Stanley Stations, would be located within the safety zones, using this example.

Alameda County Airport Land Use Commission (ALUC), Alameda County Airport Land Use Policy Plan (ALUPP). The State Aeronautics Act, Public Utilities Code Section 21670 et seq., provides for the establishment of airport land use commissions in counties with airports and requires that each commission develop a comprehensive airport land use plan. The ALUPP, adopted in 1986 and still in effect, contains policies that guide ALUC review of proposed local agency actions. The ALUC must determine whether these actions are compatible with current and anticipated airport operations, through a review process called a "Determination of Plan Consistency." The ALUPP addresses aircraft noise, restrictions on the height of structures and/or objects near an airport, and airport/aircraft safety guidelines for areas around an airport. The ALUPP includes policies, standards, and criteria to address each of these issues to assist affected local agencies to achieve land use compatibility with existing and future airport development and operations.

The ALUPP identifies a number of different zones around the Livermore Municipal Airport, which are defined to ensure that surrounding land uses are compatible with airport activities. The following areas are defined and described further below: General Referral Area, Height Referral Area, Airport Safety Zone, and APA. Noise Impact Zones are also defined by the ALUPP; however, the Noise Impact Zones are not addressed in this section.

- The General Referral Area or Hazard Prevention Zone is a large area, which is established to prevent hazards to safe air operations. Projects within the General Referral Area that could affect airport operations are to be referred to the ALUC for review for consistency with the ALUPP. As shown in Figure 3.12-4, segments of all alternatives, the Isabel/I-580 Station, and about half of the Isabel/Stanley Station would be within the General Referral Area of the Livermore Municipal Airport.
- The Height Referral Area is identified to preserve unimpeded airspace for safe air operations in the vicinity of the airport. The ALUC Height Referral Area is coterminus with the area within which the FAA requires notification for new construction or alteration under Part 77; however, the FAA requirement refers to notification to and analysis by the FAA, while the ALUC Height Referral Area concerns referral to the ALUC. The Height Referral Area identifies an imaginary sloping surface for airspace that starts at the end of the runway and continues up to 20,000 feet from the runway. The surface slopes upward from the end of the runway at a rate of 1 foot vertically for each 100 feet horizontally. Structures that exceed these height limits would need to be reviewed by the ALUC to determine whether they create hazards for landing and departing aircraft. As shown in Figure 3.12-4, segments of all alternatives west of the Portola/Railroad Yard would be within the Height Referral Area. Also, the Isabel/I-580 Station, Isabel/Stanley Station, Downtown Livermore Station, and about half of the Portola/Railroad Yard would be within the Height Referral Area of the Livermore Municipal Airport.

- The Airport Safety Zone includes an inner safety zone, extending up to 1,320 feet from the end of the runway, and an outer safety zone extending up to 5,000 feet from the end of the runway. The Airport Safety Zone is established by the ALUC based on review of background reports concerning accident potential near airports, and defines compatible and incompatible land uses that can occur within this zone. This zone is different that FAA-defined runway protection zones associated with the runways. In general, the Airport Safety Zone under the ALUPP is significantly larger than the FAA-defined runway-related areas (e.g. the Runway Safety Area, the Object Free Area, the Runway Protection Zone), which have separate FAA-imposed limits on the use of the property. None of the proposed alignments are within the FAA-defined runway protection zones (or other protected runway related areas) as depicted on the Airport Layout Plan (ALP). As shown in Figure 3.12-4, the southern portion of the Isabel/I-580 Station and portions of Alternatives 1a, 1b, 2a, 3, and 3a along El Charro Road are within the Airport Safety Zone of the Livermore Municipal Airport.
- An APA for the Livermore Municipal Airport was adopted by the City of Livermore in 1991, and was incorporated by the ALUC into the ALUPP in 1993. The APA extends 5,000 feet beyond the runways to the north, south, and east, and 7,100 feet to the west (the typical take-off direction). The APA is designed to keep the airport and its surroundings compatible with aviation activities. Within the APA, new residential land use designations or the intensification of existing residential land use is prohibited. Land uses other than residential are allowed within the APA, provided that they are consistent with other ALUC zone and area designations in the ALUPP. The ALUC reviews new development projects proposed within the APA for consistency with APA policies and airport land use compatibility.

  As shown in Figure 3.12-4, all alternative segments along I-580 (between Fallon Road and Portola Avenue), along El Charro Road, and along Stanley Boulevard (between El Charro Road and Railroad Avenue) are within the APA for the Livermore Municipal Airport. Also, the Isabel/I-580 Station would be within the APA.

Livermore Municipal Airport Master Plan. The Municipal Airport Master Plan acknowledges that the general plans prepared by the cities and County have effectively evaluated and planned for the needs and requirements of the airport. The Municipal Airport Master Plan does not contain policies, but does contain land use recommendations from Chapter VIII.D, Land Use Plans in order to "update the general plan recommendations in conformance with the best current estimates of the airport's growth and aviation requirements."

Electromagnetic Field Regulations. Neither the federal nor State governments have established regulatory limits for EMF exposure. Voluntary standards for EMF exposure have been developed by the International Committee on Electromagnetic Safety (ICES), which is sponsored by the Institute of Electrical and Electronic Engineers (IEEE). However, the federal and State governments do not enforce these voluntary standards. The standards are based on studies of electrostimulation (i.e., nerve and muscle responses to the internal electric field in the body). ICES standards recommend maximum permissible 60 Hz magnetic field (MF) exposure levels that are a few thousand times higher than 0.3 to 0.4 microtesla (μT) (3 to 4 mG). Exposure to magnetic fields greater than 0.3 to 0.4 μT is relatively

uncommon. A small percentage of homes that are exposed to such high levels of magnetic fields have been shown to have a possible association with childhood leukemia based on inconclusive evidence. Unresolved scientific issues concerning health effects of power frequency related to EMFs were examined extensively by the State DHS in response to a request from the State PUC. No evidence substantiates a relationship between EMFs and cancer, and the low-level EMFs typically found in homes have not been associated with other diseases.

The Federal Communications Commission (FCC) regulates sources of radiofrequency (RF) fields to maintain the quality of wireless communications across the spectrum. The FCC, which does not regulate for health and safety, has adopted regulations applicable to EMF exposure that were derived from health and safety evaluations made by the American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) and the National Council on Radiation Protection (NCRP). FCC regulations apply to devices that produce RF radiation. The ANSI/IEEE standards; NCRP recommendations, International Commission on Non-Ionizing Radiation protection (ICNIRP) guidelines, American Conference of Governmental Industrial Hygienists, Inc. (ACGIH) guidelines suggest maximum permissible 60 Hz levels for public exposure for electric transmission from 4.2 to 10 kV per meter (or approximately 9,000 to 12,000 mG).

The State PUC issued Decision 93-11-013 in 1993, which established certain steps to address EMF. After an investigation to determine the PUC's role in mitigating health effects of EMF created by electrical utility power lines and cellular radiotelephone facilities, the PUC developed measures to reduce EMF levels, establish design guidelines, create EMF measurement programs, facilitate stakeholder and public involvement, and begin educational and research programs, although the study did not determine a health risk from EMF exposure.[13] Due to the inconclusive information available on the subject, researchers have recommended practicing "prudent avoidance," which means limiting exposure when possible.

Rail Industry Regulations. The U.S. Department of Transportation's Federal Railroad Administration (FRA) regulates the rail industry in order to assure safe operation. The FRA has jurisdiction over freight, inter-city passenger, and commuter passenger operations on the general system of railroad transportation. The regulations promulgated by the FRA have the force of law, and include crashworthiness regulations for freight and passenger rail equipment. Title 49 of the Code of Federal Regulations identifies both structural and performance requirements for crashworthiness. These crashworthiness requirements are intended to assure that the rail equipment include features that provide at least a minimum level of protection for the passengers and crew in the event of a collision or derailment.[14]

[13] Public Utilities Commission, Decision No. 93-11-013, Order Instituting Investigation on the Commission's own motion to develop policies and procedures for addressing the potential health effects of electric and magnetic fields of utility facilities. December, 1993.

[14] David Tyrell, U.S. Department of Transportation, *U.S. Rail Equipment Crashworthiness Standards*, May 2001.

Impact Assessment and Mitigation Measures

Standards of Significance

For the purposes of this EIR, impacts on public health and safety are considered significant if the proposed program would:

- Create a potential public or environmental health hazard through the routine transport, use, or disposal of hazardous materials;
- Create the potential for upset or accident conditions involving the release of hazardous materials;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (this criterion applies to construction-period impacts because disturbance of hazardous materials sites and potential release of hazardous substances in the soils would occur ding construction. See Section 3.16 for a discussion of this impact.);
- Release hazardous pollutants or handle hazardous materials or waste within one-quarter miles of an existing or proposed school;
- Physically interfere with an adopted emergency response or evacuation plan;
- Be located within two miles of a public airport or public-use airport where the project would result in a safety hazard for people residing or working in the study area; or
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

For each public health and safety impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section, HS refers to Public Health and Safety.

Environmental Analysis

Table 3.12-3 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in Table 3.12-3, through the identified mitigation measures, all potentially significant impacts would be ameliorated to less-than-significant levels for all alternatives. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.12-3
Summary Comparison for Public Health and Safety Impacts in the BART to Livermore Extension Study Area

	Routine Transport, Use, or Disposal of Hazardous Materials		Release of Hazardous Pollutants or Risks Near Schools		Interference with an Emergency Response or Evacuation Plan		Airport Safety		Wildland Fire Hazard		Electromagnetic Fields		Train Safety	
Alternative	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 – Greenville East	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
1a – Downtown-Greenville East via UPRR	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
1b – Downtown-Greenville East via SPRR	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
2 – Las Positas	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
2a – Downtown-Vasco	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
3 – Portola	PS	Yes	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
3a – Railroad	PS	Yes	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA
4 – Isabel/ I-580	PS	Yes	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	NI	NA
5 – Quarry	PS	Yes	PS	Yes	LTS	NA	LTS	NA	LTS	NA	LTS	NA	LTS	NA

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant NI = No Impact NA = Not applicable

HS-1 Releases During Routine Transport, Use, or Disposal of Hazardous Materials

Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a include maintenance yards where hazardous materials for maintenance would be stored, used, and handled. Alternatives 4 and 5 do not include yards but would increase use of hazardous materials where the maintenance activities would be performed at an existing yard and shop. Certain precautions and applicable federal, State, and local regulations would be applied during operation of the maintenance yards as well as the stations and alignment. As discussed under the "Applicable Policies and Regulations" section, hazardous materials would be used and/or stored pursuant to hazardous material handling/disposal regulations, such as RCRA, CERCLA, and the California Hazardous Waste Control Law. BART would prepare an HMBP, which lists quantities of hazardous materials above specified thresholds and emergency response procedures for potential releases. Also, the BART System Safety Department would be responsible for managing hazardous materials cleanup and ensuring that emergency plans are in place to respond to an accidental release. Emergency plans would outline procedures to ensure coordination with local jurisdictions in evacuating areas and notifying BART and emergency response personnel.

Nonetheless, because hazardous materials would be handled at the maintenance yards, an accidental spill or release of these substances could occur and result in hazardous materials draining into stormwater outlets from the maintenance yards.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to routine transport, use, or disposal of hazardous materials.

Alternative 1 – Greenville East. Operation of Alternative 1 would involve the use of electric BART cars to transport BART riders. The cars would not be used to transport hazardous materials at any time, and do not employ hazardous materials. Operation of Alternative 1, with the exception of the proposed maintenance yard, would not involve the use or storage of large quantities of hazardous material.

Hazardous materials would be used at the Greenville Yard, and, to a lesser extent, at the Isabel/I-580 Station and Greenville East Station. Hazardous materials used or stored at the Greenville Yard may include car-washing chemicals (caustic detergent and for acid neutralization), solvents (aqueous solution and wipe cleaning), oils, diesel, acetylene, compressed gases (oxygen and nitrogen), waste metal particulates (copper, zinc, cadmium),

and Universal Waste.[15] The Greenville Yard would also include car lifts. Hydraulic lifts require the use of hydraulic fluid, which could contain ingredients considered hazardous under current OSHA regulations. Many hydraulic fluids available are stable and are not considered pollutants, explosive, or reactive. For spill cleanup, most hydraulic fluids would only require dry oil absorbents. As noted in Section 3.8, Hydrology and Water Quality (Impact HY-8), operation of maintenance facilities would require coverage under the General Industrial Permit, which includes requirements for preparation and implementation of a SWPPP, containment of hazardous materials, spill prevention and control, and monitoring and reporting requirements to ensure that stormwater quality is protected and this WDR is not being violated.

Although the hazardous materials used at the Greenville Yard, and to a lesser extent at the stations, would be potentially hazardous, certain precautions would be applied. The Greenville Yard would be enclosed and restricted to authorized personnel. Hazardous materials used at the maintenance facility and stations would typically be stored in appropriate containers in a designated storage area. The storage area would be divided into separate compartments for segregating incompatible chemicals and would be a secure area protected from vehicle traffic. Small quantities of flammable substances would be stored in non-flammable cabinets and compressed gases would be secured to a stationary wall.

In addition, as discussed under Applicable Policies and Regulations, hazardous materials would be used and/or stored according to hazardous material handling/disposal regulations, such as RCRA, CERCLA, and the California Hazardous Waste Control Law. Alameda County would regulate the alternatives' local hazardous waste generation and would oversee BART's development of an HMBP, which lists quantities of hazardous materials above specified thresholds and emergency response procedures for potential releases. In addition, the BART System Safety Department, which is in charge of BART's safety program, would ensure that safety procedures are implemented. Hazardous materials use at maintenance facilities would be subject to the system-wide BART SSPP and the BART Emergency Plan, which would be implemented during an emergency.

In the event that an accidental release of hazardous materials at a maintenance yard, such as the discharge of hazardous waste into stormwater outlets, BART would assess whether the release must be reported to a regulatory agency, as required by federal, State, and/or local laws. BART would also respond by following procedures set forth in emergency plans created to reduce exposure and risk to public health and safety. If a release occurred, BART personnel would be notified of the release and instructed to stop train operations, if necessary.

[15] Universal wastes are hazardous wastes that are generated by a wide variety of people that contain mercury, lead, cadmium, copper and other substances hazardous to human and environmental health. In general, universal waste may not be discarded in solid waste landfills. Examples of these wastes are batteries, fluorescent tubes, and some electronic devices. (California Department of Toxic Substances Control, "Universal Waste," accessed at: http://www.dtsc.ca.gov/hazardousWaste/UniversalWaste/index.cfm on September 23, 2009.)

Nonetheless, Alternative 1 would have a potentially significant risk related to the upset or accidental release of hazardous materials during operation because of the hazardous materials associated with the maintenance yard. An accidental spill or release of these substances could result in hazardous materials draining into stormwater outlets from the maintenance yards.

Alternative 1a – Downtown-Greenville East Via UPRR. Although the alignment under the Alternative 1a would be different from Alternative 1 in that it would exit the I-580 median at El Charro Road and follow along and within the UPRR right-of-way, impacts would be similar to that described for Alternative 1. Although Alternative 1a includes a different station than Alternative 1 (Downtown Livermore instead of Isabel/I-580), impacts related to the accidental release of hazardous materials would be the same. Therefore, Alternative 1a would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 1b – Downtown-Greenville East Via SPRR. Alternative 1b would be the same as Alternative 1a except that it would travel along the SPRR corridor instead of the UPRR corridor. This change in the alignment would not alter the transport, use, or disposal of hazardous materials, and, consequently, this alternative would have the same impacts as Alternatives 1 and 1a, as explained above. Alternative 1b would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 2 – Las Positas. Alternative 2 would be similar to Alternative 1 in that it would travel along the median of I-580 and stop at the Isabel/I-580 Station. However, unlike the Alternative 1, Alternative 2 would leave the I-580 median at Las Positas Road, travel along the UPRR corridor, and terminate at the Vasco Road Station. The impacts of Alternative 2 would, however, be the same as the impacts as those described under Alternative 1. In addition, although Alternative 2 would use the Vasco Yard instead of the Greenville Yard, the operational impacts at these maintenance facilities would be the same. Alternative 2 would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 2a – Downtown-Vasco. Alternative 2a would travel along the same alignment as Alternative 1a except that it would terminate at the Vasco Road Station instead of the Greenville East Station. In addition, the Downtown-Vasco Alternative would use the Vasco Yard instead of the Greenville Yard. Nonetheless, Alternative 2a would have the same operation and construction impacts as Alternatives 1 and 1a, as explained above. Alternative 2a would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 3 – Portola. Alternative 3 would travel along the same alignment as Alternative 1 except that it would depart from the I-580 median at Portola Avenue and terminate at the Downtown Livermore Station. In addition, Alternative 3 would use the Portola/Railroad Yard instead of the Greenville Yard. Alternative 3 would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 3a - Railroad. Alternative 3a would travel along the same alignment as Alternative 1a except that it would terminate at the Downtown Livermore Station and use the Portola/Railroad Yard. Alternative 3a would have a potentially significant impact related to the upset or accidental release of hazardous materials during operation.

Alternative 4 – Isabel/I-580. Alternative 4 would travel along the same alignment as Alternative 1 except that it would terminate at the Isabel/I-580 Station. Unlike the alternatives described above, the Isabel/I-580 Alternative would not have a maintenance yard and would employ limited maintenance capabilities. Basic train inspection could be executed on the tailtracks east of the Isabel/I-580 Station, but more thorough maintenance work would need to occur at one of BART's existing yard facilities. Alternative 4 would still use minor amounts of hazardous materials at the Isabel/I-580 Station; however, this use would not significantly affect BART patrons and employees or pose a substantial risk of releases. As described in Section 2, Alternatives, maintenance for this BART extension alternative would be performed at another facility within the greater BART network. The additional maintenance activities would increase the risk for release of hazardous materials at that yard, resulting in a potentially significant impact.

Alternative 5 – Quarry. Alternative 5 would travel along the same alignment as Alternative 1a except that it would terminate at the Isabel/Stanley Station. In addition, similar to Alternative 4, Alternative 5 would not have a maintenance yard. Alternative 5 would still use minor amounts of hazardous materials at the Isabel/Stanley Station, but this use would be standard and would not significantly impact BART patrons and employees. Therefore, Alternative 5 would result in a less-than-significant impact due to upset or accidental release of hazardous materials at the station. However, the potentially significant impact described for maintenance activities under Alternative 4 would also apply to Alternative 5.

MITIGATION MEASURE. The following measure would be applicable to all BART extension Alternatives and would reduce the potentially significant accidental release of hazardous materials impacts during operation to less than significant. (LTS)

HS-1.1 *Develop and Implement a Spill Prevention Plan.* BART shall prepare and implement a Spill Prevention Plan outlining measures that would be in place to control hazardous materials use and storage. This plan would include, at a minimum, the following measures:

- Periodic inspection of hazardous materials storage and use areas to ensure containers and equipment are securely covered, containers are properly labeled and stored on secondary containment, and each site is equipped with spill kits;
- Employee hazardous materials training and awareness; and
- Spill reporting procedures.

In addition to developing and implementing the Spill Prevention Plan, if hazardous materials are released, then BART would report to the appropriate agencies and conduct removal and remedial activities as required by federal and State law.

HS-2 Release of Hazardous Pollutants or Risks near Schools

As discussed under Impact HS-1, Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a include maintenance yards and would have potentially significant risk associated with the hazardous materials to be handled at the maintenance yards. If schools were located within one-quarter miles of the maintenance yards, then a potentially significant risk to school uses would occur due to the proposed operation of the yards. While schools occur within one-quarter miles of the proposed BART guideway and stations, their operation would not impose substantial risk, given that relatively small amount of hazardous material would be used these functions and given the various State, federal, and local regulations for use, storage, transport, and disposal of hazardous materials.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts due to hazardous releases within one-quarter miles of a school.

Alternative 1 – Greenville East. Five schools are located within the study area of the Alternative 1 alignment: the Kinder Care Learning Center (472 feet), University of Phoenix (430 feet), Tri-Valley Regional Occupational (161 feet), Fountainhead Montessori School (1,250 feet), and Kidango Owl's Learning Center (675 feet). With the exception of the proposed maintenance yards, operation (including the proposed alignments and stations) of the BART extension alternatives would not involve the use or storage of large quantities of hazardous materials. Although Alternative 1 includes operation of the Greenville Yard, the yard is not near (within one-quarter miles) an existing school, so that hazardous materials impacts on schools would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Six schools are located within the study area of the Alternative 1a alignment: the Kinder Care Learning Center (472 feet), Ladd School (232 feet), Wee Care Preschool (873 feet), Granada High School (315 feet), Saint Michael's School (975 feet), and Livermore High School (730 feet). Although Alternative 1a includes a different station than Alternative 1 (Downtown Livermore instead of Isabel/I-580), impacts related to the release of hazardous pollutants or risks near schools would be the same. Although Alternative 1a includes operation of the Greenville Yard, the yard is not within one-quarter miles of an existing school, so that hazardous materials impacts on schools would be less than significant.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b is identical to Alternative 1a, except that Alternative 1b travels along the SPRR corridor instead of the UPRR corridor. The impacts identified for Alternative 1a are applicable to Alternative 1b. Impacts related to the release of hazardous pollutants or risks near schools would be less than significant.

Alternative 2 – Las Positas. Three schools are located within the study area of the Alternative 2 alignment: the Kinder Care Learning Center (472 feet), University of Phoenix (430 feet), and Tri-Valley Regional Occupational (161 feet). As previously stated, with the exception of the proposed maintenance yards, operation of the BART extension alternatives would not involve the use or storage of large quantities of hazardous materials. Although Alternative 2 includes operation of the Vasco Yard, the yard is not near an existing school, so that hazardous materials impacts on schools would be less than significant.

Alternative 2a – Downtown-Vasco. Alternative 2a is identical to Alternative 1a, except that Alternative 2a would terminate at the Vasco Road Station instead of at the Greenville East Station. The impacts identified for Alternative 1a are also applicable to Alternative 2a. In addition, similar to Alternative 2, the Vasco Yard is not located near an existing school. Impacts related to the release of hazardous pollutants or risks near schools would be less than significant.

Alternative 3 – Portola. Nine schools are located within the study area of the Alternative 3 alignment: the Kinder Care Learning Center (472 feet), University of Phoenix (430 feet), Portola Avenue School (15 feet), Junction Avenue Middle School (adjacent to the alignment), Ladd School (164 feet), Wee Care Preschool (873 feet), Saint Michael's School (975 feet), and Livermore High School (275 feet). As previously stated, with the exception of the proposed maintenance yards, operation of the BART extension alternatives would not involve the use or storage of large quantities of hazardous materials. Alternative 3 would include the operation of the Portola/Railroad Yard. As shown in Figure 3.12-2, four schools are located within one-quarter miles of this maintenance yard: Wee Care Preschool, Junction Avenue Middle School, Ladd School, and Saint Michael's School. If an accidental release of hazardous materials occurs at the maintenance yard, then these four schools could potentially be impacted. Alternative 3 would that have a potentially significant impact.

Alternative 3a – Railroad. Alternative 3a is identical to Alternative 1a, except that Alternative 3a would terminate at the Downtown Livermore Station instead of the at Greenville East Station. The impacts identified for Alternative 1a are also applicable to Alternative 3a. In addition, similar to Alternative 3, Alternative 3a would include operation of the Portola/Railroad Yard and would result in a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 is identical to Alternative 1, except that Alternative 4 would terminate at the Isabel/I-580 Station instead of the Greenville East Station; only three schools are located within the study area of the Alternative 4 alignment. The impacts identified for Alternative 1 are also applicable to Alternative 4. Alternative 4 would

not include a maintenance yard; however, maintenance activities would be performed at one of BART's existing maintenance facilities. Given that it is unknown which yard would be used, there may be schools in the vicinity of the yard. For example, there are two schools within one-quarter miles of the Hayward Yard. Therefore, since maintenance activities could occur within one-quarter miles of a school, this alternative would result in a potentially significant impact.

Alternative 5 – Quarry. Alternative 5 is identical to Alternative 1a, except that Alternative 5 would terminate at the Isabel/I-580 Station instead of the Greenville East Station; only one school, the Kinder Care Learning School, is located within the study area of the Alternative 5 alignment. The impacts identified for Alternative 1a are also applicable to Alternative 5. Since Alternative 5 would not include a maintenance yard, and maintenance activities would be performed at one of BART's existing maintenance facilities, similar to Alternative 4. Impacts associated with maintenance activities near a school would be potentially significant.

MITIGATION MEASURES. Implementation of Mitigation Measure HS-1.1 for Alternatives 3, 3a, 4, and 5 would reduce the chance of an accidental spill or release of hazardous materials at a maintenance yard near schools to a less-than-significant level. (LTS)

HS-3 Interference with an Emergency Response or Evacuation Plan

The BART extension alternatives would interfere with emergency response or evacuation plans if they would obstruct access along designated emergency access routes or evacuations routes. However, the alignments would be grade-separated by running at-grade (with the local roads running over or under the BART guideway), in an aerial structure, in a retained trench, or in a tunnel (mined and/or cut and cover) as necessitated by surrounding terrain or existing conditions. Additionally, the alternatives would provide access and accommodations for emergency vehicles and BART operations include plans for coordination with emergency service providers.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts regarding interference with emergency response times.

All BART Extension Alternatives. The BART System Safety Department would be responsible for implementing emergency plans for the BART extension alternatives and would coordinate emergency plans with local jurisdictions, including the Comprehensive Emergency Management Plans for the cities of Livermore and Pleasanton. The BART System Safety Program Plan lists procedures for interagency coordination and participation with local

response agencies in BART disaster exercises.[16] BART coordinates local response agencies, including ambulance service, fire department, police department, and the California Highway Patrol.

The BART extension alternatives would be designed to provide access for emergency response vehicles. All proposed stations along the project alternatives would be designed to include access and a parking area for emergency response vehicles. In addition, all alignments would be fully grade-separated by running at-grade (with the local roads running over or under the corridor), in an aerial structure, in a retained trench, or in a tunnel (mined and/or cut and cover) as necessitated by surrounding terrain or existing conditions. Therefore, since the BART extension alternatives would be grade-separated from local roads, BART trains would not directly affect local circulation.

Nevertheless, station area traffic could increase volumes and decrease levels of service (LOS) near stations, which potentially could slow emergency response times. Section 3.2, Transportation, of this document presents information regarding the intersections where LOS would diminish. As discussed in Section 3.2, Transportation, all intersections would be mitigated to acceptable levels of services (except at one downtown intersection for Alternatives 3, 3a, and 4), thereby reducing the potential for the extension alternatives to substantially slow emergency response times and compromise public safety. For the intersection that would remain at significant congestion levels during the AM peak hour, there are alternative routes that could be used to avoid this intersection. Impacts would therefore be less than significant.

HS-4 Airport Safety

Portions of the BART extension alternatives would be within the ALUPP's General Referral Area, Height Referral Area, Airport Safety Zone, and APA. As such, construction of the selected alternative would be subject to the review by both the ALUC and FAA. Prior to construction, the selected alternative will be referred to the ALUC for review, and approval would be contingent upon findings that the selected alternative is compatible with the ALUPP. Also, the FAA would review the selected alternative's potential light, glare, and air emissions that could distract aircraft operators. A Determination of Plan Consistency by the Alameda County ALUC would be required prior to approval; as such, the selected alternative would not result in a significant airport safety hazard. Based on the initial assessment conducted here, the BART extension alternatives would not likely result in a hazard to air navigation under the standards set forth in FAA Regulations Part 77, and would likely be consistent with the ALUPP.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the

[16] San Francisco Bay Area Rapid Transit. 2008. *System Safety Program Plan, Revision No. 8*, February 1.

environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts related to airport safety.

All BART Extension Alternatives. As discussed under Applicable Policies and Regulations, the alignment alternatives and facilities would be subject to the following regulations and policies in regard to airport and aviation safety:

- Federal Aviation Administration Regulations Part 77 – Objects Affecting Navigable Airspace: Applicable to all of the alignment alternatives and facilities.
- Alameda County Airport Land Use Commission – Airport Land Use Policy Plan: All of the alignment alternatives and the Isabel/I-580 Station are within the ALUPP General Referral Area, Height Referral Area, and outer safety zone of the Livermore Municipal Airport. As stated previously:
  - As shown in Figure 3.12-4, segments of all alternatives, the Isabel/I-580 Station, and about half of the Isabel/Stanley Station would be within the General Referral Area of the Livermore Municipal Airport.
  - Segments of all alternatives west of the Portola/Railroad Yard would be within the Height Referral Area. Also, the Isabel/I-580 Station, Isabel/Stanley Station, Downtown Livermore Station, and about half of the Portola/Railroad Yard would be within the Height Referral Area of the Livermore Municipal Airport.
  - The southern portion of the Isabel/I-580 Station and portions of Alternatives 1a, 1b, 2a, 3, and 3a along El Charro Road are within the Airport Safety Zone of the Livermore Municipal Airport.
  - As shown in Figure 3.12-4, all alternative segments along I-580 (between Fallon Road and Portola Avenue), along El Charro Road, and along Stanley Boulevard (between El Charro Road and Railroad Avenue) are within the APA for the Livermore Municipal Airport. Also, the Isabel/I-580 Station would be within the APA.

In addition, although not yet incorporated by the Alameda County ALUC, according to the Caltrans Airport Land Use Planning Handbook, a portion of all of the BART extension alternatives would likely be located within its designated airport safety zone based on the guidance and examples in the handbook. However, under the handbook, these same alignments and facilities are located outside of the ALUPP designated inner safety zone, a more stringent measure of safety under the Alameda County ALUC. The Caltrans handbook provides guidance on safety zones based on nationwide statistics, and there is not a direct correlation to safety statistics for the Livermore Municipal Airport.

Prior to construction, the selected alternative will be referred to the Alameda County ALUC for review, and project approval would be contingent upon findings that the selected alternative is compatible with the ALUPP. Findings must include compliance with all policies pertinent to

the location in the ALUPP's General Referral Area and Height Referral Area. The Alameda County ALUC has adopted FAA Regulations Part 77, which defines areas (referred to as horizontal and sloping imaginary surfaces in the regulations) and identifies obstructions to navigation from natural and man-made objects. Not all obstructions are necessarily hazards to aviation, depending on the circumstances unique to the project and its location. Projects that lie within FAA Regulations Part 77 areas are also subject to review by the FAA for their potential effects on aircraft safety, e.g. potential light, glare, and air emissions that could distract aircraft operators. A Determination of Plan Consistency by the Alameda County ALUC would confirm that the project is consistent with the ALUPP. The FAA would make its own determination under Part 77.

As previously stated, segments of all alternatives west of the Portola/Railroad Yard; the Isabel/I-580, Isabel/Stanley, and Downtown Livermore Stations; and about half of the Portola/Railroad Yard would all be within the Livermore Municipal Airport Height Referral Area. It can be conservatively assumed that at buildout of any of the alternatives, proposed stations, parking garages, and maintenance yards would be approximately 50 feet from the top of rail to roof, except for the Downtown Livermore Station of Alternative 3a, which would be elevated (with ACE at-grade, and BART on an elevated platform), and can be conservatively assumed to be 70 feet from ground surface level to roof. These assumptions are based on standard BART station design and the West Dublin Station, which is currently under construction. The Livermore Municipal Airport is located at 397 feet above mean sea level, and the Height Referral Area slopes upward from the end of the runway at a rate of 1 foot vertically for each 100 feet horizontally. Table 3.12-4 provides a summary of the facilities that would require a Determination of Plan Consistency by the Alameda County ALUC.

As shown in Table 3.12-4, all of the alternatives would require a Determination of Plan Consistency by the Alameda County ALUC due to at least one associated facility being above the Height Referral Area limitation. The segments of Alternatives 1, 2, 3, and 4 west of the Portola/Railroad Yard would all be within the Height Referral Area. Alternatives 1a, 1b, 2a, 3a, and 5 would not be in the Height Referral Area even though these alternatives include aerial structures (it should be noted that these alternatives would still require a Determination of Plan Consistency by the Alameda County ALUC due to their associated facilities, shown in Table 3.12-4). Similarly, all alternatives would require submission of FAA Form 7460-1, Notice of Proposed Construction or Alteration, and separate evaluation by the FAA under Part 77.

All of the alignment alternatives and the Isabel/I-580 Station are within the APA. However, as previously stated, the APA would not prohibit construction of an alignment alternative and associated facilities. The APA is designed to protect the airport from the encroachment of incompatible uses, particularly the construction of new or expanded residential areas, and new residential development (including transit oriented development) would be prohibited within the APA. It should be noted that lands just east of the Isabel/I-580 Station are not within the APA.

Table 3.12-4
Required Determinations of Plan Consistency by ALUC

Alternatives – Station/Yard	Rail Elevation (feet above msl)	Elevation at Top of Roof (feet above msl)	Distance from End of Runway (feet)	Allowable Elevation[a, b] (feet above msl)	Difference Between Elevation at Top of Roof and Allowable Elevation (feet)	Requires a Determination of Plan Consistency?
1 - Greenville East						
Isabel/I-580 Station	419	469	1,850	416	53	Yes
1a –Downtown-Greenville East via UPRR						
Downtown Livermore Station	501	551	9,250	490	61	Yes
1b –Downtown-Greenville East via SPRR						
Downtown Livermore Station	501	551	9,250	490	61	Yes
2 – Las Positas						
Isabel/I-580 Station	419	469	1,850	416	53	Yes
2a –Downtown-Vasco						
Downtown Livermore Station	501	551	9,250	490	61	Yes
3 – Portola						
Isabel/I-580	392	442	1,850	416	26	Yes
Downtown Livermore Station	underground		9,250	490	N/A	No
Portola/Railroad Yard	545	595	12,250	520	75	Yes
3a –Railroad						
Isabel/Stanley	418	468	6,150	459	9	Yes
Downtown Livermore Station	525	595	9,250	490	105	Yes
Portola/Railroad Yard	545	595	12,250	520	75	Yes
4 – Isabel/I-580						
Isabel/I-580 Station	419	469	1,850	416	53	Yes
5 – Quarry						
Isabel/Stanley Station	419	469	6,150	459	10	Yes

Source: PBS&J, 2009.

Notes:

a. Livermore Airport elevation is 397 feet above msl.

b. FAA Part 77 allows one foot of height for every 100 feet of horizontal distance from the end of the runway.

While a Determination of Plan Consistency by the Alameda County ALUC and a determination by the FAA would be required to ensure that the BART extension alternatives would not result in a significant safety hazard or hazard to air navigation, respectively, the BART extension alternatives would not likely result in a determination of hazard from the FAA under Part 77, and would likely be consistent with the ALUPP. This determination is based on initial review of the different airport safety zones relative to the BART extension alternative routes and facilities and consideration of the potential heights of these facilities (see Table 3.12-4). Impacts are therefore expected to be less than significant; however, this analysis must be revisited and confirmed during project-level environmental review.

HS-5 Wildland Fire Hazard

While a major portion of the study area is urbanized with commercial, industrial, and residential uses, segments of the alternatives would traverse undeveloped areas that could have wildland fire hazards. Figure 3.12-3 depicts the areas with high and moderate fire hazard severity, according to the California Department of Forestry and Fire Protection California Fire Hazard Severity Zone Map.[17] A potentially significant impact would occur where the alternatives traverse areas with moderate or high fire hazards potential because the new train operations, activity at proposed stations, handling of hazardous substances at maintenance yards could result in inadvertent sparks or flames that could initiate wildland fires where the risk is moderate to high. All BART extension alternatives would traverse areas with either moderate or high fire hazard severity.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts associated with wildland fires.

All BART Extension Alternatives. As shown in Figure 3.12-3, moderate fire hazards occur along I-580, Greenville Road, El Charro Road, and near the intersection of Isabel Avenue and Stanley Station. There is also an area between the UPRR tracks and Lawrence Livermore Laboratory with moderate fire hazard severity. Alternatives 1, 2, 3, 4, including the Isabel/I-580 Station, would be constructed along substantial spans of I-580 that are within areas with moderate fire hazard severity. Alternatives 1, 1a, 1b, including the Greenville East Station and Greenville Yard would be constructed in areas along Greenville Road where there is moderate fire hazard severity. Alternatives 1a, 1b, 2, 4, 5, including the Isabel/Stanley

[17] California Department of Forestry and Fire Protection. 2007. *Alameda County Fire Hazard Severity Zoning, Draft*, November, Available at: http://frap.cdf.ca.gov/webdata/maps/alameda/fhsz_map.1.pdf. Accessed on: June 11, 2009.

Station, would traverse areas along El Charro Road and Stanley Boulevard where there is moderate fire hazard severity. The Vasco Road Station and Yard of Alternatives 2 and 2a would also be constructed in areas designated as moderate fire hazard severity.

As shown in Figure 3.12-3, high fire hazards occur along I-580, particularly near North Canyons Parkway, Las Positas Road, Northfront Road, and Altamont Pass Road. Alternatives 1 and 2 traverse the areas with high fire hazard severity along I-580, near Las Positas Road. Alignments for Alternatives 1, 1a, and 1b, and a small portion of the Greenville East Station and Greenville Yard would be constructed on areas with high fire hazard severity along Northfront Road and Altamont Pass Road.

Given that all the BART extension alternatives would traverse areas with either moderate or high fire hazard severity, and that the Isabel/I-580 Station, Isabel/Stanley Station, Vasco Road Station, and Greenville East Station would occur in areas with moderate fire hazards potential, all alternatives would have a potentially significant impact related to risk of wildland fire. Stations and maintenance facilities would comply with Division 21, Fire Suppression, and Division 28, Electronic Safety and Security, of the BART Facilities Standards. As stated in the Community Services section of this document, while the BART extension alternatives would increase demands for fire and emergency medical services, they would not trigger the need for additional fire facilities within the study area in order to maintain acceptable service ratios, response times, or other performance standards. The facilities along the BART corridor would include fire-suppression standpipes, wet-pipe sprinkler systems, clean agent fire extinguishing systems, and a fire alarm detection system.[18] Nonetheless, there is still a risk of exposing people or structures to the wildland fires, resulting in a potentially significant impact.

Prior to construction, the BART extension alternatives will require review for conformity with the Wildland-Urban Interface Code (WUIC), as periodically amended. All development in wildland-urban interface areas are to utilize the best development and site design practices identified by the local Fire Departments, as required in the WUIC. Along with Divisions 21 and 28 of the BART Facility Standards, impacts for all of the alternatives would be less than significant.

HS-6 Electromagnetic Fields

The BART extension alternatives would introduce additional EMF at levels for which there are no established adverse impacts. Moreover, the BART extension alternatives would introduce additional EMF that is substantially below levels suggested by voluntary standards. Neither the federal or State governments have established regulatory limits for EMF exposure. Various industry, government, and scientific organizations with expertise in EMF technology have produced a range of voluntary standards that represent their best judgment of what levels are considered safe. These standards include the ANSI/IEEE standards, NCRP recommendations, ICNIRP guidelines, and ACGIH guidelines, which suggest maximum permissible 60 Hz EMF

[18] Bay Area Rapid Transit, BART Facilities Standards, Standard Specifications, R1.2, August 2004.

levels for public exposure for electric transmission from 4.2 to 10 kilovolts (kV) per meter (or approximately 9,000 to 12,000 mG). Federal and State agencies have reviewed past studies to determine if exposure to EMF causes adverse health effects, and have found no basis for setting health standards to date.[19] In addition, the most recent research published over the past three years is either inconclusive, or cannot find a link between EMFs and various human illnesses.[20]

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts regarding exposure to EMF.

All BART Extension Alternatives. As previously stated, studies have shown that exposure to additional EMFs as a result of operation of the BART extension alternative would be up to approximately 1,500 mG for riders and employees.[21] This is well below the voluntary levels that range from 9,000 to 12, 000 mG and have been suggested by the aforementioned industry, government, and scientific organizations with expertise in EMF technology. Exposure to EMFs could also occur at traction power substations; however, a study of a substation similar to those proposed for the BART extension alternative (the BART Lafayette Substation) showed that the EMF is generally in the same order of magnitude as the local magnetic field of the Earth, at up to approximately 500 mG, when the DC magnetic field is measured at the fence line. In addition, the 60 Hz AC magnetic field from a typical substation generally drops to ambient levels 14 feet from the fence line. As stated previously, electric and magnetic field strengths decrease with distance from the source. Electric fields are shielded or weakened by materials that conduct electricity, including trees, buildings, and human skin, while magnetic fields, on the other hand, pass through most materials and are therefore more difficult to shield.

There is currently no scientific consensus on the health effects of EMFs, and the BART extension alternatives would not produce EMF near the levels that industry, government, and scientific organizations with expertise in EMF have proposed for public health and safety. As

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19 PG&E. *EMF Frequently Asked Questions*. Available at: http://pge.com/education_training/about_energy/emf/faqs/. Accessed on: August 31, 2009.

20 American Journal of Epidemiology:

- *Childhood Leukemia in Relation to Radio Frequency Electromagnetic Fields in the Vicinity of TV and Radio Broadcast Transmitters*, November 2008.
- *Nighttime Exposure to Electromagnetic Fields and Childhood Leukemia: An Extended Pooled Analysis*, August 2007.
- *Occupational Exposure to Radio Frequency/Microwave Radiation and the Risk of Brain Tumors: Interphone Study Group, Germany*, September 2006.

21 Federal Railroad Administration. *Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports*. August 1993.

a result, it can be reasonably concluded that the BART extension alternative would have a less-than-significant impact with regards to EMF.

HS-7 Train Safety

Except for the No Build Alternative and Alternative 4, the BART extension alternatives would share existing rights-of-way with heavy rail tracks and services. Existing operations within these existing heavy rail corridors include both passenger (ACE) and freight movements. Traffic on these existing rail tracks is restricted to only those rail cars that comply with FRA standards for crashworthiness(see "Applicable Plan and Regulations"). When rail vehicles of different crashworthiness are proposed to operate within proximity of one another, the FRA has established design and construction requirements to safely segregate these vehicles and limit unexpected intrusions that could present a dangerous situation.

BART trains typically operate in exclusive and spatially-separated rights-of-way, and therefore do not require compliance with FRA heavy-rail safety standards. The design of the BART extension alternatives would provide spatial separation between BART and the heavy rail ACE/UPRR operations. The spatial separation would be at a specified distance from the centerline of one track to another, and would provide protection for lighter train cars should a heavy rail vehicle overturn or derail along the route of travel. This design principle has been applied to all BART projects when an alignment is proposed to occupy a shared-use common corridor with existing freight rail tracks. This same configuration was deemed acceptable in the BART Warm Springs Extension Project.

As an additional measure of protection, the BART extension alternatives would incorporate an intrusion detection system to alert BART operations of a potential derailment or other encroachment that could affect safe travel within a shared-use common corridor. The system consists of two, redundant subsystems that together provide a highly reliable system with low incidence of false alarms.

- The first subsystem uses closed-circuit television cameras and special motion detection software to detect an intrusion across the common boundary. The cameras would be installed on poles located along the alignment from approximately 500- to 1,000-foot intervals under each alternative design scenario where BART occupies an existing freight rail right-of-way. The poles would be approximately 15 to 25 feet above the top of rail, and each pole would support two cameras facing in opposite directions. The cameras would provide a narrow view angle aligned with the railroad right-of-way fence and focused on the BART travel paths. This narrow focus would ensure that areas beyond the railroad right-of-way would not be within view.

- The second subsystem uses continuous loops of cable located in the right of way fence. Any intrusion would change the circuit characteristics of the in-fence loops, which triggers a fence alarm. A freight train disturbing the barrier fence would trigger the fence alarms.

The above safety measures would ensure less-than-significant risk of hazards with respect to train collisions.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the environmental documents prepared for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts regarding train collisions.

Alternative 1 – Greenville East. The majority of the Alternative 1 alignment would travel within the median of I-580, where collisions with heavy-rail trains would not occur since trains do not travel within this corridor. However, in order to access the Greenville East Station, the alignment would leave the I-580 median and travel for a short distance parallel to the UPRR right-of-way. At this point, the Greenville East Alternative would provide spatial separation between the track beds of the UPRR line and the BART alignment in accordance with FRA regulations and would apply BART's protective measures. As such, there would be a less-than-significant impact with regard to hazards and from other trains.

Alternative 1a – Downtown-Greenville East Via UPRR. Alternative 1a would begin by traveling along the I-580 corridor and El Charro Road, where collisions with heavy-rail trains would not occur. However, after turning off El Charro Road, this alternative would travel parallel to the UPRR right-of-way until its terminus at the Greenville East Station. The design of Alternative 1a would comply with FRA standards. In addition, Alternative 1a would incorporate an intrusion detection system to alert BART operations of a potential derailment or other encroachment that could affect safe travel within a shared-use common corridor. Therefore, Alternative 1a would result in a less-than-significant impact with regard to hazards to and from other trains.

Alternative 1b – Downtown-Greenville East Via SPRR. Alternative 1b would be the same as Alternative 1a except that it would travel parallel to the former SPRR right-of-way instead of the UPRR right-of-way. Nonetheless, Alternative 1b would have the same less-than-significant impacts as Alternative 1a by employing spatial separations and an intrusion detection system. The design and operation would be in accordance with FRA regulations and would apply BART's protective measures.

Alternative 2 – Las Positas. Alternative 2 would be similar to Alternative 1 in that it would travel along the median of I-580. However, unlike the Greenville East Alternative, the Las Positas Alternative would leave the I-580 median at Las Positas Road, travel along Los Positas Road and parallel to the UPRR right-of-way, and terminate at the Vasco Road Station and Yard. The majority of the alignment would not share a corridor with heavy trains until it turns into and follows within the UPRR right-of-way. At that point, the design and operation would be in accordance with FRA regulations and would apply BART's protective measures. Thus, Alternative 2 would have the same less-than-significant impacts as Alternative 1.

Alternative 2a – Downtown-Vasco. Alternative 2a would travel along the same alignment as Alternative 1a except that it would terminate at the Vasco Road Station instead of the Greenville East Station. Similar to Alternative 1a, Alternative 2a would apply BART's protective measures and comply with FRA regulations. As such, Alternative 2a would have a less-than-significant impact with respect to hazards to and from other trains.

Alternative 3 – Portola. Alternative 3 would travel along the same alignment as Alternative 1 except that it would depart from the I-580 median at Portola Avenue and terminate at the Downtown Livermore Station. Heavy trains do not travel along the I-580 corridor or along Portola Avenue; therefore, Alternative 3 would not be affected by potential conflicts with other trains. However, Alternative 3 would travel parallel to the UPRR right-of-way to access the Portola/Railroad Yard. At that point, the design and operation would be in accordance with FRA regulations and would apply BART's protective measures. As a result, Alternative 3 would have the same less-than-significant impacts as Alternative 1.

Alternative 3a – Railroad. Alternative 3a would travel parallel to the UPRR right-of-way, similar to Alternative 1a; the primary differences are that Alternative 3a would terminate at the Downtown Livermore Station and notably the Alternative 3a alignment would be elevated above the ACE trains in downtown Livermore. The design and operation would be in accordance with FRA regulations and would apply BART's protective measures. Therefore, Alternative 3a would have the same less-than-significant impacts as Alternative 1a.

Alternative 4 – Isabel/I-580. Alternative 4 would travel along the same alignment as Alternative 1 except that it would terminate at the Isabel/I-580 Station. Since Alternative 4 would only travel along the I-580 corridor and would not share an alignment with heavy-trains, Alternative 4 would have no impact with regard to hazards to and from other trains.

Alternative 5 – Quarry. Alternative 5 would travel parallel to the UPRR right of way, similar to Alternatives 1a, 1b, 2a, and 3a. The design and operation would be in accordance with FRA regulations and would apply BART's protective measures. As such, Alternative 5 would result in less-than-significant impacts with regard to hazards to and from other trains.

Effect of UP Commuter Access Principles

The design concepts used to develop the BART extension alternatives in the UPRR right-of-way satisfy all known state and federal requirements for rail safety and operations. As rail transit on freight rail tracks has become increasingly popular and cost effective across the country, the concern over accidents between freight and passenger rail service has escalated. The FRA regulations and standards require sufficient separation between freight and passenger service to ensure safety for both systems. For those locations at which any of the BART to Livermore alignment alternatives would approach the UPRR right-of-way, the alignments alternatives as identified in Section 2 of this EIR, Alternatives, provide sufficient separation to comply with all applicable regulatory requirements and ensure system safety. In addition, the design concepts used to develop the alignment alternatives conform to the degree of separation that UPRR previously approved for the BART Warm Springs Extension.

More recently, however, UPRR has developed its own set of principles for access to its right-of-way where freight operates. The principles essentially define a "safety envelope" around the freight tracks and indicate UPRR's preference that, within this envelope, only freight rail should operate. These principles would apply to portions of Alternatives 1a, 1b, 2, 2a, and 3a and increase the distance between BART trains and trains on the UP right-of-way (i.e., ACE and freight trains) by separating freight and passenger tracks by 50 feet or more. While the final designs of the alignments in those locations would be determined through discussions with UPRR, as the owner of the right of way, UPRR may desire that BART modify its final designs in conformance with the principles. Modification of the alignment designs in this way would further increase the separation between freight and passenger service, beyond the safety requirements of applicable regulations. As a result, the potential for derailment, train collisions, and related safety matters identified for these alternatives under existing regulations would remain less than significant for these BART extension alternatives if final designs conform to the UP principles.

Cumulative Analysis

The cumulative analysis for public health and safety considers geographic areas and population in combination with other foreseeable development anticipated by the general plans for the cities of Livermore, Pleasanton, and Dublin; however, many aspects of public health and safety are site-specific in nature, in this case, development of an extension of BART service to Livermore and the associated facilities, and are not subject to cumulative effects. This includes exposure of workers to contaminated substances and airport and wildfire hazards. In addition, under Impact HS-3, the analysis of interference with an adopted emergency response or evacuation plan already takes into account the BART extension alternatives, in combination with cumulative development. Lastly, as discussed in Section 3.1, no other foreseeable train project could be included in the cumulative assessment for this Program EIR, and so no cumulative impacts related to train safety would occur.

Only those impacts pertaining to hazards associated with the transportation, storage, use, and disposal of hazardous materials, and the potential for reasonably foreseeable accidental release of hazardous materials into the environment have the potential to cumulate with impacts from other foreseeable development.

HS-CU-8 Cumulative Public Health and Safety Impacts

Individual incidents involving hazardous materials generally do not combine with similar effects that could occur with other projects in the vicinity. Potentially adverse environmental effects associated with the transportation, storage, use, and disposal of hazardous materials are usually site-specific, although their long-term impacts may be regional in extent.

Also, other development whose impacts could cumulate with those of the proposed maintenance yards includes development under the Livermore Downtown Specific Plan, Livermore General Plan, and East County Area Plan. The Livermore Downtown Specific Plan and Livermore General Plan allow future multi-family and attached single-family

residences, lodging, public and quasi-public uses, public halls, health and exercise clubs, business and professional and government offices, medical and dental offices, and neighborhood serving commercial. The East County Area Plan seeks to preserve agricultural lands, maintain the natural environment, and protect local wildlife and habitat areas.

The foreseeable future uses encompassed by the Downtown Livermore Specific Plan, Livermore General Plan, and East County Area Plan would generally not involve large-scale uses of hazardous materials that would be comparable to those under the proposed maintenance yards. It is expected that the various safety provisions of the cities' municipal codes, BART, EPA, Cal-EPA, OSHA, Cal-OSHA, and CUPA would adequately prevent spill of hazardous materials from the other foreseeable development so that impacts from the spills would not cumulate with potential spills from the proposed maintenance yards. As such, while the alternatives that include the proposed maintenance yards would have a significant project-level impact, in the context of combined impacts with other development, the cumulative impact would be less than significant.

3.13 COMMUNITY SERVICES

Introduction

This section describes community services within the study area, specifically police, fire, and emergency medical services in the cities of Dublin, Pleasanton, and Livermore, unincorporated Alameda County, and areas under BART jurisdiction. Service providers from each of these jurisdictions were contacted to obtain information on existing service levels and to understand how the BART extension alternatives might affect the capacity for and delivery of community services within the study area. In addition, local police and fire departments from areas with existing BART stations and maintenance facilities were contacted to gain an understanding of the magnitude of calls for service generated by existing BART facilities. This community services analysis was also informed by reports and materials published by local community service providers, the BART Facilities Standards, and local general plans.

Concerns or questions were raised during the scoping period regarding crime and demand for police services around station areas. These issues are addressed in this section.

Existing Conditions

Police Services

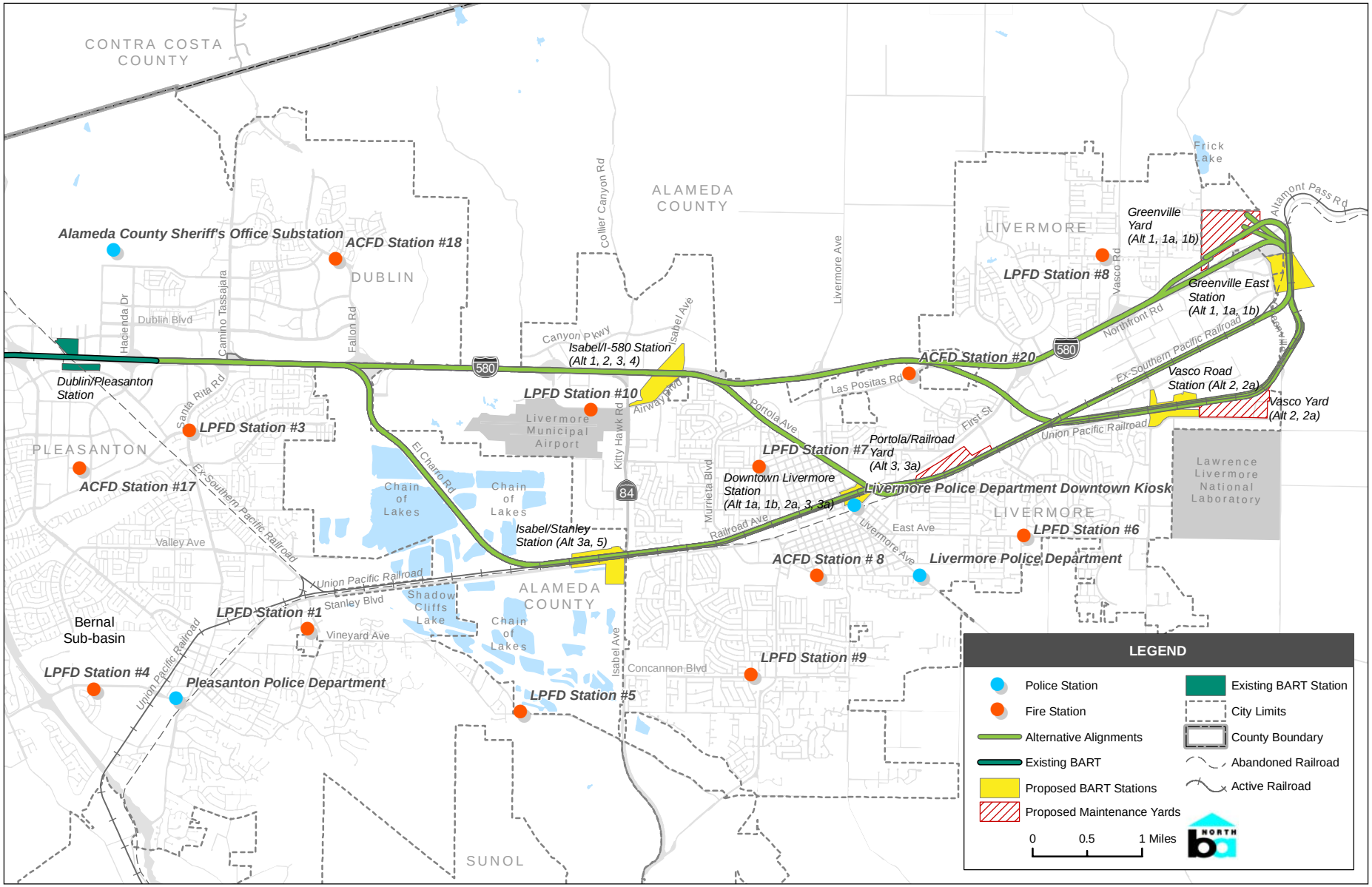
Police services in the study area are currently provided by the Dublin Police Department, Pleasanton Police Department, Livermore Police Department (LPD), Alameda County Sheriff's Office, and BART Police. Each of the respective jurisdictions is discussed below. Figure 3.13-1 provides a map of police stations in the study area.

Livermore Police Department. The LPD is responsible for law enforcement in the City of Livermore. The department operates one station, located in the Civic Center at 1100 South Livermore Avenue. In addition, department has a kiosk office in Downtown Livermore, located at 2375 Railroad Avenue. The department currently has 96 sworn officers and 51.5 non-sworn employees. This staffing level reflects a performance standard of 1.2 to 1.5 sworn officers per 1,000 residents.[1]

The department has established different response time standards for calls for service according to the priority assigned to them. Priority One calls, the most urgent, have a response time standard of three minutes or less. Priority Two calls, or calls for non-serious crimes, have a response time standard of 10 minutes or less. Priority Three calls, or calls that generally do not require immediate police presence, have a response time standard of 30 minutes.[2] In 2008, the Department met its response

[1] Weiss, Mark, Captain, Livermore Police Department, phone interview with BAE, May 6, 2009.

[2] Weiss, Mark, Captain, Livermore Police Department, email communication with BAE, May 6, 2009.



Source: AECOM, May 4, 2009; PBS&J, 2009.

LOCATION OF POLICE AND FIRE STATIONS IN THE BART TO LIVERMORE STUDY AREA

FIGURE 3.13-1

standard for Priority Two and Priority Three calls more than 90 percent of the time. For Priority One calls the department met its response time standard 55 percent of the time.[3] The department has cited traffic congestion, increasing population, and the geographic spread of population, as factors affecting its delivery of service.[4]

Dublin Police. The Dublin Police Department, located at 100 Civic Plaza, is responsible for law enforcement in the City of Dublin. The department does not have an established standard as to the size of its police force relative to the city population, but with 52 sworn officers and 10 non-sworn employees, the department has a ratio of 1.2 sworn employees per 1,000 residents.[5] The department strives to respond to calls as expeditiously as possible, but does not have a specific standard for response times. The current average response time for highest priority calls is 3.5 minutes.[6]

While BART Police has primary jurisdiction over BART facilities, a portion of the existing Dublin/Pleasanton BART Station (including train track and parking facilities) is located in the City of Dublin. The Dublin Police Department reports that they receive four to five calls annually in relation to the existing Dublin/Pleasanton BART Station, out of a citywide total of more than 41,000 calls in 2008. The department reports that typical calls related to BART are to cover or assist BART Police officers or to respond to suspicious persons or audible car alarms in the parking lot.[7]

Pleasanton Police Department. The Pleasanton Police Department, located at 4833 Bernal Avenue, is responsible for law enforcement in the City of Pleasanton. The department currently has 87 sworn officers and 38 non-sworn employees for a ratio of 1.3 sworn employees per 1,000 residents. The department does not have a specific standard for response times but reports an average response time for emergency calls of 4.7 minutes as of 2008.[8] The Pleasanton General Plan 2005 – 2025 establishes a goal that the Police Department have an average response time of four minutes for emergency calls.[9]

As noted above, BART Police have primary jurisdiction over BART facilities. Nonetheless, a portion of the Dublin/Pleasanton BART Station is located in the City of Pleasanton. The Pleasanton Police Department does not track calls for service specifically to the Dublin/Pleasanton BART Station. However, it notes that the reporting district that encompasses the BART station is an area with limited demand for police services. As of 2008, this reporting district accounted for less than 0.25 percent of citywide calls for service/incidents, with the largest categories of calls/incidents being for traffic and pedestrian stops.[10]

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3 Weiss, Mark, Captain, Livermore Police Department, email communication with BAE, June 16, 2009.

4 City of Livermore, *State of the City Report 2004*, http://www.ci.livermore.ca.us/city-report/Livermore_SOTC.pdf, accessed June 17, 2009.

5 Craft, Ellis, Sergeant, Dublin Police Department, email communication with BAE, June 16, 2009.

6 Craft, Ellis, Sergeant, Dublin Police Department, email communication with BAE, June 15, 2009.

7 Craft, Ellis, Sergeant, Dublin Police Department, email communication with BAE, May 11, 2009.

8 Spiller, Dave, Captain, Pleasanton Police Department, email communication with BAE, June 16, 2009.

9 City of Pleasanton, *Draft Pleasanton General Plan* 2005-2025*,* September, 19, 2008, p. 5-44.

10 Spiller, Dave, Captain, Pleasanton Police Department, email communication with BAE, May 18, 2009.

Alameda County Sheriff's Office. The Alameda County Sheriff's Office (ACSO) is responsible for a wide array of tasks and duties, including providing patrol and investigative services to the unincorporated areas of Alameda County. The Sheriff's Office has over 1,500 authorized personnel, including over 1,000 sworn officers.[11] The main patrol office is located in San Leandro, approximately 24 miles west of the City of Livermore. The Sheriff's Office also operates a Tri-Valley Substation in the City of Dublin at the San Rita Jail.

ACSO has four officers assigned to the area from Sunol to the eastern boundary of Alameda County at any given time. The City of Livermore and surrounding areas represent the core of this patrol area. Officers assigned to the Livermore area are based out of the Tri-Valley Substation but spend most of their time in the field, primarily patrolling and responding to incidents in unincorporated portions of the County.[12] ACSO does not have a response time standard as their patrol officers do not respond from a specific sheriff office.[13]

BART Police Department. Law enforcement services for the BART system are provided by the BART Police Department, which has 206 sworn peace officers.[14] In addition, the department has 90 non-sworn employees that work as community service assistants, communications and 9-1-1 dispatchers, computer aided dispatch/records management system (CAD/RMS) administrators, and clerical staff. BART police officers are invested with the identical powers of arrest as city police officers and county sheriff deputies and are authorized to take enforcement action off BART property (e.g., within city limits, county jurisdictions, or on State highways) if there is immediate danger to persons or property.

In order to provide safety and security for BART riders and employees, the BART Police Department seeks to maintain a highly visible presence in the enforcement of laws and regulations throughout the BART system.[15] All reported crimes, felonies, misdemeanors, or infractions that occur on BART property are investigated by BART police officers and detectives.

Law enforcement tools employed by the BART Police Department include pay phones and emergency call-boxes in parking lots. These phones are directly connected to the BART police 9-1-1 communications center. The BART Police Department also deploys video-surveillance systems in trains, stations, and parking lots. To protect BART's infrastructure against the threat of terrorism, BART police officers participate in counterterrorism working groups at the local, State, and federal level, and also conduct training drills for first-responders throughout the Bay Area.

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[11] Alameda County Sheriff's Office, http://www.alamedacountysheriff.org/about_us.htm, accessed May 29, 2009.

[12] Scheuller, Brett, Sergeant, Alameda County Sheriff's Office, phone interview with BAE, May 14, 2009.

[13] Scheuller, Brett, Sergeant, Alameda County Sheriff's Office, phone interview with BAE, May 14, 2009.

[14] BART, http://www.bart.gov/about/police/aboutpolice.asp, accessed May 5, 2009.

[15] BART, http://www.bart.gov/about/police/aboutpolice.asp, accessed May 5, 2009.

For crime prevention and investigation, the BART Patrol Bureau has a community-based development strategy, which decentralizes the bureau into four geographical police zones. BART Police operates 35 beats across the four zones. Each zone has its own headquarters and field office. Zone lieutenants are assigned personnel, equipment, and resources to manage their respective police operations. This community-based deployment strategy enhances the ability of the BART police to work more closely with the local residents, allied public-safety agencies, businesses, schools, and other transit district employees.[16] The Zone 1 facility is located at the Lake Merritt Station (this is also the location of the BART Police Department's main headquarters). Zone 2 has four police facilities, one each at the El Cerrito del Norte Station, the Walnut Creek Station, the Concord Station, and the Pittsburg/Bay Point Station. Zone 3 has three police facilities one each at the Castro Valley Station, the Hayward Station, and the Dublin Station. The Zone 4 facilities are located at the Powell Street Station in San Francisco and at the San Bruno Station.

BART system's performance is monitored every quarter and performance indicators are tracked on a quarterly and annual basis.[17] The BART Police Department has established crime and police responsiveness goals for the system. These goals are based on millions of trips for crimes against persons and quality of life violations, and on every 1,000 parking spaces for auto crimes. Table 3.13-1 shows the amount and types of crimes that occurred during the first quarter of fiscal year 2009 throughout the entire BART service area. The existing crime rates are compared to BART security goals. As shown, BART met its goal of 2.0 crimes per million trips or fewer for the number of crimes against persons by achieving a ratio of 1.9 crimes per million trips. BART also met its goal of 8.0 or fewer per 1,000 spaces for the number of automobile crimes by achieving a ratio of 6.4 crimes per 1,000 spaces. Finally, BART met its goal for response time to calls for service, achieving an average response time of 3.7 minutes compared to a goal of 4.0 or fewer minutes.

For emergency preparedness, the BART Office of Emergency Services (in cooperation with city and public protection agencies) is responsible for delineating evacuation routes, and where possible, alternate routes around points of congestion. BART's System Safety Program Plan outlines the technical and managerial safety activities, describing procedures for accident investigation and reporting and emergency management, for the BART District, which includes Alameda, Contra Costa, Marin, San Francisco, and San Mateo counties. In addition, BART contingency plans cover a full range of possible emergencies and integrate the support of local police, fire departments, and other emergency agencies, all of which practice emergency responses jointly with BART.

Fire Protection and Emergency Medical Services

Fire protection and emergency medical services in the study area are currently provided by the Livermore-Pleasanton Fire Department and the Alameda County Fire Department. The respective jurisdiction of each fire department is discussed below. Existing station locations are shown in Figure 3.13-1.

[16] BART, http://www.bart.gov/about/police/aboutpolice.asp, accessed May 5, 2009.

[17] BART, http://www.bart.gov/about/police/aboutpolice.asp, accessed May 5, 2009.

Table 3.13-1
BART Police Department Quarterly Data – First Quarter Fiscal Year 2009

Category	Results	Goal (Not to Exceed)
Crimes Against Persons	55	
On Trains	8	
In Stations	11	
In Parking Lots	36	
Passenger Trips	28,107,848	
Crimes Against Persons Per Million Trips	1.96	2.00
Auto Crimes	299	
Auto Burglary	191	
Auto Theft	108	
Parking Spaces (in thousands)	47.07	
Auto Crimes per 1,000 spaces	6.35	8.00
Quality of Life Violations	552	
Quality of Life Violations per Million Trips	19.64	N/A
Calls for Service	11,679	
Average Emergency Response Time (minutes)	3.74	4.00
Bike Thefts	240	N/A

Source: Cruz, Brando, Crime Analyst Officer, BART Police Department, email communication with BAE, May 29, 2009.

Notes:

Crimes against persons are aggravated assaults, robberies, rape, and homicide. Quality of life violations are infractions, such as fare evasion, and eating, drinking, or smoking on trains or station areas.

Livermore-Pleasanton Fire Department. The Livermore-Pleasanton Fire Department (LPFD) has primary responsibility for fire suppression, emergency medical service, emergency hazardous materials response, and specialized rescue within the municipal boundaries of the cities of Livermore and Pleasanton. In cooperation with the Alameda County Fire Department, LPFD at times also provides mutual aid assistance beyond municipal boundaries in adjacent communities and portions of unincorporated Alameda County. In 1996, the Livermore and Pleasanton Fire Departments consolidated through a joint powers authority. The cities of Livermore and Pleasanton share the LPFD budget through a cost-sharing plan that allows each city to pay its fair share of LPFD operating expenses. Each city builds and maintains its own fire stations and purchases and maintains its own light-duty vehicles and fire apparatus.[18]

LPFD has eight engine companies and two truck companies that are strategically located in ten fire stations throughout the two cities. LPFD headquarters in Pleasanton house administrative and non-

[18] Livermore-Pleasanton Fire Department, *Livermore-Pleasanton Fire Department Annual Report, 2007*. May 2008. http://www.ci.livermore.ca.us/LPFD/pdfs/2007Annual%20Report.pdf, accessed May 5, 2009.

emergency safety services; including fire prevention and hazardous materials regulations, emergency medical services system management, emergency preparedness, training, information technology, finance, and public information.[19]

LPFD staff consists of 30 fire captains, 30 fire engineers, 30 firefighter/paramedics, 18 firefighters in line operations, six chief officers, five managers, one emergency preparedness manager, six fire prevention inspectors, one hazardous materials coordinator, and four office support staff. The Fire Suppression and Rescue Division provides emergency response services with a daily staffing complement of 36 members on 10 fire companies 24 hours a day, 365 days a year.[20] The majority of LPFD calls are for medical emergencies. All fire suppression personnel are certified as emergency medical technicians (EMTs) and each company has at least one trained firefighter-paramedic to provide advanced life support.[21]

LPFD follows National Fire Protection Association standards, which require the capability to deploy an initial full alarm assignment within an eight-minute response time to 90 percent of the medical and fire incidents. LPFD has indicated that it is satisfactorily able to achieve this service standard based on current staffing levels and facilities.[22,23] The *Pleasanton General Plan 2005 – 2025* establishes a goal that within Pleasanton, LPFD strive to respond to all emergency fire-related calls within seven minutes of the time the call for service is received 90 percent of the time.[24]

LPFD is the primary fire and emergency service provider for the Dublin/Pleasanton BART Station, with jurisdiction over the existing terminus station, BART tracks, and parking facilities located in the City of Pleasanton. Table 3.13-2 provides the number of calls for service received by LPFD related to these BART facilities as well as call volumes citywide for the past three years. Between 2006 and 2008, LPFD reported between 28 and 61 calls for service to the Dublin/Pleasanton BART Station, primarily for emergency medical response, with no significant call activity related to BART track facilities within their jurisdiction. By comparison, there are more than 10,000 calls for service reported throughout the LPFD jurisdiction each year.

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19 Livermore-Pleasanton Fire Department, *Livermore-Pleasanton Fire Department Annual Report, 2007*, May 2008. http://www.ci.livermore.ca.us/LPFD/pdfs/2007Annual%20Report.pdf, accessed May 5, 2009.

20 Livermore-Pleasanton Fire Department, *Livermore-Pleasanton Fire Department Annual Report, 2007*. May 2008. http://www.ci.livermore.ca.us/LPFD/pdfs/2007Annual%20Report.pdf, accessed May 5, 2009.

21 Livermore-Pleasanton Fire Department, *Livermore-Pleasanton Fire Department Annual Report, 2007*. May 2008. http://www.ci.livermore.ca.us/LPFD/pdfs/2007Annual%20Report.pdf, accessed May 5, 2009.

22 National Fire Protection Association, NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public, 2004.

23 Zolfarelli, Jeff, Deputy Fire Chief, Livermore Pleasanton Fire Department, phone communication with BAE, June 15, 2009.

24 City of Pleasanton, *Draft Pleasanton General Plan* 2005-2025*,* September, 19, 2008, p. 5-38.

Table 3.13-2
LPFD Calls for Service History

Year	LPFD Calls to BART Facilities	Total LPFD Calls
2006	28	10,753
2007	43	10,491
2008	61	10,798

Sources: Deputy Chief Jeff Zolfarelli, LPFD, 2009; BAE, 2009.

The location of LPFD stations relative to the BART to Livermore Extension facilities is reported in Table 3.13-3. The distribution of fire stations indicates that no proposed BART station or maintenance facility serving an extension to Livermore would be more than a few miles from an existing station.

Alameda County Fire Department. Within the study area, the Alameda County Fire Department (ACFD) has primary responsibility for fire and emergency medical services within the municipal boundaries of the City of Dublin, at the Lawrence Livermore National Laboratory, as well as in all unincorporated areas surrounding Dublin, Pleasanton, and Livermore.[25] ACFD also cooperates with LPFD to provide mutual aid assistance within the cities of Livermore and Pleasanton when needed. ACFD services include fire suppression, arson investigation, hazardous materials mitigation, paramedic services, urban search and rescue, fire prevention, and public education. ACFD has 20 fire stations which house 20 engine companies and five ladder truck companies. ACFD also follows National Fire Protection Association standards for response times.[26] ACFD reports that it is able to successfully meet this standard for the various jurisdictions it serves including the City of Dublin, the Lawrence Livermore National Laboratory, and unincorporated Alameda County.[27]

There are two ACFD fire stations in the City of Livermore. Station 8 at 1617 College Avenue houses two engines. Station 20 is on the Lawrence Livermore National Laboratory property and houses one engine company and one ladder truck company. Security regulations associated with activities at the Lawrence Livermore National Laboratory require at least one ACFD company be located on laboratory property at certain times. This requirement limits the ability of personnel at Station 20 to respond to incidents off laboratory property.

[25] Countywide ACFD also provides fire and paramedic services for the City of San Leandro, the Lawrence Berkeley National laboratory, and all unincorporated areas in Alameda County.

[26] National Fire Protection Association, NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public, 2004.

[27] Rocha, David, Deputy Chief of Operations, Alameda County Fire Department, phone interview with BAE, June 15, 2009.

Table 3.13-3
Livermore-Pleasanton Fire Department Stations Distance to BART Facilities (in miles)

	Dublin/ Pleasanton Station	Isabel/ I-580 Station	Greenville East Station	Vasco Road Station	Downtown Livermore Station	Isabel/ Stanley Station	Portola/ Railroad Yard	Vasco Yard	Greenville Yard
LPFD Station #1 3560 Nevada St. Pleasanton 94566	3.4	3.6	9.3	7.9	5.0	2.4	5.7	8.3	8.4
LPFD Station #2 6300 Stoneridge Mall Road Pleasanton 94588	1.4	6.5	12.4	11.2	8.5	6.1	9.2	11.9	11.4
LPFD Station #3 3200 Santa Rita Rd Pleasanton	1.4	4.0	9.9	8.6	5.9	3.7	6.6	9.2	8.9
LPFD Station #4 1600 Oak Vista Pkwy. Pleasanton 94566	3.1	5.5	11.3	10.0	7.0	4.5	7.6	10.3	10.3
LPFD Station #5 1200 Machado Pl. Pleasanton 94566	5.3	3.1	7.9	6.3	3.5	1.4	4.5	6.8	7.0
LPFD Station #6 4550 East Ave. Livermore 94550	9.0	3.4	3.1	1.5	1.4	3.6	0.6	2.0	2.5
LPFD Station #7 951 Rincon Livermore 94551	6.5	1.1	4.9	3.6	0.8	1.5	1.5	4.1	4.0
LPFD Station #8 5750 Scenic Ave. Livermore 94551	9.5	3.9	1.4	1.3	3.0	5.1	2.0	1.6	0.5
LPFD Station #9 1919 Cordoba St. Livermore 94550	7.0	2.7	5.9	4.3	1.8	1.4	2.4	4.8	5.4
LPFD Station #10 330 Airway Boulevard Livermore 94551	4.9	0.5	6.5	5.3	2.6	1.3	3.3	5.8	5.5
ACFD Station 8 1617 College Ave. Livermore 94550	7.2	2.1	4.9	3.4	0.7	1.7	1.4	3.9	4.1
ACFD Station 18 4800 Fallon Road Dublin 94568	2.6	3.1	8.6	7.6	5.1	3.5	5.4	8.0	7.5
ACFD Station 20 Lawrence Livermore Ntl. Lab Livermore 94550	9.0	5.1	1.9	0.9	3.3	5.6	2.2	0.7	2.2

Sources: Livermore Pleasanton Fire Department, 2009; Alameda County Fire Department, 2009; BAE, 2009.

While the existing BART station at Dublin/Pleasanton is located within the LPFD jurisdiction, the ACFD does have jurisdiction over the BART parking facilities for this station located to the north of I-580 in the City of Dublin. ACFD reports responding to a small number of paramedic and other calls for service in this area each year.[28]

Applicable Policies and Regulations

BART is exempt from local planning and development policies pursuant to California Government Code Section 53090. Nevertheless, this section describes relevant local policies and guidelines concerning community services and desired service levels, because BART supports and coordinates with local emergency response agencies. In addition, it is useful to inform readers of BART's responsibilities for safety and security versus those of local agencies.

Livermore General Plan. The City of Livermore's General Plan includes policies related to police and fire department staffing standards. Policy INF-5.1.P3 reads that the City shall review annual Police Department staffing levels and development trends to determine whether additional police staffing or facilities are needed. Likewise, Policy INF-6.1.P5 states that the City shall review annual LPFD staffing levels and development trends to determine whether additional fire staffing or facilities are needed.[29]

Dublin General Plan. The City of Dublin's General Plan calls for the addition of one or more fire stations east of Tassajara Road as the Eastern Extended Planning Area continues to urbanize.[30] Based on existing arrangements, ACFD would operate these stations on behalf of the City of Dublin. Additional fire stations in this area would provide additional resources for fire response in the eastern portion of Dublin and for mutual aid assistance in surrounding areas.

Pleasanton General Plan. The City of Pleasanton adopted its new General Plan in July 2009. The *Pleasanton General Plan 2005 – 2025* states that the City will strive to respond to all emergency fire-related calls within seven minutes of the time the call for service is received 90 percent of the time (Goal 3, Policy 10) and will evaluate the need for expanded services or facilities as the City grows (Goal 3, Program 10.3). In addition, the Plan calls for the Police Department to strive for a response time of an average of four minutes for emergency calls and sixteen minutes for general service calls (Goal 8, Policy 27).[31]

East County Area Plan. The East County Area Plan serves as the guiding document for the future development and resource conservation within unincorporated areas of eastern Alameda County. The Plan includes several policies related to police, fire, and emergency medical services. Policy 241 reads

[28] Rocha, David, Deputy Chief of Operations, Alameda County Fire Department, phone interview with BAE, June 15, 2009.

[29] City of Livermore, *City of Livermore General Plan*, February 9, 2004, p. 7-36 and p. 7-39.

[30] City of Dublin, *City of Dublin General Plan*, March 2008, p. 69.

[31] City of Pleasanton, *Draft Pleasanton General Plan* 2005-2025, September, 19, 2008, p. 5-38 and 5-44.

that the County shall provide effective law enforcement, fire, and emergency medical services to unincorporated areas. In addition, the Plan reads that the County shall reserve adequate sites for sheriff, fire, and emergency medical facilities in unincorporated locations within East County (Policy 242).[32]

BART Facility Standards. BART Facility Standards control the design and construction of BART facilities and contain a number of relevant standards applicable to emergency response, crime prevention, and fire suppression and prevention. Related to public safety, these standards include requirements for the installation of public address systems, closed-circuit televisions, and emergency call-boxes. Related to fire suppression and prevention, the standards require wet sprinkler systems, under car deluge systems, fire detection and alarm systems, and fire hose cabinets at specified locations. These standards are in addition to requirements for the use of various fire resistant materials in construction.

BART Station Access Guidelines. In addition to the Facility Standards, the BART Station Access Guidelines provide a framework for BART staff and contractors in designing facilities at new and existing stations. An important component of the Station Access Guidelines is an endorsement of Crime Prevention Through Environmental Design (CPTED). CPTED refers to the effective use of the built environment to addressing actual crime as well as the public's perception of crime, and to improve quality of life. The Station Access Guidelines include the following CPTED design recommendations:

- Provide enhanced lighting in parking lots, parking structures, walkways, bus stops and stations;
- Discourage the use of pedestrian tunnels;
- Limit designs that require pedestrians to cross through bus zones or bus access points;
- Locate passenger drop-off zones and taxi zones in areas that allow easy access to the stations and businesses;
- Helps define stations as part of a community by including art through community input from the station area planning process, local neighborhood groups or local jurisdiction efforts; and
- Design lots, drop-off zones, and bus zones so that buses and cars do not mix.

Impact Assessment and Mitigation Measures

Standards of Significance

The alternatives would result in significant community services impacts if any of the alternatives would trigger the need for new police or fire department facilities in order to maintain acceptable service ratios, response times, or other performance standards associated with police, emergency medical, and fire services. For each community services impact analyzed below, a level of significance is

[32] Alameda County, *East County Area Plan*, November 2000, p. 62.

determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section CS, refers to Community Services.

Environmental Analysis

Table 3.13-4 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, all BART extension alternatives would experience less-than-significant impacts related to police and fire services. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.13-4
Summary Comparison for Operational Impacts to Community Services in the BART to Livermore Extension Study Area

	Police Service		Fire Service / Emergency Medical Response	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	PS	No	PS	No
1 – Greenville East	LTS	NA	LTS	NA
1a – Downtown-Greenville East via UPRR	LTS	NA	LTS	NA
1b – Downtown-Greenville East via SPRR	LTS	NA	LTS	NA
2 – Las Positas	LTS	NA	LTS	NA
2a – Downtown-Vasco	LTS	NA	LTS	NA
3 – Portola	LTS	NA	LTS	NA
3a – Railroad	LTS	NA	LTS	NA
4 – Isabel/I-580	LTS	NA	LTS	NA
5 – Quarry	LTS	NA	LTS	NA

Significance Classification:
S = Significant PS = Potentially Significant LTS = Less than Significant
NI = No Impact NA = Not applicable

CS-1 Police Services

Operation of a BART to Livermore Extension Program would lead to increased activity at station locations and maintenance yards in the City of Livermore and/or adjacent unincorporated areas, leading to increased demands on the BART Police Department, the LPD, and/or ACSO. Provided below is a description of the impact of such increases in activity on

affected police departments and a discussion of the ability of existing facilities to accommodate additional officers as would be needed to serve a BART extension.

No Build Alternative. The No Build Alternative would only include completion of programmed and funded transit and roadway improvements within the study area. Nevertheless, it is anticipated that vehicle miles traveled would continue to increase, resulting in worsened congestion and traffic conditions on I-580. No Build traffic conditions are discussed in detail in Section 3.2, Transportation. With increased traffic, the likelihood of traffic-related accidents occurring would be higher, resulting in increased calls for service which could negatively affect the LPD's ability to meet response time goals or trigger the need for new or expanded facilities as a result of the No Build Alternative. As such, this is considered a potentially significant impact.

All BART Extension Alternatives. BART Police would have primary responsibility for law enforcement services at BART facilities associated with the extension alternatives. For all alternatives, BART Police would need to hire additional officers and establish a new beat to serve the extension. Such a beat would be staffed by approximately six additional officers. These officers would provide service during day and evening shifts with at least one officer on patrol during regular BART operating hours. Officers would patrol BART trains and facilities and be available to respond to calls on BART property. Based on their experience with existing BART maintenance yards, BART police expect that very little demand for service would be generated by a new maintenance yard in Livermore. The maintenance yard would not be open to the public and would be regularly staffed by BART employees.[33]

To serve the BART extension alternatives, BART Police would require additional facilities, which would be incorporated into the design of new station(s). The incorporation of such BART Police facilities is anticipated as a component of each alternative and hence these facilities would not generate any additional environmental impacts beyond those described in this Program EIR. For each alternative, BART Police would require one additional field office. A field office consists of office space, a holding cell, and locker rooms. For alternatives that include two stations, BART Police would require an additional smaller office space at one of the stations in addition to the field office at the other station. The smaller office would allow officers to write reports and conduct interviews. The BART Police field office would likely be located at the terminus station, and the smaller office would be located at the intermediate station between the existing Dublin/Pleasanton BART Station and the new terminus station.[34]

BART Facilities Standards include several requirements related to public safety at stations such as public address systems, closed-circuit televisions, and emergency call-boxes. In addition, BART Station Access Guidelines recommend the use of CPTED design measures to reduce the

[33] Gee, Gary, Chief of Police, BART Police Department, email communication with BAE, June 12, 2009.

[34] Gee, Gary, Chief of Police, BART Police Department, email communication with BAE, June 12, 2009.

actual incidence of crime as well as the public's perception of crime, including the use of enhance lighting and other measures to prevent the creation of an inhospitable pedestrian environment.

Consistent with ridership projections presented in Section 3.2, Transportation, activity levels at the existing Dublin/Pleasanton BART Station would be expected to decline somewhat as a result of the alternatives. Hence, there is expected to be no impact or potentially a beneficial impact from the BART extension alternatives on the Dublin and Pleasanton Police Departments, related to a decrease in demand for police service compared to the No Build Alternative.[35]

While BART Police regularly patrol BART facilities, local police departments respond to calls in surrounding areas and occasionally support BART Police by responding to calls on BART property. Local police departments that would be impacted by the extension alternatives are LPD and ACSO. Based on the experience of the Dublin and Pleasanton Police Departments, LPD and ACSO anticipate that a relatively low increase in demand for police service would result from the extension alternatives.[36,37] As described in the "Existing Conditions" section, the Dublin Police Department reports receiving only approximately four to five calls annually in relation to the existing terminus at the Dublin/Pleasanton BART Station, while the Pleasanton Police Department reports that the Dublin/Pleasanton BART Station and surrounding area account for very little of citywide demand for police service (less than 0.25 percent).

For extension alternatives that include station locations within the City of Livermore (i.e., the Isabel/I-580 Station, Downtown Livermore Station, and/or Vasco Road Station), LPD officers would assist BART Police officers when necessary and respond to traffic-related calls and other calls in the areas surrounding the station(s). According to LPD staff, traffic issues would be of particular concern around the Downtown Livermore Station due to the intensity of existing and planned development in the area. Consistent with the experience in Dublin and Pleasanton, increased activity around BART stations in Livermore would result in a small increase in demands for service for LPD. Nonetheless, LPD indicates that this small expected increase in demand for service would not negatively affect their ability to meet response time goals nor would it triggering any need for new or expanded facilities as a result of any of the alternatives.[38]

For extension alternatives that include station locations in unincorporated Alameda County (i.e., the Isabel/Stanley Station and Greenville East Station), ACSO officers would assist BART Police officers when necessary and respond to traffic-related and other calls in areas

[35] Spiller, Dave, Captain, Pleasanton Police Department, email correspondence, June 16, 2009.

[36] Weiss, Mark, Captain, Livermore Police Department, phone interview with BAE, May 6, 2009.

[37] Scheuller, Brett, Sergeant, Alameda County Sheriff's Office, phone interview with BAE, May 14, 2009.

[38] Weiss, Mark, Captain, Livermore Police Department, phone communication with BAE, May 6, 2009

surrounding the station. Consistent with the experience in Dublin and Pleasanton, increased activity around BART stations in the unincorporated County would result in a small increase in demands for service for ACSO. ACSO indicates that facilities are adequate to house additional officers, particularly because officers serving the Livermore area primarily operate from the field. ACSO does not anticipate the need for new or expanded facilities as a result of any of the alternatives.[39]

Because the addition of BART Police facilities is anticipated as a component of each BART extension alternative and there would not be any need to build or expand LPD or ACSO facilities, impacts to police services would be less than significant.

CS-2 Fire Protection and Emergency Response

The operation of BART trains and maintenance yards and the presence of additional BART stations, tracks, and other facilities would increase demands for fire and emergency medical services within study area. Such services would be provided by LPFD, within the cities of Livermore and Pleasanton, and by the ACFD, in the City of Dublin and in unincorporated Alameda County, with each fire department providing mutual aid assistance to the other as needed. Provided below is a description of the impact of such increases in activity on affected service providers and a discussion of the ability of existing staffing levels and facilities to accommodate additional demands that would be generated by the BART extension alternatives.

No Build Alternative. The No Build Alternative would only include completion of programmed and funded transit and roadway improvements within the study area. Nevertheless, vehicle miles traveled would continue to increase, resulting in worsened congestion and traffic conditions on I-5-80. No Build traffic conditions are discussed in detail in Section 3.2, Transportation. With increased traffic, the likelihood of traffic-related accidents occurring would be higher, resulting in increased calls for emergency response service which could negatively affect the LPFD's ability to meet response time goals. As such, this is considered a potentially significant impact of the No Build Alternative.

All BART Extension Alternatives. While the BART extension alternatives would increase demands for fire and emergency medical services, they would not trigger the need for additional fire facilities within the study area in order to maintain acceptable service ratios, response times, or other performance standards. Table 3.13-3 shows that future BART to Livermore stations and maintenance facilities would be near existing fire stations. Based on current experience with the existing BART facilities located in the study area and elsewhere in the BART system, including stations and maintenance yard facilities, LPFD and ACFD report that existing staffing levels would be adequate to serve the BART extension alternatives. Moreover, BART Facility Standards would require a number of fire safety measures, including the installation of wet sprinkler systems, under car deluge systems, fire detection and alarm

[39] Scheuller, Brett, Sergeant, Alameda County Sheriff's Office, phone interview with BAE, May 14, 2009.

systems, and fire hose cabinets, at specified locations, in addition to requirements for the use of various fire-resistant materials in construction, which would help to diminish demands for service.

While LPFD and ACFD indicate that none of the alternatives would be expected to generate a need for new facilities or additional staffing, they did indicate a strong interest to coordinate closely with BART in the design of stations to ensure optimal access by emergency response personnel. In particular, for the Isabel/I-580 Station, LPFD felt such coordination would be especially important given the unique access challenges posed by a station location within a freeway median. Nonetheless, LPFD considers existing fire facilities and staffing levels adequate to serve the Isabel/I-580 Station, particularly given the close proximity of LPFD Station #10 and the low call volume anticipated from BART facilities.[40] Hence, impacts to fire protection and emergency response would be less than significant.

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in changes to proposed BART to Livermore Extension operations (e.g., number of trains, schedule, frequency, etc.), station or maintenance yard needs or locations, or local congestion, all factors that contribute to and/or affect the demand for community services associated with the BART extension alternatives. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the community service analysis or conclusions presented earlier in this section.

Cumulative Analysis

This cumulative analysis for community services considers geographic areas and population and employment growth projections for jurisdictions that are served by those departments. For law enforcement, the cumulative context is the cities of Dublin, Pleasanton, and Livermore, as well as unincorporated Alameda County. BART would assume responsibility for law enforcement for all BART property associated with the extension alternatives. For fire protection and emergency services, the cumulative context would include the areas that are served by the LPFD and the ACFD. Population and employment growth projections assumed for these areas provide the context within which to examine potential cumulative community services impacts. These growth forecasts are contained in the general plans for various jurisdictions, and in the specific plans for East Dublin, Staples Ranch, El Charro, and Downtown Livermore. The increased calls for service associated with the BART extension alternatives in combination with other reasonably foreseeable development as anticipated by the planning documents for these communities define the cumulative impacts presented below.

[40] Zolfarelli, Jeff, Deputy Fire Chief, Livermore Pleasanton Fire Department, interview with BAE, May 5, 2009.

CS-CU-3 Cumulative Police, Fire, and Emergency Services Impacts

As described in Section 3.1, Introduction to the Environmental Analysis, and Section 3.4, Population and Housing, substantial population and employment growth are anticipated in the cities of Dublin, Pleasanton, and Livermore, as well as in unincorporated Alameda County, through 2035. The projected increase in population and employment in the cities of Dublin, Pleasanton, and Livermore, and the East County Plan for unincorporated Alameda County, is expected to result in the need for additional fire protection/emergency response services and law enforcement services.

Consistent with this increased need, each jurisdiction has General Plan policies calling for the addition of new community facilities to serve planned growth. The City of Dublin's General Plan calls for the addition of one or more fire stations east of Tassajara Road as the Eastern Extended Planning Area continues to urbanize.[41] The City of Pleasanton General Plan calls for incorporating fire department expansion needs into each year's Capital Improvement Program and Operating Budget (Goal 3, Program 8.1) and continuously evaluating the need for new fire stations as the City expands and constructing new stations as necessary (Goal 3, Program 10.3).[42] The City of Livermore's General Plan Policy INF-5.1.P3 states that the City shall review annual Police Department staffing levels and development trends to determine whether additional police staffing or facilities are needed. Likewise, Policy INF-6.1.P5 states that the City shall review annual LPFD staffing levels and development trends to determine whether additional fire staffing or facilities are needed.[43] Finally, the Alameda County East County Area Plan states that the County shall reserve adequate sites for sheriff, fire, and emergency medical facilities in unincorporated locations within East County (Policy 242).[44]

Given the above policies and the substantial population and employment growth in the cities of Dublin, Pleasanton, and Livermore, as well as in unincorporated Alameda County through 2035, it is expected in the cumulative scenario that new or expanded public service facilities would be needed. As such, cumulative development would result in a significant cumulative impact related to public services. It should be noted, however, where new community facilities would be needed to serve proposed development, the lead agencies for those projects would be required to prepare environmental documentation that identifies mitigation measures to reduce any significant impacts on police and fire protection services.

As discussed in Impacts CS-1 and CS-2, the BART extension alternatives would not trigger the need for new police and fire protection facilities, and no mitigation would be required.

41 City of Dublin, *City of Dublin General Plan*, March 2008, p. 69.

42 City of Pleasanton, *The Pleasanton General Plan,* August 6, 1996, p. V-16 and V-19.

43 City of Livermore, *City of Livermore General Plan*, February 9, 2004, p. 7-36 and p. 7-39.

44 Alameda County, *East County Area Plan*, November 2000, p. 62.

The number of calls for service from existing BART facilities suggests that BART's future contribution to the cumulative demand for law enforcement, fire protection, and emergency response in the project corridor would be less than cumulatively considerable. Furthermore, the extension alternatives alone would not contribute considerably to the need to build additional community service facilities or generate other cumulative impacts on community services, since the proposed transit service, which would possibly trigger the need for an additional staff person, would not cause the construction of new, or the alteration of existing, facilities. Hence, the contribution of a BART to Livermore extension would be such that there would be a less-than-significant cumulative impact.

3.14 UTILITIES

Introduction

This section considers whether existing water and wastewater treatment capacity could accommodate the demand created by operation of station and maintenance facilities associated with the BART extension alternatives. Water demand and wastewater generation would primarily be dependent on the level of exterior train cleaning activities. For the purposes of this Utilities analysis, the study area for impacts on water and wastewater treatment capacity includes the City of Livermore where the stations and yards would be located.

In its response to the NOP, the California Public Utilities Commission indicated that any new utilities serving the BART extension alternatives would need to meet the Commission's design criteria. At this program-level analysis, there is only limited design detail on any of the BART extension alternatives. Recognition of the Commission's design criteria will be a more critical element once a BART extension alternative is selected and BART commences more detailed engineering and project-level environmental analysis.

Existing Conditions

Utility Providers and Facilities

Utility Lines. Utility lines in the study area include overhead and underground electrical and transmission lines, gas, sanitary sewer, water, TV, cable, telephone, and petroleum lines. Relocation of utility lines and disruption to services could inconvenience communities surrounding the study area.

Specifically, utilities that may be impacted by the BART extension alternatives include existing storm drains and water and wastewater lines that cross I-580 at various segments along the proposed BART extension alternatives; the initial 5-mile phase of the Altamont Water Treatment Plant and Pipeline Project (under construction); and a future Zone 7 transmission pipeline that would cross I-580 to the east of Santa Rita Road.[1] In addition, several fiber optic lines, natural gas pipelines, overhead and underground electric transmission lines occur at various locations crossing and parallel to the alternative alignments in the study area, and may be impacted by construction of the BART alternatives.

In order to reduce utility impacts, BART would restrict service interruptions to off-peak periods and notify customers of service interruptions. A detailed discussion of utility impacts is provided in Section 3.16, Construction Impacts.

[1] Zone 7 Water Agency, *Zone 7 Water Transmission System Facility Map*, 2007.

Water Supply. Communities surrounding the study area obtain water from the Zone 7 Water Agency of the Alameda County Flood Control and Water Conservation District (Zone 7), which provides wholesale water to the local water distributors in the area. The California Water Service Company (Cal Water), Livermore Municipal Water (LMW), and the City of Pleasanton purchase water from Zone 7 for local distribution. As described in the subsequent paragraphs, sources of water in the surrounding communities include both surface water and groundwater.

Zone 7 Water Agency. The Zone 7 is the main supplier of wholesale treated water to the cities of Dublin, Pleasanton, and Livermore, and to the southern portions of the City of San Ramon. Within Livermore, Zone 7 supplies wholesale water to the California Water Service Company (Cal Water) and the City of Livermore Municipal Water, which in turn provide retail water service to residential and commercial customers. In addition, Zone 7 acts as the regional groundwater basin manager for the Tri-Valley area, which includes the cities of Dublin, Pleasanton, Livermore, San Ramon, and Danville.

Approximately 70 percent of Zone 7's water supply is from the State Water Project[2] (SWP). The remaining 30 percent of Zone 7 service area water supply is from local runoff stored in Lake Del Valle, local groundwater from the aquifer that lies below the Livermore-Amador Valley, and supplemental surface water sources, such as the Byron Bethany Irrigation District.[3]

Zone 7 projects a long-term sustainable water supply of approximately 62,500 acre-feet per year (ac-ft/y).[4] According to the City of Livermore General Plan,[5] the Zone 7 long-term average water supply is projected to meet the City of Livermore's future treated-water needs (estimated to be approximately 22,000 ac-ft/y), assuming that Zone 7 maintains its contractual allocation from its supply sources.

To determine the long-term sustainable supply, Zone 7 develops an 80-year simulation of annual operations, which demonstrates long term sustainability.[6] Based on this simulation, Zone 7 determined it has sufficient contractual water supplies for all potable water demands (based on 2007 retailer's delivery requests and a linear development growth model to buildout in about 2030-2035)[7] and for all nonpotable water demands. However, conditions have changed since the development of the General Plan. A decline in some Delta fish species triggered lawsuits regarding the impact of export operations (State and federal water delivery projects) on fish species protected under the State and federal endangered species acts. The 2007 Wanger decision on Delta smelt resulted in a reduction in water delivery available to SWP contractors in 2008 by an average of 30 percent.[8] The reduction is anticipated to last while federal agencies develop a revised federal Biological Opinion for the Delta

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2 State Water Project is a statewide system of reservoirs, canals, pipelines, and pump stations that transport surface water drawn from rivers, lakes, and reservoirs, such as the Del Valle Reservoir.

3 City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

4 Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

5 City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

6 Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

7 Tri-Valley Water Retailers, *Annual Report Fiscal Year 2007/08*, 2008.

8 Tri-Valley Water Retailers, *Annual Report Fiscal Year 2007/08*, 2008.

smelt that will ensure compliance with the Endangered Species Act requirements. If reduced water deliveries continue into future years (i.e., no changes in the SWP system or operations) and assuming current projections of local growth rates, projected water demands for the Zone 7 area (69,170 ac-ft/y) will exceed the estimated long-term average yield of existing water supplies by approximately 6,670 ac-ft/y beginning in approximately 2015.[9] After 2015, assuming the projections and underlying assumptions are correct, Zone 7 and the water retailers (including the City of Livermore and Cal Water) will need to either reduce demand or increase supplies.

To address the shortfall in future supply, Zone 7 identified a planned risk-based analysis to help develop an action plan that will maximize flexibility and minimize risk to meet the future water supply commitment.[10] The risk-based analysis will include, but will not be limited to: 1) evaluation of the existing water supply system per established contracts, ordinances, resolutions, and policies, and known constraints to key water supplies; 2) additional storage; 3) enhanced groundwater recharge and recovery; 4) the Los Vaqueros Expansion Project; 5) water conservation; and 6) water supply exchange opportunities.[11] Zone 7 does not consider the above list to be final, and envisions that other potential solutions will surface throughout the analysis and in the future. The completed analysis will help identify how Zone 7 plans to meet contracted water demands throughout the Livermore-Amador Valley.

More specifically, Zone 7 currently has plans for the following capital improvement projects and water conservation efforts.

- South Bay Adequate Enlargement (scheduled completion: November 2010)
- Altamont Water Treatment Plant FY09/10 (scheduled completion: Recommended to be June 2014)
- Chain of Lakes – Mocho Diversion for Recharge (scheduled completion: Fall 2010)
- Chain of Lakes – Arroyo Valle Diversion (scheduled completion: 2030)
- New Production Wells, Chain of Lakes Wells No. 1 & 2, Phase I (scheduled completion: July 2009)
- New Production Wells, Chain of Lakes Wells, Phase 2 (schedule completion: July 2012)
- New Production Wells, Chain of Lakes Wells. Phase 3 (schedule completion: July 2013)
- New Production Wells, Future Wells (schedule completion: to be determined)

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[9] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

[10] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

[11] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

The Chain of Lakes Project will enable Zone 7 to recharge the groundwater basin when high-quality water is available to the Delta. To date, Zone 7 has acquired Lake I and Cope Lake and expects to acquire Lakes A through H, and integrate them into the Chain of Lakes network. Zone 7 will also construct a structure at the Arroyo Mocho to divert South Bay Aqueduct water (when available) to the Chain of Lakes for recharge.[12] The Chain of Lakes Project is expected to be completed in the year 2030.

Zone 7 is also exploring the option to impose longer term voluntary or mandatory conservation measures to slow the rate at which Zone 7 uses its reserve local surface and groundwater supplies. The reserves are intended for prolonged droughts.

In addition, Zone 7 in conjunction with a collective of other water agencies (i.e., Alameda County Water District and Santa Clara Valley Water District) has commissioned a study (the Delta Supply Reliability Assessment Study) to evaluate Delta water supply reliability and potential water storage strategies. The study will estimate the potential value to these agencies of various surface storage options (e.g., Sites, Temperance Flats and Los Vaqueros Expansion, Del Valle Expansion) as part of the agencies' long-term water supply portfolios. The analysis will focus on comparative benefits of expanding Del Valle Reservoir and participating in the Los Vaqueros Reservoir project.[13]

Zone 7 is also working with the State to address the potential water shortfall. Potential actions being considered with the State include:

- Fish protections under consideration by federal fisheries agencies, the Bureau of Reclamation, and California State Department of Water Resources that rely less on overall water volumes;
- Interim Delta projects such as the "Frank's Tract, Two-gate Project" that could protect Delta smelt and enhance water supplies; and
- Implementation of the Bay Delta Conservation Plan (BDCP), a long-term planning and permitting process to restore habitat for Delta fisheries in a way that reliably delivers water supplies. The plan includes conservation strategies and a dual conveyance facility for Delta water supplies. The operational criteria for such a facility are not yet known, but could fully restore recent water supply cuts.[14]

To further reduce impacts from the potential water shortfall resulting from the Wanger ruling, Zone 7 is working with water retailers, including the Tri-Valley water retailers. The Tri-Valley water retailers, including the City of Livermore and Cal Water, have recommended continued involvement in the Delta water supply issues in fiscal years 2008 – 2009 and beyond through a range of policies and action items, including:

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12 Tri-Valley Water Retailers, *Annual Report Fiscal Year 2007/08*, 2008.

13 Alameda County Water District, *Memorandum*, January 2008.

14 Tri-Valley Water Retailers, *Annual Report Fiscal Year 2007/08*, 2008.

- Reviewing opportunities for water supply interties with other water agencies in the region (e.g., San Francisco, East Bay Municipal Utility District, Contra Costa Water District, etc.) in order to help meet demands during periods when surface water deliveries are interrupted;
- Investigating and developing partnerships with other regional water agencies to enhance water quality and reliability;
- Reviewing opportunities for federal grants to construct recycled water facilities in the Valley; and
- Exploring opportunities to impose more stringent voluntary or mandatory rationing if water supplies are not restored to at least 2008 levels.

Zone 7's current estimate that long-term projected demands may exceed available water supply is based on a number of assumptions. Should one of the basic assumptions used by Zone 7 or Department of Water Resources in their revised water supply models change, Zone 7's future water supply analysis would change. The following are examples of basic assumptions that may affect the water supply analysis:[15]

- The current slowdown in economic development could extend the adequate water supply period beyond 2015.
- If legislation is enacted mandating conservation measures to reduce per capita water use by 20 percent by 2020, and if there is an increases in recycled water use, water supply impacts could be lessened, and Zone 7 could have adequate supplies through buildout.
- Increases in recycled water use could also ease water supply constraints.
- If the BDCP and related measures are implemented, water supply reliability could be restored and Zone 7 would return to the analysis of sustainable water supplies that was used prior to the Wanger ruling.

California Water Service Company. Cal Water serves the downtown area of the City of Livermore, which encompasses an area of approximately 11.5 square miles. The water supply comes from a combination of local groundwater pumped from 12 wells maintained by Cal Water and wholesale surface water purchased from the Zone 7 through nine turnouts.[16,17]

Cal Water has an existing water supply of approximately 12.1 million gallons per day (mgd) and additional storage capacity of 12.09 million gallons. Cal Water's distribution system includes 26 storage tanks, 42 booster pumps, nearly 205 miles of pipelines (ranging from 1 to 16 inches in

[15] Tri-Valley Water Retailers, *Annual Report Fiscal Year 2007/08*, 2008.

[16] Water turnouts are facilities that transfer water from Zone 7's water system to a public or private water system.

[17] City of Livermore, *The State of the City Report*- 2007, 2008.

diameter), and five pressure points. To meet intensified development in the downtown area, Cal Water recently upgraded its existing water system in order to meet current standards for system design.[18]

Livermore Municipal Water. LMW serves the northwest, northeast, and eastern portions of the city (approximately one third of the city). LMW obtains 100 percent of its water supply from Zone 7 through eight permanent turnouts. The turnouts are located off Zone 7's Cross Valley Pipeline, which crosses the city from east to west, and runs along Kitty Hawk Drive, south of I-580.[19] As of 2007, LMW maintained a network of transmission and distribution pipelines which include 117 miles of pipeline (ranging from six to 22 inches) and three reservoirs with a storage capacity of 10 million gallons.

LMW's Water Master Plan, updated in 2004, identified major capital improvement based on the estimated general plan buildout. Capital improvement projects include the completion of a reservoir, and connecting pipelines for the pressure zone on the northwestern side of the city. The Water Master Plan also identified the need for an additional 12.5 million gallons of reservoir storage on the eastern side of Livermore to meet the city's long-term storage needs. The exact size of the reservoirs and the timing of their construction are dependent on water usage patterns, future development, and general plan buildout projections.[20]

City of Pleasanton. In a typical year, the City of Pleasanton receives approximately 75 to 80 percent of its water from Zone 7 through seven permanent turnouts and from its own wells. The remaining 15 to 20 percent of water supply is pumped through the City of Pleasanton owned groundwater wells.

Pleasanton's annual groundwater entitlement is 3,500 ac-ft/yr, fixed by contract with Zone 7. According to the *City of Pleasanton General Plan*,[21] the city does not anticipate that future pumping limits would change significantly. Therefore, the city will rely more on Zone 7 for the bulk of its water supply (current water demand is approximately 16,480 ac-ft/yr, and future demand is 22,770 ac-ft/yr). As described above, Zone 7 has a current commitment to maintain full water deliveries through general plan buildout of its customers, including the City of Pleasanton.

Wastewater. Sewer service in the communities surrounding the BART extension alternatives is provided by the City of Livermore and the Dublin San Ramon Services District (DSRSD).

City of Livermore. The City of Livermore's Public Services Department provides sewer service to the City. Livermore's Public Services Department owns, operates, and maintains over 250 miles of existing sewer lines, ranging in size from six to 48 inches in diameter. Wastewater is collected and conveyed to the Livermore Water Reclamation Plant. The 2003 average dry weather daily inflow to the treatment plant was approximately 6.5 mgd and peak wet weather flow was 8.0 mgd. The Livermore Water Reclamation Plant has a capacity of 8.5 mgd (average dry weather flow). At full

[18] City of Livermore, *The State of the City Report*- 2007, 2008.

[19] John Koltz, Senior Engineer, Zone 7 Water Agency, personal communication with ERM, June 15, 2009.

[20] City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

[21] City of Pleasanton, *Pleasanton General Plan 2005-2025*, 2008.

general plan buildout, wastewater flows are expected to reach 10.0 mgd of average dry weather flow and approximately 12.26 mgd of wet weather flow.[22]

The Livermore Water Reclamation Plant Master Plan, updated in 2006, identified a shortfall of capacity to treat and dispose of wastewater flows beyond the current average dry weather flow of 8.5 mgd. The Master Plan reported that in order to meet future wastewater treatment projections, new facilities are needed. A Phase VI expansion project is planned to provide sufficient capacity to process future flows. The Phase VI expansion project is scheduled to commence in mid-2010 and will be completed by 2015.[23] Furthermore, the city has implemented a sanitary sewer impact fee program to fund required improvements.

Dublin San Ramon Services District. In the City of Pleasanton, wastewater service is provided by the Dublin San Ramon Services District. The City of Pleasanton owns, maintains, and operates a wastewater collection system that includes over 250 miles of local and trunk pipes, ranging in size from four to 42-inches in diameter. The City of Pleasanton contracts with the DSRSD to treat its wastewater.

The City of Pleasanton prepared a Wastewater Collection System Master Plan, which identified facility capacities and improvements for buildout conditions of its general plan. These improvements include construction of new or parallel sewers and diversion structures.

Applicable Policies and Regulations

BART Facility Standards. BART Facility Standards would be implemented under all BART extension alternatives. The BART Facility Standards require that approximately 60 percent of the water consumption for train cleaning be recycled.

Impact Assessment and Mitigation Measures

Standards of Significance

The alternatives would result in significant utility impacts if any of the alternatives would:

- Exceed available water supplies, such that new or expanded entitlements are needed; or
- Exceed available wastewater treatment capacity.

For each utility impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant

[22] City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

[23] Joel Waxdeck, Engineer, City of Livermore Water Resources Division, personal communication with ERM, June 16, 2009.

level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For the purposes of this section, UT refers to Utilities.

Environmental Analysis

Table 3.14-1 summarizes the impact conclusions for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are operational impacts; impacts that could result during construction are addressed in Section 3.16 of this document. As shown in the table, the BART extension alternatives would result in less-than-significant impacts related to water supply and wastewater treatment and disposal. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.14-1
Summary of Comparison for Utility Impacts
of the BART to Livermore Extension Alternatives

	Water Supply		Wastewater Generation	
Alternative	**Significance**	**Mitigated to Less than Significant?**	**Significance**	**Mitigated to Less than Significant?**
No Build	NI	NA	NI	NA
1 – Greenville East	LTS	NA	LTS	NA
1a –Downtown-Greenville East via UPRR	LTS	NA	LTS	NA
1b –Downtown-Greenville East via SPRR	LTS	NA	LTS	NA
2 – Las Positas	LTS	NA	LTS	NA
2a –Downtown-Vasco	LTS	NA	LTS	NA
3 – Portola	LTS	NA	LTS	NA
3a –Railroad	LTS	NA	LTS	NA
4 – Isabel/I-580	LTS	NA	LTS	NA
5 – Quarry	LTS	NA	LTS	NA

Significance Classification:

S = Significant PS = Potentially Significant SU=Significant and Unavoidable

LTS = Less than Significant NI = No Impact NA = Not applicable

UT-1 Water Supply

Compared to the No Build Alternative, the BART extension alternatives would increase demand on water supply. Water use for the BART extension alternatives would be associated with restroom facilities, drinking water fountains, landscaping for the parking areas, and train-cleaning operations for train cars and other maintenance activities. Estimates of water demand at a station are based on previous documentation for the El Cerrito BART station at Del Norte.[24]Information on water consumption at maintenance yards, where train washing is the greatest component of water use, has been obtained from BART staff.[25]

Future Water Supply Availability. As previously discussed in the "Existing Conditions" section, accounting for the Wanger ruling, Zone 7 has determined that if reduced water deliveries continue into future years (i.e., no changes in the SWP system or operations) and, assuming current projections of local growth rates, projected water demands for the Zone 7 area (69,170 ac-ft/y) will exceed the estimated long-term average yield of existing water supplies by approximately 6,670 ac-ft/y[26] beginning in approximately 2015.

Water supply in the study area would be provided by Zone 7, Cal Water, or LMW depending on the location of the particular station and maintenance facility. Since Cal Water and LMW obtain much of their supply from Zone 7, this assessment considers the BART extension alternatives' demand on Zone 7. Although BART would include water reclamation processes at the maintenance yards associated with the two-station extension alternatives to reduce impacts on water demand, there is already an anticipated water shortfall in the future with or without the BART to Livermore Extension Program. Thus, the BART extension alternatives, although limited in water demand, would exceed currently available and known water supplies.

As discussed in the "Existing Conditions" section, to address the shortfall in future supply, Zone 7 identified a planned risk-based analysis to help develop an action plan that will maximize flexibility and minimize risk to meet the future water supply commitment.[27] Zone 7 does not consider the currently developed action plan to be final, and envisions that other potential solutions will surface throughout the analysis and in the future. The completed risk-based analysis will help identify how Zone 7 plans to meet contracted water demands throughout the Livermore-Amador Valley.

In addition to the proposed risk-based analysis described above, Zone 7 is also considering the following measures:

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[24] BART and US FTA, BART-San Francisco Airport Extension Draft Environmental Impact Report/Technical Appendix, January 1995, p. 3.5-10.

[25] John Gee, BART Stations Capital Program, email to PBS&J, March 10, 2008.

[26] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

[27] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

- Capital improvement projects to increase treated water capacity and transmission;
- Voluntary and mandatory conservation measures;
- Development of a Delta Supply Reliability Assessment Study in conjunction with Alameda County Water District and Santa Clara Valley Water District to evaluate Delta water supply reliability and potential water storage strategies; and
- Participation in Statewide efforts pursued by State agencies.

No Build Alternative. The No Build Alternative would include completion of programmed transit system and roadway improvements within the study area and region, including the widening of I-580. Effects of programmed projects within the study area associated with the No Build Alternative have been addressed in the previous environmental documents for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed projects, there would be no new impacts to water supply.

All BART Extension Alternatives. Water use for all alternatives would service restroom facilities, drinking water fountains, landscaping for parking areas (collectively identified as domestic water usage here), and train cleaning operations.

As described in Section 2, Alternatives, BART estimates the need for between 54 and 57 additional railcars for BART extension alternatives with one station (Alternatives 4 and 5), and between 74 and 90 additional railcars for extension alternatives with two stations (Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a) to accommodate operating headways and passenger demand within the expanded system.

For train cleaning, BART typically uses approximately 80 gallons of water per BART car per day twice a week. BART Facility Standards would require that approximately 60 percent of the water be recycled.[28] Given the proposed fleet of approximately 57 vehicles for alternatives with one station (Alternatives 4 and 5), it is conservatively estimated that approximately 4,560 gallons of water per day twice a week would be required for exterior car washing, assuming no recycling (or 474,240 gallons per year). Under the other alternatives, water demand for exterior car washing of up to 90 vehicles would be approximately 7,200 gallons of water per day twice a week, assuming no recycling (or 748,800 gallons per year). Train washing water usage would be reduced to 1,824 gallons twice per week or 189,696 gallons per year for Alternatives 4 and 5 and 2,880 gallons twice per week or 299,520 gallons per year for the remaining alternatives with the implementation of the 60 percent water recycling requirement.

For the purposes of this assessment, the estimated average domestic water demand for the stations associated with the BART extensions alternatives is based on water demand at an existing station. In particular, the average domestic water demand for the El Cerrito Del Norte

[28] John Gee, BART Stations Capital Program, email to PBS&J, March 10, 2008.

Station is 4,300 gallons per day.[29] It is assumed that domestic water demand at the El Cerrito Del Norte Station is comparable with the demand for the stations associated with the BART extension alternatives. Thus, domestic water demand under all the BART alternatives is estimated to be 4,300 gallons per day (equivalent to 1,565,200 gallons per year) for each station.

The total water demand for Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a with two stations (train washing and domestic water usage) would be approximately 3,429,900 gallons per year. This is equivalent to the amount of water consumed by approximately 11 average households in California. [30, 31]

For Alternatives 4, and 5 that have one station, the estimated total water demand (train washing and domestic water usage) would be approximately 1,754,900 gallons per year. This is equivalent to the amount of water consumed by approximately five average households in California. For Alternatives 4 and 5, there would be no maintenance facility included within the study area, and so train-washing activities would occur at another location within the BART system. Although the location for these activities is unknown, as described in Section 2, Alternatives, it is likely that maintenance activities for Alternatives 4 and 5 would occur at an existing maintenance yard whose location is not yet defined. Therefore, the 1,824 gallons twice per week twice a week for train cleaning for Alternative 4 and 5 would occur outside the study area, but would likely fall within the jurisdiction of a water service provider other than Zone 7 that obtains water supply from the SWP Systems, and therefore would also be subject to future water shortages. Within the study area, impacts under Alternatives 4 and 5 would be associated with water demand from the stations, such as from restroom facilities and drinking water fountains.

The estimated water use associated with the BART extension alternatives would contribute to the projected exceedance of the estimated long-term average yield of existing water supplies of approximately 6,670 ac-ft/y[32] beginning in approximately 2015. BART would create new water demand of 11 ac-ft/y, which is approximately 0.16 percent of the projected regional shortfall, under the two-station alternatives, and a demand of 5.4 ac-ft/y[33] for Alternatives 4 and 5, which is approximately 0.08 percent of the projected regional shortfall.

Long-term Zone 7 water supply shortfalls are expected to be reduced following implementation of the Zone 7 action plan developed to address shortfalls. While Zone 7 is committed to

[29] BART and US FTA, BART-San Francisco Airport Extension Draft Environmental Impact Report/Technical Appendix, January 1995, p. 3.5-10.

[30] The average household in California consumes between one half acre foot (approximately 163, 000 gallons) and one acre-foot of water a year (approximately 326,000 gallons).

[31] http://www.fs.fed.us/r5/publications/water_resources/html/water_use_facts.html

[32] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

[33] 1 ac-ft = 326,000 gallons

meeting future water demand, these actions are currently being formulated and forecasts cannot be quantified to estimate the amount by which Zone 7's action plan would reduce the shortfall and by which the BART extension alternatives would exceed supply. Similarly, water conservation and reclamation measures imposed on the BART extension alternatives as required by the BART Facility Standards would reduce BART's contribution to the impact, but given the uncertainty in water supply, the potential Zone 7 shortfall after implementation of Zone 7's actions cannot be accurately assessed.

Nevertheless, as described previously, BART's contribution to the shortfall in water supply is equivalent to the amount of water consumed by up to 11 average California households. Considering BART's small contribution to the increase in regional water demand, the impact of the alternative to water supply is considered to be less than significant.

UT-2 Wastewater Treatment Capacity Availability

Compared to the No Build Alternative, wastewater would be generated by the BART extension alternatives at the stations and maintenance facilities through service restroom facilities, drinking water fountains, and train cleaning, with train cleaning activities being the primary source of wastewater generation. With 60 percent of the water demand from train cleaning being recycled, wastewater discharged to the wastewater system would be the remaining 40 percent of water demand.

The impact of the increase in wastewater generation from the BART extension alternatives would depend on the current and future wastewater treatment capacity available for the area. The extent of new growth and development proposed in the City of Livermore General Plan, including the BART "future transit node," would increase the demand for wastewater treatment capacity at the Livermore Water Reclamation Plant. Additional wastewater flows resulting from buildout as proposed in the General Plan, when added to the 2003 flows at the treatment plant, produce approximately 10.03 mgd in average dry weather flow and 25.6 mgd in peak hour wet weather flows.[34] This demand would exceed the current capacity of the plant (currently 8.5 mgd dry weather flow and 15.5 mdg for wet weather flow).[35]

To accommodate the projected wastewater flows from all anticipated development, improvements at the Livermore Water Reclamation Plant would be needed to increase average dry weather capacity by approximately 1.53 mgd, and wet weather flow by approximately 10.1 mgd.[36] The City's planned improvements are designed to increase average dry weather flow capacity by an additional 2.6 mgd, resulting in a total treatment capacity of 11.1 mgd. As previously discussed, planned improvements include the Phase VI expansion project (to provide

[34] City of Livermore, *Livermore Draft General Plan and Downtown Specific Plan Environmental Impact Report,* 2003.

[35] City of Livermore, *Livermore Draft General Plan and Downtown Specific Plan Environmental Impact Report,* 2003.

[36] City of Livermore, *Livermore Draft General Plan and Downtown Specific Plan Environmental Impact Report,* 2003.

sufficient capacity to process future flows), expected to commence in mid-2010 and be operational in 2015.[37] Wastewater demand for the BART alternatives would be accommodated by the Livermore Water Reclamation Plant's planned improvement capacity.

In addition, the City of Livermore enlarged the holding basins at the Water Reclamation Plant to improve the capacity of the plant to handle peak hour wet weather flows (estimated to have increased capacity to 22 mgd). Thus, the combination of 22 mgd of peak hour wet weather flow capacity at the treatment plant and an additional storage capacity identified as part of the Phase VI proposed expansion project (to provide sufficient capacity to process future flows) would accommodate the projected 25.6 mgd of peak hour wet weather flows required for the anticipated new growth and development.[38]

No Build Alternative. The No Build Alternative would include completion of programmed transit system and roadway improvements within the study area and region, including the widening of I-580. Effects of programmed projects within the study area associated with the No Build Alternative have been addressed in the previous environmental documents for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed projects, there would be no new impacts to wastewater treatment facilities.

All BART Extension Alternatives. Wastewater would be generated by the BART extension alternatives at the stations and maintenance facilities through service restroom facilities, drinking water fountains, and train cleaning, with train cleaning activities being the primary source of wastewater generation. With 60 percent of the water demand used for train cleaning being recycled, the amount discharged to the wastewater system (the remaining 40 percent of water demand) is estimated to be approximately 1,824 gallons twice per week (or 189,696 gallons per year). This would result from train car washing for a 57-car fleet associated with the one-station alternatives (Alternative 4 and 5). For the remaining alternatives with a 90-car fleet and two stations (Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a), approximately 2,800 gallons of wastewater twice per week would be generated (or 299,520 gallons per year).

For the purposes of this assessment, it is assumed that all domestic water consumption (bathroom, drinking water and landscaping usage) would flow to the wastewater treatment plant. Normally, water used for landscaping, for example, would not flow to the wastewater treatment plant, but be discharged through the storm drain system. Because domestic water demand has not been disaggregated among the various users, it is not possible to estimate how much of the water consumed would be conveyed to a wastewater treatment plant versus a storm drain. Thus, domestic wastewater generated under all BART extension alternatives is

[37] Joel Waxdeck, Engineer, City of Livermore Water Resources Division, personal communication with ERM, June 16, 2009.

[38] City of Livermore, *Livermore Draft General Plan and Downtown Specific Plan Environmental Impact Report,* 2003.

conservatively estimated to be the same as the domestic water consumed, or 4,300 gallons per day (equivalent to 1,562,200 gallons per year) for each station.

The total wastewater generated for Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a with two stations (train washing and domestic wastewater) would be approximately 3,429,000 gallons per year. As noted above, because Alternatives 4 and 5 would not include a maintenance facility. Train cleaning operations would occur outside the study area. Within the study area, approximately 1,565,200 gallons of wastewater would be generated from each station under Alternatives 4 and 5, as domestic wastewater.

BART's wastewater generation of 7,100 gallons per day (train washing and domestic wastewater for two-station alternatives) would be within the Livermore Water Reclamation Plant's planned improved capacity of 11.1 mgd. Wastewater treatment demand of 4,300 gallons per day for the one-station alternatives (Alternative 4 and 5) would also be within the Livermore Water Reclamation Plant's planned improvement capacity as wastewater generation would be less than under the two station alternative and would only be associated with wastewater generation from the stations, such as from restroom facilities and drinking water fountains.

Considering the factors described above for planned improvements, the Livermore Water Reclamation Plant would have adequate capacity to serve the projected wastewater generation associated with the BART extension alternatives at General Plan buildout in 2030. Therefore, impacts on wastewater treatment capacity would be less than significant.

Effect of UP Commuter Access Principles

Compliance with the UP Commuter Access Principles could require the BART extension to operate in its own right-of-way north of the UPRR ROW. This change in the alignment for some of the BART extension alternatives would not result in changes to proposed BART to Livermore Extension operations (e.g., number of trains, schedule, frequency, etc.), station or maintenance yard needs or locations, or ridership, all factors that contribute to and/or affect the demand for utilities associated with the BART extension alternatives. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the utilities analysis or conclusions presented earlier in this section.

Cumulative Analysis

This discussion focuses on the potential for cumulative growth to water demand that exceeds supplies and to generate wastewater that exceeds forecasted capacity. The geographic context for determining cumulative water demand includes the service area covered by the Zone 7 Water Agency (which supplies raw water to the cities of Pleasanton, Livermore, Dublin, and Dougherty Valley), Cal Water (which serves the downtown areas of Livermore), and Livermore Municipal Water. The geographic context for determining cumulative wastewater generation includes the service area of the Livermore Public Services Department.

UT-CU-3 Cumulative Impacts on Water Supply

The Association of Bay Area Governments (ABAG) projects significant population growth in the cities of Dublin, Pleasanton, and Livermore, and Alameda County between 2010 and 2035. The Livermore population is projected to increase to almost 120,900 by the year 2035.[39] The City of Pleasanton projects population growth to peak to 94,500[40] by the year 2035, and the City of Dublin projects a population growth of at least 82,600 by the year 2035.[41]

Metropolitan Transportation Commission[42] (MTC) Resolution 3434 (discussed in greater detail in Section 5, Program Merits) requires that each extension funded under MTC Resolution 3434 plan for a minimum number of housing units along proposed transit corridors. The corridor-level housing threshold for BART alternatives utilizing BART technology is 3,850 housing units on average per station area. However, as described in Section 4, Other CEQA, and Section 5, Program Merits, the projected housing associated with the BART stations would be a redistribution of planned growth within the City of Livermore and would not result in growth inducement beyond the growth planned for in the Livermore General Plan.

The BART extension alternatives in combination with projected growth in the communities in the Zone 7 service area (i.e., Livermore–Amador Valley), would increase demand for water, which could have potential impacts on future water supply. BART's contribution, while relatively small compared to regional water demand, may be cumulatively considerable. As previously described under "Existing Conditions," Zone 7 projects future water demand of 69,170 ac-ft/yr. Due to the current pumping restrictions in the Delta, this

[39] ABAG Projections, 2007; BAE, 2009.

[40] ABAG Projections, 2007; BAE, 2009.

[41] ABAG Projections, 2007; BAE, 2009.

[42] MTC is responsible for financing and coordinating public transportation in the nine-county San Francisco Bay Area.

future demand is projected to exceed the estimated long-term average yield of existing water supplies by approximately 6,670 ac-ft/yr[43] beyond 2015.

Measures proposed by Zone 7 as discussed in Impact UT-1 to address future supply shortfall would help to address the potential shortfall. These include: 1) capital improvement project; 2) water conservation; 3) Delta Supply Reliability Study; 4) Statewide efforts to restore/protect habitat and enhance water supply; and 5) risk based analysis and action plan to maximize flexibility and minimize risk to meet the future water supply commitment.

To further reduce cumulative significant impacts on future water supply, cities in the Livermore-Amador Valley (i.e., Livermore, Dublin, and Pleasanton) would make every effort to assure the long-term availability of water to support projected growth in these communities.

- City of Livermore General Plan – The City of Livermore General Plan contains policies that would ensure adequate water supply for planned development.[44] Under Water Policies INF-1.2 (P1 – P10), the City of Livermore would require coordination between land-use planning and water facilities and services to ensure that adequate water supplies are available to accommodate projected population growth identified in the General Plan. The City of Dublin's Implementing Policy considers obtaining waters service from the East Bay Municipal Utility District and other sources. Under Water Policy 1 in the City of Pleasanton General Plan Water Element, the city would preserve and protect water supply for long-term sustainability.

- Downtown Livermore Specific Plan – The Downtown Livermore Specific Plan provides regulatory policy to guide and govern future development within the downtown area of Livermore. This area is served by Cal Water for drinking water supply. Zone 7, the water supplier for Cal Water, projects that it can supply sufficient water supplies to meet the City's future needs for treated water.[45] To support anticipated buildout of the downtown area, Cal Water proposes improvements to replace older mains with new mains, increase storage capacity, and install new pumps. Under Water Services Improvement Policies 1–3,[46] water service to all properties shall provide sufficient water quality, upgrades to the water system, and require developers to provide a "fair share cost" associated with water improvements.

- El Charro Specific Plan – Water supply in the El Charro Specific Plan area is provided by the City of Livermore, with water purchased from the Zone 7 Water. The maximum daily water demand in the Plan area associated with growth is anticipated to

[43] Alameda County Flood Control and Water Conservation District, *Memorandum: Annual Review of the Sustainable Water Supply Report*, 2009.

[44] City of Livermore, *City of Livermore General Plan: 2003-2025*, 2004.

[45] City of Livermore, *Downtown Specific Plan*, 2008.

[46] City of Livermore, *Downtown Specific Plan*, 2008.

be 243,200 gallons per day, two times the average daily demand.[47] The El Charro Specific Plan sets goals and policies to ensure that utilities and infrastructure are able to meet demand of future development. Under Goal 5.1 of the El Charro Specific Plan, adequate supplies of water would be provided to the El Charro Specific Plan area through the implementation of Policies 5.1.1 and 5.1.2.[48]

- Water Master Plan – In order to accommodate new developments, potable and recycled water services would need to be expanded. The 2004 Water Master Plan specifies measures such as requiring new development to use recycled water for irrigation, and major water infrastructure improvements for the Plan area (such as construction of water pipeline system, construction of a water pump (by the City) sized to handle estimated flows for the area, and construction of a 3 million gallon reservoir).

- Urban Water Management Requirements – In addition to these important local policies and local developments, the State requires that local land development demonstrate the availability of a viable, long-term water supply. In particular, Senate Bill (SB) 610, adopted in 2001, amended the statutes of the Urban Water Management Planning Act, and requires local water suppliers to conduct water supply assessments to determine the availability of water supply for proposed development projects in a long-term cumulative context, under a broad range of water supply scenarios (e.g., under drought conditions). SB 610 aims to ensure that land use decisions for certain large development projects are fully informed as to whether sufficient water supplies are available to serve the project. SB 221 requires an affirmative written verification of sufficient water supply for subdivisions of more than 500 dwelling units or where there is an increase of 10 percent or more of service connections for public water systems with less than 500 service connections.[49] This verification must also include documentation of historical water deliveries for the previous 20 years, as well as a description of reasonably foreseeable impacts of the proposed subdivision on the availability of water resources in the region. SB 221 enables cities and counties to attach conditions to ensure that there is an adequate water supply available to serve the forecasted development as part of the tentative map approval process.

Although Zone 7 is committed to providing a reliable supply of water through its Reliability Policy and has proposed a range of additional measures described above to address water supply impacts, these actions are being formulated and forecasts cannot be quantified at this time to estimate the amount by which the cumulative projects would exceed supply. Policies and measures described above as being applicable to future development are designed to minimize impacts on water supply through various water

[47] Daily demand (121, 600 gallons per day) is based on 152 acres of Business Commercial Park (BCP) and 800 gallons per day per acre of BCP.

[48] City of Livermore, *El Charro Specific Plan*, 2007.

[49] Department of Water Resources, Senate Bill 221, www.groundwater.water.ca.gov/docs/sb_221_bill _20011009_chaptered.pdf, Accessed April 26, 2008.

conservation measures would reduce the impact. However, without reliable supply forecasts, and given the uncertainty in water supply and use, the potential shortfall cannot be adequately assessed.

BART's water demand in combination with projected growth would contribute to an existing regional water supply issue. However, BART's contribution to the estimated shortfall in water supplies is approximately 0.16 percent of the projected shortfall for the two-station alternatives, or the equivalent amount of water consumed by 11 average California households, and 0.08 percent of the projected shortfall for Alternatives 4 and 5 (equivalent to water consumed by approximately five California households). Generally, CEQA requires an EIR to evaluate, not only whether the cumulative effect of multiple projects is significant, but also whether an individual project's contribution to that impact is "cumulatively considerable." A modest contribution may be more likely to be cumulatively considerable in the context of a regional water supply problem that is already serious. Nevertheless, the amount of water demand generated by 11 households is not considered a "considerable" contribution. Accordingly, in the context of planned growth, the cumulative impact attributable to the water demand of the BART alternatives is considered less than significant.

UT-CU-4 Cumulative Demand on Wastewater Treatment Capacity

As described above, according to ABAG, the population in the city of Livermore is projected to grow over the next 20 years. The projected population growth in the Livermore Public Services Department service area would increase demand for wastewater treatment that could affect existing wastewater treatment capacity.

Wastewater generated from the City of Livermore is conveyed and treated at the Livermore Water Reclamation Plant. For the purposes of this analysis, cumulative wastewater impacts consider the ability of the Livermore Water Reclamation Plant to treat additional wastewater generated by the cumulative projects in the city of Livermore.

Projected flows reported in the City of Livermore General Plan (including the BART transit node) exceed the existing wastewater treatment capacity of 8.5 mgd by 1.53 mgd (dry weather flow) and by 10.1 mgd (wet weather flow). To accommodate the projected wastewater flows from all anticipated development, the City of Livermore's planned improvements would increase the wastewater capacity for dry weather flow by 2.6 mdg (for a total capacity of 11.1 mgd), and would increase wet weather flow capacity to 25.6 mgd.[50]

Sewer Policies 1–3, in the Downtown Livermore Specific Plan, include the need for new development to submit hydraulic calculations as part of the building permit plan check process to determine if existing sewer mains serving the proposed development have

[50] City of Livermore, *Livermore Draft General Plan and Downtown Specific Plan Environmental Impact Report,* 2003.

available capacity for its additional demands.[51] The 2004 Sewer Master Plan for the entire city of Livermore Plan proposes major infrastructure improvements including a pump station (capacity of 325,000 gallons).

A local collection system (new pump station and connections) would need to be constructed for the El Charro Plan Area that flows into a new 0.325 million gallon per day pump station. A force main[52] would need to be constructed that connects the new El Charro Plan Area pump station with the existing Airport Pump Station. The Airport Pump Station has an existing firm capacity[53] of 1.65 mgd, which is adequate to handle the projected 0.325 mgd from the Plan Area along with an ultimate 1.0 mgd tributary to the station itself. The existing ten-inch force main between the Airport Pump Station and the Water Reclamation Plant is adequately sized to handle the combined ultimate peak hourly wet weather flow of 1.325 mgd.[54] Improvements described above would be funded entirely by the development within the El Charro Specific Plan Area.

The City of Livermore General Plan contains policies that would ensure adequate wastewater treatment capacity for planned development. Under Sewer Policies INF-1.2 (P1–P12), the City of Livermore would plan, manage, and develop wastewater collection, treatment, and disposal systems in a logical and timely and appropriate manner.

Considering the above factors for the proposed expansion of the Livermore Water Reclamation Plant to meet demand and policies and measures applicable to future development to ensure adequate wastewater treatment capacity, cumulative impacts on wastewater service are considered less than significant.

51 City of Livermore, *Downtown Specific Plan*, Amended 2008.

52 Pipelines that convey wastewater under pressure from the discharge side of a pump or pneumatic ejector to a discharge point.

53 Firm capacity equals the capacity of the pump station with largest pump out of service.

54 City of Livermore, *El Charro Specific Plan*, 2007.

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3.15 ENERGY

Introduction

During the construction and operation of the BART extension alternatives, energy resources would be consumed. Energy consumption can be categorized as either direct or indirect. In this Program EIR, direct energy consumption includes energy consumed for propulsion of BART trains and for powering facilities. Indirect energy consumption includes energy expended during construction, manufacturing, and maintenance of trains. Energy consumed during operations for train propulsion and for providing electricity to stations and maintenance yard facilities would be classified as direct energy consumption. As a result, energy would be consumed both within and outside the study area.

The alternatives each involve BART trains and stations that would primarily be powered by electricity generated off site at power plants. These power plants may burn fossil fuels, such as natural gas and coal, or utilize renewable resources such as wind and biomass. While these components of the alternatives would increase energy demand, as noted in comments received from the public in response to the NOP, the BART extension alternatives would also diminish energy consumption by reducing vehicle miles traveled (VMTs) on roadways as people choose the convenience of new transit accessibility over driving their own cars.

This section describes the direct and indirect impacts of the BART extension alternatives, as well as the change in overall transportation energy demand associated with greater transit use in the Livermore Valley.

Existing Conditions

Statewide Energy Consumption

A California Energy Commission (CEC) report concluded that California was the tenth largest consumer of energy in the world, slightly ahead of Italy.[1] According to the Energy Information Administration (EIA), in 2006 California was the second largest energy consumer in the United States, next to Texas.[2] However, at the same time, California had the third lowest per capita energy consumption in the nation, in part, due to the State's energy efficiency programs. In satisfying this demand for energy, 47 percent of the total energy supply was estimated to be from petroleum sources, with most of the petroleum going toward the transportation sector. Table 3.15-1 presents energy consumption by source and sector as provided by the EIA. As shown, the transportation sector consumes the greatest amount of energy in California compared to other sectors of the economy, about twice as much as any of the other sectors (residential, commercial, and industrial).

1 California Energy Commission (CEC), *California Energy Demand 2000-2010, Staff Report,* June 2000.
2 Energy Information Administration (EIA), State Energy Profiles, available at http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=CA, accessed June 2, 2009.

Table 3.15-1
Energy Consumption in California by Source and Sector, 2006

	Percent of Total Energy Consumption (%)
By Source	
Petroleum	47
Natural Gas	28
Hydroelectric	6
Nuclear	4
Biomass	2
Coal	1
Other[a]	12
Total	100%
By Sector	
Transportation	40
Industrial	23
Residential	18
Commercial	19
Total	100%

Source: Energy Information Administration, 2009.

Notes:

a. Other includes geothermal, wind, solar, energy imported from out of State, and energy losses.

Petroleum and Natural Gas. California obtains its energy from both in-State and out-of-State sources. The State is highly dependent on imports of petroleum and natural gas. In fact, as shown in Table 3.15-2, in-State sources contribute less than 40 percent of the petroleum and less than 15 percent of the natural gas supply. As energy demand continues to increase, the dependence on out-of-State sources may also increase to meet the demand unless measures are actively taken to reduce that dependence.

Table 3.15-2
Source of California Energy (%)

Source	Petroleum	Natural Gas	Electricity
In-State	38	13	73
Out-of-State (imported)	62	87	27

Source: CEC, 2009.

Note: Electricity and petroleum numbers for calendar year 2008. Natural gas numbers for calendar year 2007.

Based on the most current data available, California consumed about 2,394,930 million cubic feet of natural gas in 2007, with consumption projected to grow by 0.3 to 0.6 percent annually. This makes

California the second largest State consumer of natural gas behind Texas. Natural gas is used for the electricity, residential, industrial, commercial, and transportation sectors as detailed in Table 3.15-3. About 43 percent of the natural gas consumed in California is for the generation of electricity.[3]

Table 3.15-3
Natural Gas Usage in California by Sector, 2006

Sector	Approximate Percent of Total Natural Gas Usage (%)
Electricity Generation	43
Residential	22
Industrial	23
Commercial	10
Transportation	< 1

Source: CEC, 2008.

Electricity. Generation of electricity comes from a variety of sources (see Table 3.15-4), with natural gas being the largest. In 2007, 12 percent of California's electricity was supplied by renewable resources. To reduce dependence on fossil fuels, Governor Arnold Schwarzenegger signed California Executive Order S-21-09 to require regulation be developed by July 31, 2010 that increases the renewable resources portion (not including large hydroelectric resources) to 33 percent by 2020.

Table 3.15-4
Sources of Electricity Supplied to California, 2007

Resource	Percent of Total Supply (%)
Natural Gas	45.2
Coal	16.6
Large Hydroelectric	11.7
Nuclear	14.8
Geothermal	4.5
Small Hydroelectric (< 30MW)	2.8
Biomass	2.1
Wind	2.3
Solar	0.2

Source: CEC, available at: http://energyalmanac.ca.gov/electricity/overview, accessed December 30, 2008.

California is the second largest user of electricity among all the states, using approximately 254,250 gigawatt-hours (GWh) in 2005. However, California used 7,032 kilowatt-hours (kWh) per

[3] CEC, available at: http://energyalmanac.ca.gov/overview/energy_sources.html, accessed June 2, 2009.

capita in 2005, which was the lowest per capita of all states.[4] Electricity consumption in terms of GWh is expected to increase 1.25 percent annually, driven mostly by the anticipated increase in population.[5]

Electricity demand needs to be examined in terms of both electricity consumed over time (measured as GWh) and peak electricity supply and demand (measured as gigawatts [GW] or megawatts [MW]). The energy consumed over time must be met by the generating capacity of the regional energy supply. In addition, during hours of peak operation, the transmission capacity and reliability must be sufficient to carry the electricity from generator to consumer. The transmission capacity and reliability can limit the supply of electricity even if the generating capacity is sufficient. As discussed below, there are uncertainties in the ability of the transmission infrastructure to provided long-term reliable service.

Peak demand statewide typically occurs late afternoon during hot summer months when air conditioning units are in greatest use. In 2005 and 2006, statewide peak demand exceeded 55,000 MW. Peak demand exceeded 55,000 MW for 1.5 percent of the year (130 hours) in 2005 and exceeded 55,000 MW for 3 percent of the year (267 hours) in 2006.[6] In California, peak electricity demand is anticipated to increase 1.4 to 1.75 percent annually. Concerns about the long-term ability to meet this demand exist partly because of the uncertainty in the peak demand during the summer when air conditioning use is driven by high temperatures, which vary from year to year. There are also concerns regarding the aging transmission infrastructure and the ability of this transmission infrastructure to handle high electricity demands.

To reduce the likelihood of demand exceeding supply, investor-owned utilities (such as Pacific Gas and Electric Company [PG&E]) are now required to maintain a 15 to 17 percent planning reserve margin (in excess of peak load obligations). However, the CEC has studied scenarios in which even those reserves may not be sufficient in Southern California due to transmission constraints. The California Independent System Operator (Cal-ISO), a not-for-profit corporation in charge of operating the long-distance, high-voltage power lines that deliver electricity, conducted a recent study that shows that in 2013 and 2018 the Greater Bay Area (which includes the BART extension alternatives study area) is expected to have sufficient internal generation resources and transmission capability under normal summer peak operating conditions when all transmission systems are in service. However, Cal-ISO believes that under contingency conditions (when summer peak demand occurs during an existing loss of one or two elements associated with the power grid), certain transmission lines and transformers may overload. The location of primary concern under these contingency scenarios is the San Francisco Bay Area. As a result, Cal-ISO has proposed measures that would ensure that the system can handle the contingency conditions. Nine projects have already been approved to address some of the recommended measures, and seven additional projects were considered feasible projects that will be considered in Cal-ISO's planning window for next year.[7]

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4 CEC, available at: http://energyalmanac.ca.gov/electricity/us_per_capita_electricity_2005.html, accessed December 30, 2008.

5 CEC, *2007 Integrated Energy Policy Report*, *CEC-101-2007-008-CMF,* December 2007.

6 CEC, *2007 Integrated Energy Policy Report*, *CEC-101-2007-008-CMF,* December 2007.

7 *Cal-ISO Transmission Plan: A Long-Term Assessment of the California ISO's Controlled Grid* (2009-2018), 2009.

While not immune to power outages, BART is not likely to experience a loss of power during a planned outage. BART's lines are on outage Block 50 which serves essential services such as certain large hospitals. PG&E normally exempts this Block from rotating outages. In addition, BART's stations have two feeds (that are not on Block 50) and each feed is on a different outage block so both feeds would not be simultaneously blacked out. Thus, it is unlikely that a station will experience a loss of power during a PG&E planned outage.

Transportation Sector. Transportation consumes more than 40 percent of all energy used in the State and the primary sources of energy for transportation are gasoline and diesel. In 2006, 16 billon gallons of gasoline and 4 billion gallons of diesel were consumed in California for transportation.[8] To compare the consumption of gasoline and diesel on a common basis, the gallons consumed are converted to British thermal units (Btu) based on the energy content of gasoline and diesel. A Btu is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. Gasoline has a heat content of 125,000 Btu per gallon, and diesel has a heat content of 138,700 Btu per gallon. The equivalent energy consumption of using 16 billion gallons of gasoline and 4 billion gallons of diesel is 2,554,800 billion Btu per year.

Over the past 20 years, fuel consumption for transportation needs has increased by almost 50 percent. On a per-year basis, future demand is expected to increase by 0.8 to 1.6 percent per year through 2012, 0.1 to 1.0 percent from 2012 to 2020 for gasoline, and 3.0 to 3.5 percent per year through 2020 for diesel. Other sources of energy (non-petroleum) for transportation make up only 6 percent of the total. To reduce dependence on petroleum products, particularly from out-of-state sources, California has a goal of increasing the non-petroleum portion to 20 percent by 2010 and 33 percent by 2020.[9]

Regional Energy Consumption

The primary means of transportation in Alameda County is by cars and trucks on roadways and highways. Based on 2000 Census data, 84 percent of workers commute using a private car or truck, while about 9 percent of workers use public transit. The estimated daily VMT in the County in 2005 was 34,545,515 miles (about 12.6 billion miles annually), with 3,009,467 of those miles being truck miles.[10] The energy associated with gasoline and diesel fuel being consumed by automobiles can be calculated using the energy consumed per mile traveled. The United States Department of Energy's (US DOE) *Transportation Energy Data Book: Edition 27*[11] lists energy consumption per mile as 5,514 Btu for cars and 6,785 Btu for personal trucks, based on 2006 data. Assuming an equivalent of 365 days per year, the total annual energy consumed by the 12.6 billion miles traveled in Alameda County in 2005 would then be approximately 70,900 billion Btu per year. This represents about 3 percent of the total transportation energy used in California through the combustion of gasoline and diesel.

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8 CEC, *2007 Integrated Energy Policy Report*, CEC-100-2007-008-CMf, December 2007.

9 CEC, Presentation by Gordon Schremp of the CEC's Transportation Fuel Office. *California Petroleum Market: Overview and Outlook for Diesel Fuel,* October 27, 2005.

10 Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009.

11 US DOE, *Transportation Energy Data Book: Edition 27,* 2008.

BART Energy Consumption

In addition to the vehicle miles traveled on the roads, energy is consumed to operate and maintain the BART system. Table 3.15-5 presents approximate electricity consumption for various stations and facilities on the BART system and total electricity consumption in 2008. To generate electricity at fossil-fueled power plants, a fuel such as natural gas or coal is burned. This process of generating electricity results in consuming more energy than is produced. Therefore, electricity consumption in terms of kWh per year must to be converted to energy consumption in terms of Btu per year to account for the inefficiencies associated with generating and distributing electricity. The conversion would theoretically vary with the method of generating electricity (e.g., fossil fuel power plants versus wind power plants). However, there is no generally accepted method of developing this factor for electricity from hydroelectric, wind, photovoltaic, or solar thermal energy sources.[12] The conversion factor used in this EIR is 10,339 Btu per kWh based on the US DOE *Transportation Energy Data Book: Edition 27*. This conversion factor assumes that the electricity is primarily from fossil-fueled power plants with an overall energy conversion efficiency of about 33 percent. Table 3.15-5 presents the equivalent energy use in terms of Btu per year based on this factor.

Train propulsion energy usage data from 2006 provide a conversion factor from train miles traveled to energy used. Energy consumed by train traction in 2006 is divided by the total train miles traveled system wide in 2006, to yield consumption of 4.51 kWh/mile traveled. This factor is applied in the impact analysis to project the energy consumption of future BART train operations.

The peak load for BART in 2006 was 84 MW. This demand, about 0.15 percent of the statewide peak load, is relatively small compared to the statewide peak load of more than 55,000 MW during 2006. Also, PG&E's peak load in 2006 was about 19,000 MW, making BART's peak load less than 0.5 percent of the PG&E peak load.[13] Typically, peak load for BART occurs in the late afternoon around 5:00 p.m. to 6:00 p.m. The peak load is minimized in part because BART cars use regenerative braking, which feeds electricity back into the system when BART cars are slowing down.

[12] US DOE, *Annual Energy Review 2006*, Report #DOE/EIA-0384 (2006), June 2006.

[13] California Energy Commission website accessed June 9, 2008, http://www.energy.ca.gov/electricity/index.html#demand, "2006 Annual Non-Coincident Peak Loads."

Table 3.15-5
BART System Electricity and Energy Consumption at Facilities, 2008

Source	Electricity (kWh/yr)	Equivalent Energy (Billion Btu/yr)
Traction (to power trains)	313,634,966	3,242
Total Stations and Maintenance Facilities	78,463,444	811
Total Systemwide	392,098,410	4,054
Selected Stations		
Lake Merritt (Underground)	3,252,186	33.6
Concord (Above Ground)	1,513,826	15.7
Pittsburg/Bay Point (Above Ground)	1,203,845	12.4
MacArthur (Above Ground)	1,082,734	11.1
Lafayette (Above Ground)	753,151	7.8
Rockridge (Above Ground)	696,969	7.2
Orinda (Above Ground)	749,353	7.7
Selected Yards/Maintenance Facilities		
Southern Alameda Yard	5,331,326	55.1
Richmond Yard	3,343,960	34.6
Concord Yard	2,616,086	27.0
Daly City Maintenance Facility	2,137,722	22.1
Oakland Maintenance Facility	1,243,714	12.9

Source: BART, email from BART to ERM, March 3, 2009, and January 15, 2009.
Note: Conversion factor of 10,339 Btu/kWh is used to estimate equivalent energy.

The electricity needed for the existing BART system is supplied primarily through power generators located in the Pacific Northwest. About 66 percent is from hydroelectric sources, 22 percent from natural gas, 9 percent from coal, 2 percent from nuclear, and 1 percent from other renewable resources. BART is planning to gradually increase the other renewable portion (including wind power, biomass, geothermal, wind, and solar) of the supply starting in 2010, so that the renewable portion is 20 percent of the total by 2016.[14]

Applicable Policies and Regulations

Corporate Average Fuel Economy Standards. At the federal level, the Energy Policy and Conservation Act of 1975 established a program to regulate fuel economy of passenger automobiles and light-duty trucks. As a result of this act, the Corporate Average Fuel Economy Standards (CAFE) were developed by the National Highway Traffic Safety Administration (NHTSA). The CAFE standards require that manufacturers maintain a fleet average fuel economy standard for their passenger automobiles and light-duty trucks. CAFE originally included only automobiles with a gross vehicle

[14] BART, electronic communication with ERM, November 9, 2007.

weight rating (GVWR) of less than 6,000 pounds (lb). The standard was then revised to include automobiles with GVWR of less than 8,500 lb starting with model year 1980. According to the current CAFE standards, manufacturers must maintain a fleet average of 27.5 miles per gallon (mpg) for their passenger automobiles.

The standard for light-duty trucks will gradually increase from 20.7 mpg for model year 2002 to 22.2 mpg for model year 2007. After model year 2007, new CAFE rules that initially became effective in March 2006 would have changed how manufacturers met the standards for light-duty trucks. After a transition period for model year 2008 through 2010, light-duty truck fuel economy standards would have been based on a mathematical function that relates required fuel economy to the footprint of the truck (wheelbase times track width). The new standards would have also included trucks with GVWR of up to 10,000 lb. However, the light-duty truck standard was struck down by the courts. In December 2007, President Bush signed into law the Energy Independence and Security Act of 2007 that will require fleet-wide (including light trucks) fuel economy to reach 35 mpg by 2020. In support of this law, NHTSA has proposed new CAFE rules that would increase passenger vehicle and light truck fuel efficiency by 4.5 percent per year between 2011 and 2015. The proposed rule would increase passenger and truck fleet average fuel economy to 35.7 mpg and 28.6 mpg, respectively, by 2015. California is preempted under federal law from setting its own fuel economy standards, unless preemption is waived by USEPA. During the Bush Administration, USEPA rejected California's request for a preemption waiver to allow California to implement state greenhouse gas emissions standards for new motor vehicles. In January 2009, President Obama directed EPA to re-assess whether it should grant California's waiver application. On June 30, 2009, EPA granted California's waiver request.

On May 19, 2009, President Obama announced proposed fuel efficiency standards in line with the standards California promulgated in Assembly Bill 1493 (AB1493). The AB1493 standards, which would supplant the current CAFE standards, call for passenger vehicle and light truck fuel efficiency of 40.6 mpg in 2015, increasing to 49.1 mpg in 2020. In this case, passenger cars and light trucks are those with vehicle weights less than 3,751 lb. For trucks between 3,751 lb and 8,500 lb, the standards will be 25.5 and 32.7 mpg in 2015 and 2020, respectively. The Department of Transportation and the Environmental Protection Agency will implement the new standards as mandated by the president.

Federal Transportation Planning and Energy Conservation. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 established an integrated and systematic approach to develop a transportation system that considered mobility, local economy, and the environment (including energy consumption). ISTEA made the local metropolitan planning organizations responsible for creating a long-range transportation plan in cooperation with local and state agencies. The transportation plan must consider, among other factors, consistency with conservation programs, goals, and objectives and the overall energy effects. The Transportation Equity Act for the 21st Century (TEA-21) was signed into law in 1998 and builds on the ISTEA, providing transportation funding from 1998 to 2003. More recently, after several extensions of TEA-21, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU) was signed into law in August 2005. This law reauthorized transportation funding through 2009 and provided funding that is 30 percent higher than

under TEA-21. These laws require that energy conservation be considered during the planning of transportation systems.

California Energy Planning and Efficiency Standards. At the State level, the CEC is the primary agency for developing energy policy. The five major responsibilities of the agency include:

- Forecasting future energy needs and maintaining historical energy data;
- Licensing thermal power plants that are 50 MW or larger;
- Promoting energy efficiency through appliance and building standards;
- Developing energy technologies and supporting renewable energy; and
- Planning for and directing State response to any energy emergency.

In 1978, CEC established the Building Energy Efficiency standards (Title 24, Part 6 of the California Code of Regulations [CCR]) to help reduce the State's energy consumption. CEC updated the standards in 2005, which apply to residential and nonresidential buildings and include requirements for indoor and outdoor lighting, ventilation systems, and roofing.

BART Energy Conservation Policy. BART's Strategic Plan (adopted in October 2008) and related policies identify goals and strategies in its role as a major transit provider in the San Francisco Bay Area. One of the goals identified in the Strategic Plan is to reduce energy and resource use, which can be accomplished in part through Plan policies that call for BART to adopt applicable provisions of the Leadership in Energy and Environmental Design (LEED) Guidelines. LEED provides guidelines for the construction and/or improvement of buildings to be environmentally responsible and considers many elements including energy conservation.

Impact Assessment and Mitigation Measures

Standards of Significance

The following standards of significance apply to the construction and operational phases of the BART extension alternatives. An alternative would have significant energy impacts during operation if it would result in the following:

- Lead to a wasteful, inefficient, and unnecessary usage of energy;
- Place a significant demand on regional energy supply or require significant additional capacity;
- Significantly increase peak and base period electricity demand; or
- Cumulatively contribute (together with regional growth) to a collectively significant shortage of regional energy supply.

For each energy impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary tables as follows: significant (S), potentially

significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and avoidable (PSU). For this section, EN refers to Energy.

Methodology

As described in the "Introduction," energy consumption can be categorized as either indirect or direct. For the purposes of this Program EIR, indirect energy includes energy consumed to construct the proposed system and maintain the BART trains. Direct energy is energy consumed to operate and power the proposed BART trains (i.e., electrical energy from power plants), stations, and other facilities.

Energy consumed during construction is addressed on a qualitative basis in this EIR later in Section 3.16, Construction Impacts. On the other hand, direct and indirect energy impacts during operation are presented on a quantitative basis for the year 2035. The direct energy consumed by the operation of the BART trains is compared to the reduction in energy consumed by motor vehicles. The reduction in energy occurs because fewer people are driving their own motor vehicles and are instead taking public transit. Direct energy is consumed not only by the BART trains and automobiles, but also by the stations and maintenance facilities associated with the BART extension alternatives.

Direct Energy. Annual energy consumption from the operation and propulsion of the BART trains associated with the BART extension alternatives is estimated by multiplying the energy intensity in terms of Btu per mile by the annual miles traveled by the BART trains. Energy consumption per mile by BART cars is based on electricity consumption data collected for calendar year 2006 as provided by BART.[15] BART provided electricity consumed (kWh) by the BART cars and total car miles traveled for the whole system in 2006. A systemwide average kWh per car mile is estimated by dividing the 2006 kWh data by the total BART car miles (4.51 kWh/mile). This value is multiplied by 10,339 Btu per kWh, based on the efficiency of electricity production, to obtain a Btu per mile per car energy intensity factor of 46,600 Btu per mile per car.

Automobile fuel efficiency standards for the near future were used to extrapolate automobile energy consumption in 2035. The energy intensity factor for passenger cars was 5,514 Btu per mile in 2006 and 6,785 for trucks.[16] This factor is expected to decrease as fleet average fuel economy improves. To account for this decrease, the factor was adjusted assuming the fleet average fuel economy improves as the fuel economy standard improves. The resulting energy intensity factors are 3,088 Btu per mile in 2035 for cars and 4,482 Btu per mile for trucks.

[15] BART, electronic communication with ERM, December 27, 2007, and January 8, 2008.
[16] *US DOE,* Transportation Energy *Data Book: Edition 27*, Table 2.12, 2008.

BART Train Propulsion (traction). Direct energy consumption from BART train propulsion was calculated for varying numbers of cars per train based on typical demand. In addition, the BART trains would run five trains per hour in each direction during revenue service. Based on the proposed operating plans for the BART extension alternatives and the number of cars per train, as provided by Wilbur Smith and Associates (WSA), transportation consultants for this Program EIR, estimated miles per BART car per year were calculated for each of the nine alternatives. Total annual miles traveled by BART cars are given below in Table 3.15-6.

Vehicle Miles Traveled. The fuel efficiency factors (Btu per mile) described above were multiplied by on-road automobile miles traveled to estimate energy consumption. Daily and annual miles traveled for the alignment alternatives were provided by WSA.[17] The alternatives assume annual miles for on-road cars based on the equivalent of 365 operating days multiplied by the daily operational miles as estimated by WSA. Reductions in total annual car miles traveled projected for both cars and trucks in the year 2035, as a result of each alternative are given in Table 3.15-7.

Table 3.15-6
Additional BART Car Miles Traveled per Year
for the BART to Livermore Extension

Alignment Alternative	Total BART Car Miles Traveled per Year (miles/year)
Alternative 1 – Greenville East	5,513,698
Alternative 1a – Downtown–Greenville East via UPRR	6,271,915
Alternative 1b – Downtown–Greenville East via SPRR	6,068,959
Alternative 2 – Las Positas	4,819,668
Alternative 2a – Downtown–Vasco	5,282,235
Alternative 3 – Portola	3,571,542
Alternative 3a – Railroad	3,871,404
Alternative 4 – Isabel/I–580	2,596,474
Alternative 5 – Quarry	2,673,121

Source: Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009.

[17] Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009 and October 19, 2009.

Table 3.15-7
Reduction in Motor Vehicle Miles Traveled (VMT) per Year due to BART to Livermore Extension

Alignment Alternative	Reduction in Motor Vehicle Miles per Year (million miles/year)
Alternative 1 – Greenville East	251
Alternative 1a – Downtown–Greenville East via UPRR	271
Alternative 1b – Downtown–Greenville East via SPRR	271
Alternative 2 – Las Positas	271
Alternative 2a – Downtown–Vasco	314
Alternative 3 – Portola	257
Alternative 3a – Railroad	231
Alternative 4 – Isabel/I–580	148
Alternative 5 – Quarry	227

Source: Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009.

Stations and Maintenance Facilities. Alternatives 4 and 5 require one new BART station each, while the other BART extension alternatives would require two additional BART stations each. Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a would also require a new maintenance facility. Estimated energy consumption by the stations and maintenance facilities is based on electricity consumption in 2008 at various existing BART facilities. This Program EIR conservatively assumes that electricity consumption at the new stations is equivalent to the 2008 electricity consumption of the Lake Merritt Station, the highest-consuming station in 2008. The analysis also assumes maintenance facility energy consumption is similar to that of the Southern Alameda Yard (the highest-consuming maintenance facility in 2008). For Alternatives 4 and 5, which do not require new maintenance facilities but would require the maintenance of additional BART cars at an existing yard in the greater BART network, the increase in energy usage was assumed to be proportional to the additional number of BART cars to be maintained at the selected yard. For purposes of this analysis to provide some quantification of the energy consequences, the Southern Alameda Yard has been used to derive the relative energy demand. Alternatives 4 and 5 would add 54 cars to the maintenance load of the Southern Alameda Yard, as described in Section 2, Alternatives. The energy increase at maintenance yard for Alternatives 4 and 5 is then based on the proportional energy load of 54 additional cars at the Southern Alameda Yard, which maintained 190 cars in 2008. Both the station and maintenance facility energy consumption estimates are conservative in that the anticipated energy consumption would very likely be less for the BART to Livermore Extension facilities since the stations would be smaller in scale and most would be at grade which require less energy and since the maintenance yard would not be as large and intensively used as the Southern Alameda Yard.

Indirect Energy. Indirect energy consumption for the maintenance of BART trains and automobiles is estimated based on energy intensity factors presented in Table 3.15-8. Given the annual mileage estimated for BART trains in Table 3.15-6 and the annual motor vehicle miles traveled (VMT) reductions estimated in Table 3.15-7, BART train maintenance energy demand and the concurrent automobile maintenance energy reduction can be calculated.

Table 3.15-8
Comparison of Energy Intensity for Maintenance of BART Vehicles with Private Motor Vehicles

Vehicle	Maintenance Energy Intensity (Btu per mile)
Motor Vehicle	1,400
BART	7,060

Source: Caltrans, Energy and Transportation Systems, Table E-13, July 1983.
Note: Energy to maintain BART cars is assumed to be equivalent to energy to maintain Light Rail Vehicles (LRV).

Environmental Analysis

Table 3.15-9 summarizes the impact conclusions for each BART extension alternative and indicates whether significant impacts are mitigated to less-than-significant levels. As shown in the table, all BART extension alternatives would have the beneficial effect of reducing net transportation energy usage because the automobiles diverted off the roads accounts for more energy consumption than the energy required to operate and maintain the transit service. The BART extension alternatives, however, increase electricity demand to potentially significant and unavoidable levels. An explanation of these conclusions is provided under the subsequent impact discussions.

EN-1 Energy Demand

Compared with the No Build Alternative, the BART extension alternatives all reduce projected energy demand for the year 2035 and thus result in a beneficial energy effect, as shown in Table 3.15-9. While train propulsion and maintenance, stations, and maintenance facilities all increase BART energy demand over current usage, these increases are offset by the reduction in energy demand from automobile and truck traffic. The new public transit opportunities result in decreased total VMT for each of the alternatives, because people can take public transit instead of driving. The shift from driving to public transit decreases the vehicular energy demand and the energy required to maintain personal motor vehicles as well. The energy requirements of the expanded BART routes comprise roughly 30 to 60 percent of the decrease in on-road motor vehicle energy demand, with the remainder being energy savings over the No Build Alternative.

Table 3.15-9
Summary Comparison for Net Operational Energy Impacts of the BART Extension Alternatives

Alternative	Energy Demand		Electricity Demand	
	Significance Before Mitigation	Mitigated to Less than Significant?	Significance Before Mitigation	Mitigated to Less than Significant?
No Build	S	No	NI	NA
1 - Greenville East	B	NA	PS	No
1a - Downtown-Greenville East via UPRR	B	NA	PS	No
1b –Downtown-Greenville East via SPRR	B	NA	PS	No
2 - Las Positas	B	NA	PS	No
2a - Downtown-Vasco	B	NA	PS	No
3 - Portola	B	NA	PS	No
3a - Railroad	B	NA	PS	No
4 - Isabel/I-580	B	NA	PS	No
5 - Quarry	B	NA	PS	No

Significance Classification:

B = Beneficial
S = Significant
NI = No Impact
NA = Not applicable
PS = Potentially Significant
SU= Significant and Unavoidable
LTS = Less than Significant

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the previous environmental documents for these projects. However, the energy savings that would result under the BART extension alternatives would not occur under the No Build Alternative. In particular, energy consumption associated with vehicle miles traveled would continue to increase as development increases. Without the benefit of the BART extension alternatives, the impact of the No Build Alternative would be significant.

All BART Extension Alternatives. Direct energy consumption for BART and direct credits from motor vehicle mile reductions were calculated by multiplying the relevant impact factors by the miles traveled per year by both modes of transportation. Maintenance factors for BART and motor vehicles are also based on miles traveled. While the bulk of new energy consumption is from train propulsion, BART would implement various design features to conserve energy and further increase sustainability, thereby reducing overall energy consumption.

As shown in Table 3.15-10, all of the BART extension alternatives yield net reductions in transportation energy consumption. The longer, two-station extension alternatives, which also require a maintenance facility, involve greater direct and indirect energy demand to operate and maintain BART service. Thus, Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a show higher energy demand with respect to total BART energy consumption than the one-station extensions (Alternatives 4 and 5). However, the two station extension alternatives also tend to achieve a greater diversion of motor vehicles from the roadways than the one-station Alternative 4. On the other hand, the single station in Alternative 5, with higher usage than the one in Alternative 4, results in an energy reduction from reduced vehicle miles traveled that is comparable to the two-station extension alternatives. Table 3.15-10 shows total motor vehicle energy savings of 624 billion BTU/year to 919 billion BTU/year for the two-station extensions (Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a), compared to 402 billion BTU/year and 770 billion BTU/year for Alternatives 4 and 5, respectively.

Overall, Alternative 2a would realize the greatest net energy savings of 919 billion Btu per year. Alternative 4 would save the least amount of net energy of the alternatives (402 billion Btu per year) but still has a beneficial effect relative to the No Build Alternative. In summary, all of the BART extension alternatives would have a beneficial effect in terms of net energy consumption compared to the No Build Alternative.

Table 3.15-10
Total Energy Consumption
for the BART to Livermore Extension

Alignment Alternative	Total BART Energy Use (billion BTU/year)	Total Motor Vehicle Energy Reductions (billion BTU/year)	Net Energy Reductions (billion BTU/year)
1 - Greenville East	418	1046	628
1a - Downtown–Greenville East via UPRR	459	1127	668
1b - Downtown–Greenville East via SPRR	448	1127	678
2 - Las Positas	381	1135	754
2a - Downtown–Vasco	406	1325	919
3 - Portola	314	1070	756
3a - Railroad	330	955	624
4 - Isabel/I–580	189	591	402
5 - Quarry	193	963	770

Source: Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009 and October 19, 2009.

EN-2 Electricity Demand

For the BART extension alternatives, electricity would be required for train propulsion, station operation, and maintenance facility operation. Overall increased annual electricity consumption in terms of GWh would be within current PG&E capacity for each of the alternatives. Thus, for typical scenarios concerning annual or daily electrical power supply versus demand, the BART extension alternatives would have a less-than-significant effect. While the potential increased annual electricity demand associated with the BART extension alternatives is expected to be met, the alternatives may affect the peak load of the region on any particular day. The increased peak demand created by the BART extension alternative is described below.

No Build Alternative. The No Build Alternative would include completion of programmed and funded transit and roadway improvements within the study area and region, including the modification of I-580 to accommodate high occupancy vehicle lanes. Effects of these projects within the study area associated with the No Build Alternative have been addressed in the previous environmental documents for these projects. Since there would be no developments under the No Build Alternative beyond those accounted for in the programmed and funded projects, there would be no new impacts to electricity demand.

All BART Extension Alternatives. For the BART extension alternatives, electricity would be required for train propulsion, station operation, and maintenance facility operation. Overall increased annual electricity consumption in terms of GWh would be within current PG&E capacity for each of the alternatives. For example, the overall electricity consumption of the BART system in 2008, considering consumption from stations, maintenance facilities, and trains, was about 394 GWh. This is 0.15 percent of the statewide electricity demand, which was 254,250 GWh in 2005. The BART extension alternatives are expected to increase annual electricity consumption between 15 and 40 GWh, depending on the additional length of tracks, number of stations, and need for a maintenance facility. Given that PG&E sold 88,127 GWh of electricity in 2008, the BART extension alternative with the greatest electricity demand could add 0.04 percent to regional electricity demand in PG&E's service area.[18]

While the potential increased annual electricity demand associated with the BART extension alternatives is expected to be met, the alternatives may affect the peak load of the region on any particular day. Existing BART propulsion energy requirements are about five times as large as the combined station and maintenance facility energy needs and peak in the morning and late afternoon, the hours of maximum BART service. For comparison purposes, the statewide peak load in 2005 and 2006 exceeded 55,000 MW. BART peak load in 2006 was 84 MW, about 0.15 percent of the statewide peak load. Regionally, PG&E's peak load in 2006 was about

[18] *PG&E,* 2008 Corporate Responsibility Report, General Utility Production Statistics, 2008.

19,000 MW,[19] making BART's systemwide peak load in 2006 less than 0.5 percent of the PG&E peak load.

Each alternative would demand an increased amount of electricity at the hours of peak usage. Based on the increase in track miles (which is assumed to correspond to the potential increase in number of BART trains running at the same time), the alternatives are estimated to raise BART peak electricity demand between 4 and 12 percent relative to existing BART electricity consumption, with some usage more or less steady, such as station and maintenance facility usage; and other usage dependent on time, for instance train propulsion power during rush hour. The time-dependent usages may affect peak electricity demand for the region. Impacts to base-period electricity demand from the BART extension alternatives are expected to be less than significant for all alternatives. However, as described in the "Setting" section, there is uncertainty regarding the ability of California's transmission system to transfer the electricity from the power plants to the users during peak demand. While Cal-ISO believes the Greater San Francisco Bay Area is expected to have sufficient internal generation resources and transmission capability under normal summer peak operating conditions when all transmission systems are in service in 2013 and 2018, Cal-ISO estimates that under contingency conditions (when summer peak demand occurs during an existing loss of one or two elements associated with the power grid), certain transmission lines and transformers may overload. Therefore, some uncertainty exists regarding the adequacy of the transmission capacity when the alternatives are in service during contingency conditions.

The construction of new stations and maintenance facilities for all alternatives would comply with the BART Facility Standards regarding energy conservation in building and landscaping design. These standards consider building placement and configuration to optimize energy efficiency and achieve a level of energy performance above that required by CCR Title 24 (Building Energy Efficiency Standards). In addition, BART would implement the additional energy efficiency measures described in Section 2, Project Alternatives. Implementation of the Facility Standards with the measures described in Section 2 would reduce peak electricity demand. However, because of long-term uncertainties with transmission reliability and the possibility of an increase in peak demand for an alternative occurring during the statewide peak demand, impacts to peak electricity demand may be significant for all alternatives.

For comparison purposes, Table 3.15-11 presents estimated electricity consumption or demand over a year for each alternative. While this information does not directly show peak electricity demand, it is suggestive of the relative peak electricity demand among the different alternatives. Alternatives 1 through 2a are expected to have the highest electricity demand. The effects of contributions from Alternatives 4 and 5 to energy demand at existing maintenance yards are scaled based on the anticipated additional number of cars required for each. Even considering this, Alternatives 4 and 5 have the lowest electricity demand of the extension alternatives.

[19] California Energy Commission website accessed June 9, 2008, http://www.energy.ca.gov/electricity/index.html#demand, "2006 Annual Non-Coincident Peak Loads."

Table 3.15-11
Comparison for Electricity Demand Impacts

Alternative	Estimated Increase in Annual Electricity Demand Compared to No Build (in GWh per year)
1 - Greenville East	37
1a - Downtown–Greenville East via UPRR	40
1b - Downtown–Greenville East via SPRR	39
2 - Las Positas	34
2a - Downtown–Vasco	36
3 - Portola	28
3a - Railroad	29
4 - Isabel/I–580	16
5 - Quarry	17

Source: Wilbur Smith Associates, electronic communication with ERM, May 4 and 6, 2009.

MITIGATION MEASURE. No mitigation measures are available that would reduce the impacts to less than significant. Therefore, the alternatives would have a potentially significant and unavoidable impact on peak electricity demand. (PSU)

Effect of UP Commuter Access Principles

The change in the alignment for some of the BART extension alternatives to comply with the UP Commuter Access Principles would not result in changes to proposed BART to Livermore Extension operations (e.g., number of trains, schedule, frequency, etc.), the regional vehicle miles traveled, or electrical demand to operate the trains, stations, and maintenance facilities, all factors that contribute to and/or affect the energy consumption associated with the BART extension alternatives. As a result, modifications to the BART extension alternative alignments to comply with the UP guidelines would not alter the energy analysis or conclusions presented in this section.

Cumulative Analysis

The geographic context for cumulative impacts of energy supply and demand can be viewed from a regional, statewide, national, and even global perspective. The cost of a barrel of crude oil in the Middle East influences the price of gas locally and directly affects transit ridership. However, to consider cumulative energy impacts on a global scale is impractical and introduces too many variables to offer anything but a highly speculative and general examination. Instead, this assessment focuses on growth in the study area and associated energy consumption. The study area extends from the current eastern terminus of BART service at the Dublin/Pleasanton Station through the proposed Greenville East Station, going as far south as Stanley Boulevard.

EN-CU-3 Cumulative Energy Demand

The net effect on energy usage of all alternatives is positive since, on the balance, the reduced energy consumption from automobile traffic offsets the increased energy demand by the BART system. The transportation projections for the alternatives were based on a travel demand model that takes into account local and regional growth as reported by the general plans and specific plans for the individual jurisdictions and by ABAG. These traffic forecasts are reflected in the preceding assessment (see Impact EN-1), which show the effect of the BART extension alternatives on reducing motor vehicle miles traveled. The BART extension alternatives are estimated to have a net beneficial effect since they would reduce transportation energy consumption and petroleum consumption in the region. Therefore, the alternatives would not contribute to cumulative energy demand, on a net operational basis, and in fact would reduce cumulative impacts.

EN-CU-4 Cumulative Peak Electricity Demand

Continued development in the study area as defined by the general plans and specific plans for the cities of Dublin, Pleasanton, and Livermore and unincorporated Alameda County would result in an increase in peak electricity demand. The BART extension alternatives would also contribute to increased peak electricity demand through electricity consumed by the trains, stations, and maintenance facility. While the peak demand would likely be satisfied by PG&E and other generating sources, there is uncertainty about the transmission system and its reliability.

Even without the peak demand increase in energy from future development in the study area, the contributions of the BART extension alternatives to peak electricity demand may be potentially significant on their own (Impact EN-2). Despite BART's efforts to reduce this demand through implementation of the BART Facility Standards and energy conservation elements identified in Section 2, as described in Impact EN-2, BART's peak load hours would still coincide with the regional peak electricity demand. Because of the long-term uncertainty in transmission reliability, cumulative impacts on electricity demand would be potentially significant and the contribution from the alternatives would be cumulatively considerable.

MITIGATION MEASURE. No mitigation measures are available within BART's authority that would improve the reliability of the energy transmission infrastructure and reduce the impacts to less than significant. As noted above, BART has and will continue to take measures to control its peak load and demand for electricity, but these efforts would not enhance the transmission capacity or reliability which is managed by PG&E and the California Public Utilities Commission. Therefore, the contribution of the BART extension alternatives to the cumulative impact related to peak electricity demand cannot be mitigated and would be significant and unavoidable. (SU)

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3.16 CONSTRUCTION IMPACTS

Introduction

This section provides a general discussion of various aspects of the construction process. Construction activities are described, focusing on the techniques that would likely be used once a preferred alignment for the BART to Livermore Extension is selected. The construction scenario described here is intended to give a general overview of the techniques that may be used for each of the types of alignment proposed under the extension alternatives. At this stage of planning, it is premature to identify specific construction techniques for a BART extension project; quantities of materials; number and type of construction equipment; number of construction workers; duration of various construction phases; location of roadway closures; and locations and sizes of construction staging and laydown areas. Thus, the information for the construction scenario is based on techniques used for other BART extension projects. The construction scenario provides the basis for the subsequent discussion of impacts anticipated during the construction period.

The types of impacts addressed in this section are short-term in nature and directly related to activities during the construction period. Because this analysis is programmatic and specific details are not available, it was necessary to make a number of assumptions regarding construction impacts. These assumptions are documented in the analysis.

Construction Scenario

Construction Activities

The choice of construction methods for the BART extension alternatives depends upon relative costs, access to work areas, soil conditions, proximity of adjacent structures, extent of utilities relocation, traffic control requirements, and permissible noise levels, among other requirements. This section summarizes the construction methods that may be used for a selected project, assuming that portions of the alignment could be at grade, portions below grade, and portions above ground. The guideway construction activities are summarized by alternative in Figure 2-1 in Section 2, Alternatives. This figure which is reproduced as a fold-out figure inside the back cover of this report shows the total linear footage proposed for each construction technique; that is, at-grade, below-grade, and aerial alignments.

Guideway Construction

Under the various alignment alternatives, portions of the BART line would be constructed at grade, below grade, and in an aerial configuration. Construction techniques commonly associated with these methods are described below.

At-Grade Guideway Sections. Typical activities for at-grade construction include demolition, tree and scrub removal, clearing and grubbing, and relocation of existing structures, facilities, utilities, roads, tracks, and fences; excavation and grading for foundations; construction of track subgrade; and placement of sub-ballast and track work materials. Generally, at-grade construction can be expected to progress 500 feet per week.

Below-Grade Guideway Sections. Below-grade guideway sections may be constructed in a cut-and-cover subway configuration (enclosed, reinforced concrete box below grade), retained cut (a "U-shaped" reinforced concrete structure that is open at the top and partially or entirely below grade, with an above-grade security fence or sound wall), or underground tunneling. All of these techniques, except the underground tunneling, are expected to be applicable in the BART to Livermore study area. These construction techniques are described below.

Cut-and-Cover Subway Section. A typical subway box is 40 feet wide and 20 feet high. The top of the box would be about 5 feet below ground surface, with the bottom of the subway box about 25 feet below ground surface. In an unconstrained right-of-way, the trench width (assuming a 1:1 slope on both sides and 25 feet to bottom of subway box) would be approximately 90 feet.

Following excavation and shoring operations, the guideway section subgrade would be compacted and graded, and underground subdrains, ductbanks, and other utilities installed. This process would be followed by placing concrete for the bottom slab foundation. Frequent concrete pours (every two to five days) of 60 to 600 cubic yards or more (six to 60 ready-mix truckloads) can be expected as work proceeds.

Retained Cut Section. It is expected that nearly all proposed retained cut guideway sections would be U-shaped concrete structures placed approximately 20 feet below ground. Construction of this type of structure is similar to that of subway lines, except there is no top slab and the forms are easier to fabricate and handle. For shallow depths, open cut instead of shoring would be utilized. Generally, retained cut sections require more utility relocation work than cut-and-cover sections, because utilities can be suspended above the cut-and-cover box during construction. Utilities spanning retained cut segments would have to be rebuilt or relocated in most cases.

Aerial Guideway Sections. The aerial guideway sections consist of reinforced, precast concrete or steel girders installed on cast-in-place, reinforced concrete columns. Column footings would be drilled caissons and/or drilled and driven piles, depending on soil and structural considerations. After the caissons are drilled and rebars placed, concrete would be placed into the drilled hole. The footing caps would be formed, reinforcing bars placed, and concrete poured. The column rebar cages would be prefabricated on site and placed on the footing caps by a large crane. The column forms would be placed around the rebar cage, and the column poured in place and allowed to cure.

Precast, prestressed, reinforced concrete girders would be fabricated and delivered to the project site. Because of the weight and length of the girders, special tractors and trailers would be necessary to transport the girders. The girders would be approximately 4 feet deep, 12 feet wide, up to 98 feet

long, and weigh approximately 175 tons. For a standard aerial structure section, two girders are placed on each bent (one on the inbound and the other on the outbound track section) by large cranes.

A closure pour between the girders at the column bents would be formed, rebar placed, and concrete poured. Track drainage facilities would be included in the closure pour. A temporary safety railing would be required for worker safety during construction, and this railing could be replaced with sound barrier panels. A steel walkway would be installed between the girders, and system conduits installed below the walkway.

Station and Maintenance Yard Construction

As with guideway construction, stations may be constructed below grade, at grade, or in an aerial configuration. Maintenance yards would be constructed at grade. Below-grade and at-grade station structures would normally be placed on concrete spread footings, except where subsurface conditions warranted deeper foundations. Aerial stations would be constructed on columns with drilled concrete caissons or driven pile foundations similar to aerial guideway sections.

Station and maintenance work would begin with site work, excavation, and construction of retaining walls and the structural shell stations and maintenance buildings. Upon completion of this work, track and system work necessary for start-up and testing could be completed simultaneously with remaining station work, including architectural, mechanical, and electrical systems, followed by parking structures, parking lots, and landscaping.

The station and parking structures include foundations, superstructures, and associated architectural, structural, mechanical, and electrical works, and are cast-in-place, reinforced concrete structures.

Systems

System elements for the BART extension alternatives include traction power, train control, communications, and automatic fare collection. Conduits, foundation pads, and other facilities required for system operations would be installed with the guideway and station. System work is light- to medium- intensity construction, consisting of sensors, pulling cables switchgear assembly, and transformers.

Traction Power Substations. Traction power facilities are necessary to supply propulsion power to the vehicles. Traction power substations would be located adjacent to the trackway at stations or midway between stations. Power substation equipment generally consists of an electrical switch assembly, rectifiers, and transformers installed in prefabricated enclosures; this equipment would be shipped to the site and placed on foundation pads constructed by the guideway or station contractor.

Train Control. The train control system includes cables and devices installed on the track, in train control bungalows (wayside equipment rooms), and in Central Control facilities to provide automatic train protection, operation, and supervision functions.

Control equipment located on the trackside includes track circuits; switch machines; station stop apparatus and antennae; and wayside signals, signs, ID readers, and other wayside indication apparatus. In the train control bungalows, apparatus include control and data communication circuits signaling modules, logic circuitry, and uninterrupted power supplies. Cable trays and conduits for communication controls are included in the guideway work.

Communications. The communication element of the project is composed of the system-wide cable network, radio communication system, station communication system, communication tower, and supervisory control and data acquisition (SCADA) system. The system-wide cable network provides the backbone communication link for voice and data signals from Central Control to all remote facilities. The radio system provides voice communications along the BART right-of-way, adjacent roadways, and off-trackway locations. Station communications include public address, closed-circuit television, and telephone systems. SCADA provides remote control and supervision of traction power operation, train control, and other support facilities.

Fare Collection. The automatic fare collection system proposed for the BART extension is the same as the self-service fare payment system in other stations. Generally, automatic fare collection systems are supplied and installed by equipment manufacturers, and must be compatible with the existing BART self-service fare payment system.

Temporary Rail Alignment Relocation

Construction of the BART to Livermore Extension, under all BART extension alternatives except Alternatives 1 and 4, would require temporary horizontal relocation of the UPRR or SPRR tracks to allow construction of the new BART facilities. A temporary track, known as a "shoofly," would bypass the construction areas and permit Altamont Commuter Express (ACE) and freight trains to continue to operate during the construction period. All shooflies would be located within the existing Union Pacific Railroad right-of-way.

Disposal Sites

Excavated materials not needed for backfill would be hauled to a landfill or to another construction site where fill was required. Broken cement concrete or asphalt concrete material would be recycled and utilized on this or other projects. The amount of excavated material and debris would vary by alternative.

Excavated material could potentially be contaminated and require disposal as hazardous material. Haul routes to disposal sites would be predetermined in agreements with local authorities prior to starting construction to identify the safest route with the least effect on existing traffic, residences, and businesses.

Construction Schedule

At this time, length of construction that would be required for a BART extension to Livermore is unknown. However, a description of potential short and long duration scenarios for construction of each of the extension alternatives is provided below. Depending on the alternative selected, the project could be constructed over a period ranging from about four to five years for the one-station alternatives to about seven years for the longest alternative, as shown in Table 3.16-1. (This estimate includes final design, advanced utility coordination and relocation, as well as actual guideway construction activities.) The short duration schedule assumes non-I-580 work can progress concurrently with I-580 widening, and that non-widening I-580 work can proceed concurrently with I-580 widening work as long as a reasonable distance separates the two different types of work and the non-widening work can only commence on sections of I-580 that have been fully widened. The long duration schedule assumes funding, contracting, and/or safety constraints will not permit any non-I-580 work to commence until all I-580 widening that is required for the BART extension is completed, and that the BART extension contractor will perform two or more station/maintenance yard construction operations concurrently.

Table 3.16-1
Estimated Construction Schedule by Alternative

Alternative	Short Duration	Long Duration
1- Greenville East	6 years and 4 months (76 months)	7 years and 4 months (88 months)
1a- Downtown (via UPRR)	4 years and 5 months (53 months)	5 years and 7 months (67 months)
1b- Downtown (via SPRR)	4 years and 6 months (54 months)	5 years and 11 months (71 months)
2- Los Positas	5 years and 10 months (70 months)	6 years and 4 months (76 months)
2a- Downtown Vasco	4 years and 2 months (50 months)	5 years and 10 months (70 months)
3- Portola	5 years and 7 months (67 months)	6 years and 1 month (73 months)
3a- Railroad	4 years and 4 months (52 months)	5 years and 10 months (70 months)
4- Isabel/I-580	4 years and 1 month (49 months)	5 years (60 months)
5- Quarry	3 years and 9 months (45 months)	5 years (60 months)

Source: AECOM, 2009.

Impact Assessment and Mitigation Measures

Standards of Significance

Based on significance criteria, the BART extension alternatives may result in significant impacts related to construction if they would:

Transportation

- Create traffic hazards or create congestion that would stop general traffic flow in the study area by more than 40 seconds (equivalent to an intersection LOS E);
- Eliminate vehicular, pedestrian, or bicycle access to adjoining areas; or
- Substantially diminish access to, or parking at, a business thereby reducing the ability of customers to patronize the business.

Visual Quality

- Substantially degrade visual quality; or
- Create a new source of substantial light or glare which would significantly impact day or nighttime views in the area.

Cultural Resources

- Demolish or materially alter a significant historical or archaeological resource.

Geology, Soils, and Seismicity

- Result in substantial soil erosion of topsoil (geology).

Hydrology and Water Quality

- Alter the existing drainage pattern of the site or area in a manner that would cause substantial flooding, erosion, or siltation;
- Substantially degrade groundwater quality or interfere with groundwater recharge, or depletes groundwater resources;
- Create or contribute to runoff that would exceed the drainage and flood control capacity of existing or planned stormwater drainage systems;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows, or otherwise expose people and/or property to water-related hazards, such as flooding; and
- Conflict with applicable legal requirements related to hydrology or water quality, including a violation of state water quality standards or waste discharge requirements.

Biological Resources

- Substantially affect sensitive species or habitats, including natural communities and federally protected wetlands.

Air Quality

- Result in increased emissions of criteria pollutants, excessive dust, or strong odors that would affect a substantial population.

Noise and Vibration

- Generate noise and vibration that substantially affects nearby sensitive receptors (e.g., residences, schools, hospitals).

Public Health and Safety

- Create a potential public or environmental health hazard; an undue potential risk for health-related accidents; or result in a safety hazard for people residing or working in the project area; or
- Physically interfere with an adopted emergency response or evacuation plan (public health and safety; community services).

Utilities

- Through the excavation and relocation of underground utilities, disrupt daytime drinking water supplies, disrupt wastewater transport; or substantially disrupt the ability to transport stormwater.

Energy

- Consume non-renewable energy resources in a wasteful, inefficient, or unnecessary manner.

Construction impacts to land uses are addressed under the various topics, i.e. traffic, air quality, and noise and vibration. There would be no construction-related impacts to population and housing or community services, and are not discussed further in this section. Also, because the No Build Alternative would not result in any new construction impacts, this analysis focuses on impacts that could result during construction of the BART extension alternatives.

For each construction impact analyzed below, a level of significance is determined for each alternative. Conclusions of significance are reported in the summary table as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as significant and unavoidable (SU) or potentially significant and unavoidable (PSU). For this section CI, refers to Construction Impacts; TR for Transportation; VQ for Visual Quality/Aesthetics; CR for Cultural Resources; GEO for Geology, Soils, and Seismicity; HY for Hydrology and Water Quality; BIO for Biological Resources; NO for Noise and Vibration; AQ for Air Quality; HS for Public Health and Safety; UT for Utilities; and EN for Energy.

Methodology

For the evaluation of construction noise and vibration impacts, BART follows criteria developed by the Federal Transit Administration. These criteria are reported in Table 3.16-2 and 3.16-3.

Table 3.16-2
Noise Impact Criteria during Construction

Land Use	Acceptable Maximum Daytime Noise Level (dBA)	Acceptable Maximum Nighttime Noise level (dBA)
Residential	90	80
Commercial Areas	100	100
Industrial Areas	100	100

Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report*, May 2006.

Table 3.16-3
Vibration Damage Impact Criteria during Construction

Land Use	Acceptable Vibration Levels (VdB)	Acceptable Peak Particle Velocity (in/sec)
Reinforced-concrete, steel or timber (no plaster)	102	0.5
Engineered concrete and masonry (no plaster)	98	0.3
Non-Engineered timber and masonry buildings	94	0.2
Buildings extremely susceptible to vibration damage	90	0.12

Source: FTA, *Transit Noise and Vibration Impact Assessment, Final Report*, May 2006.

Environmental Analysis

Table 3.16-4 summarizes the impact conclusions (beneficial, no impact, less than significant, potentially significant, or significant) for each alternative and indicates whether significant impacts are mitigated to less-than-significant levels. Impacts addressed in this section are construction impacts; impacts that could result during operation are addressed in Sections 3.2 through 3.15 of this document. As shown in the table, all BART extension alternatives would experience potentially significant construction impacts related to transportation, visual quality, hydrology and water quality, biological resources, noise and vibration, air quality, public health and safety, utilities, and energy. Through identified mitigation measures, all potentially significant construction impacts would be ameliorated to less-than-significant levels for all alternatives, except for impacts from construction noise and vibration. An explanation of these conclusions is provided under the subsequent impact discussions.

Table 3.16-4
Summary Comparison for Construction Impacts of the BART to Livermore Extension Alternatives

	Transportation		Visual Quality		Cultural Resources		Geology, Soils, and Seismicity		Hydrology and Water Quality		Biological Resources		Noise and Vibration		Air Quality		Public Health and Safety		Utilities		Energy	
Alternative	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?	Significance	Mitigated to Less than Significant?
No Build	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA	NI	NA
1 – Greenville East	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
1a – Downtown-Greenville East via UPRR	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
1b – Downtown-Greenville East via SPRR	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
2 – Las Positas	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
2a – Downtown-Vasco	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
3 – Portola	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
3a – Railroad	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
4 – Isabel/I-580	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes
5 – Quarry	PS	Yes	PS	Yes	LTS	NA	LTS	NA	PS	Yes	PS	Yes	PS	No	PS	Yes	PS	Yes	PS	Yes	PS	Yes

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant SU=Significant and Unavoidable NI = No Impact NA = Not applicable

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Transportation

CI-TR-1 Traffic Construction Impacts

Construction activities, duration, and sequencing, are not known at this time, but are likely to result in temporary, construction-related traffic impacts, as well as possible impacts to the existing BART system. Construction vehicles and equipment would use I-580 and local roadways to access construction sites along the project alignment. Trucks and equipment traffic could temporarily disrupt existing local traffic patterns during the construction of the project. Construction traffic would include heavy equipment such as bulldozers, dump trucks, cranes, and excavators. Workers driving to the construction site would also represent additional traffic to the local and regional network.

Construction of station areas would require staging areas that are located on local streets. However, staging areas and yards have not been identified at this time. Trucks would use I-580 and local streets to access the staging areas, adding to existing congestion and vehicular delays.

The project alignment would allow some of the construction activity to occur within the I-580 median, with direct access to the construction site provided by the westbound and eastbound interior lanes through openings made in the concrete traffic barriers. However, temporary lane closures would be required for delivery and haul truck access. Depending on the locations and times of day of lane closures, disruption to regular traffic circulation could be significant. For construction outside of the I-580 median, lane closures may also be necessary along local roadways for certain construction activities and material deliveries. Such roadway detours and lane/ramp closures could also impede emergency response times by police and fire departments, leading to a potentially significant short-term impact for the BART extension alternatives.

Alternative 1 – Greenville East. Traffic disruptions would be anticipated along I-580, Airway Boulevard, Kitty Hawk Road, and Isabel Avenue in the vicinity of the Isabel/I-580 Station during the construction phase. Disruptions would also occur along Greenville Road during the construction of the Greenville East Station. Moreover, construction of the BART alignment in the freeway median would necessitate temporary lane closures along I-580.

Alternative 1a – Downtown-Greenville East via UPRR. Traffic disruptions would be expected along Railroad Avenue, North Livermore Avenue, First Street, Junction Avenue, and possibly other surrounding roadways. As discussed in Alternative 1, traffic delays may also occur along Greenville Road during the construction of the Greenville East Station. Construction of the BART alignment would require temporary lane closures along I-580 and roadway closures along El Charro Road between I-580 and Stanley Boulevard. This alternative involves substantial use of existing rail rights-of-way through developed

areas in the City of Livermore. Such use which would be expected to lead to fewer traffic disruptions during the construction phase compared to alternatives that are routed along existing roadways.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b includes the Downtown Livermore and Greenville East Stations and the Greenville Yard. The same impacts discussed for Alternative 1a apply to this alternative because the two alternatives would include the same stations and maintenance yard and would only differ at the SPRR alignment.

Alternative 2 – Las Positas. Traffic disruptions associated with the Isabel/I-580 Station discussed in Alternative 1 apply to this alternative. In addition, traffic delays may occur along Las Positas Road and Vasco Road during construction of the aerial structure, and Patterson Pass Road during the construction of the Vasco Road Station. Construction of the BART alignment would require temporary lane closures along I-580 and Las Positas Road, Arroyo Vista Road, and Contractors Street.

Alternative 2a – Downtown-Vasco. Construction of the Downtown Livermore Station would cause traffic disruptions along Railroad Avenue, North Livermore Avenue, First Street, Junction Avenue, and other local surface roadways in the vicinity of the Station. Traffic disruptions associated with the Vasco Road Station discussed in Alternative 2 apply to this alternative. Construction of the BART alignment would require temporary lane closures along I-580 and roadway closures along El Charro Road between I-580 and Stanley Boulevard. This alternative makes substantial use of existing rail rights-of-way through developed areas in the City of Livermore. Such use would be expected to lead to fewer traffic disruptions during the construction phase compared to alternatives that are routed along existing roadways.

Alternative 3 – Portola. Traffic disruptions associated with the Isabel/I-580 Station discussed in Alternative 1 and with the Downtown Livermore Station discussed in Alternative 1a apply to this alternative. In addition, Portola Avenue and Junction Avenue would be disrupted along much of their length while the subway box is under construction.

Alternative 3a - Railroad. Traffic disruptions associated with the Downtown Livermore Station discussed in Alternative 1a apply to this alternative. In addition, traffic disruptions along Isabel Avenue and Stanley Boulevard would be expected during the construction of the Isabel/Stanley Station. This alternative makes substantial use of existing rail rights-of-way as it routes through developed areas in the City of Livermore, which would be expected to lead to fewer traffic disruptions during the construction phase compared to alternatives that area routed along existing roadways.

Alternative 4 – Isabel/I-580. Traffic disruptions would be anticipated along I-580, Airway Boulevard, Kitty Hawk Road, and Isabel Avenue in the vicinity of the Isabel/I-580

Station during the construction phase. Moreover, construction of the BART alignment in the freeway median would necessitate temporary lane closures along I-580.

Alternative 5 – Quarry. Traffic disruptions associated with the Isabel/Stanley Station discussed in Alternative 3a apply to this alternative. Construction of this BART extension alternative would require temporary lane closures along I-580 and roadway closures along El Charro Road between I-580 and Stanley Boulevard.

MITIGATION MEASURE. The following measure would reduce construction-related traffic impacts to less than significant. (LTS)

CI-TR-1.1 Develop and Implement a Construction Phasing and Traffic Management Plan. BART will ensure that a Construction Phasing and Traffic Management Plan is developed and implemented by the contractor. The plan shall define how traffic operations, including construction equipment and worker traffic, are managed and maintained during each phase of construction. The plan shall be developed in consultation with the cities of Dublin, Pleasanton, and Livermore, BART, Caltrans, Alameda County, and local transit providers, including Livermore Amador Valley Transit Authority (LAVTA), and Altamont Commuter Express (ACE). The contractor shall also consult with Caltrans and the highway patrol in the development of the plan in order to address any issues and reduce disruption to the flow of traffic along I-580 to the extent feasible. This plan shall also be coordinated with plans to maintain access and parking for adjacent businesses and residences that may be affected. This plan shall also be reviewed by affected emergency service providers to ensure that appropriate measures have been included. Emergency service providers shall be notified two weeks in advance of any lane or roadway closures so that alternate emergency response routes can be identified for use during the affected time period. To the maximum extent feasible, the plan shall include the following measures:

a) Specify predetermined haul routes from staging areas to construction sites and disposal areas by agreement with the cities of Dublin, Pleasanton, and Livermore, and Alameda County prior to construction. The routes shall follow streets and highways that provide the safest route and have the least possible impact on traffic.

b) Identify construction activities that, due to concerns regarding traffic safety or congestion, must take place during off-peak hours.

c) Provide a plan for lane closures and require information be provided to the public on lane closures using signs, press releases, and other media tools.

d) Identify a telephone number that the public can call for information on construction scheduling, phasing, and duration, as well as for complaints. Such information shall also be posted on BART's website.

e) Provide safe access and circulation routes for vehicles, bicycles, pedestrians, and emergency response vehicles during construction.

f) Provide parking replacement where construction results in temporary displacement of parking.

CI-TR-2 Transit and Freight Rail Construction Impacts

Construction activities, described above, could interfere with LAVTA bus routes, as local streets used by LAVTA buses may be closed temporarily; delivery trucks and construction crews would increase traffic volumes on local roads that could disrupt bus service frequency and scheduling; and bus stops may need to be temporarily relocated. The impacts would have a potentially significant temporary effect on bus service and ridership.

As noted above under the Construction Scenario, construction of the BART to Livermore Extension, under all BART extension alternatives except Alternative 1, would require temporary horizontal relocation of the UPRR or SPRR tracks to allow construction of the new BART facilities. A temporary track, known as a "shoofly," would bypass the construction areas and permit ACE and freight trains to continue to operate during the construction period.

MITIGATION MEASURE. The following measure would reduce construction-related impacts on local transit to less than significant. (LTS)

CI-TR-2.1 Plan, Schedule, and Coordinate Construction Activities to Reduce Effects on Local Transit Bus Lines, ACE Service, and Freight Rail Service. BART shall ensure that the Construction Phasing and Traffic Management Plan, developed under Mitigation Measure CI-TR-1.1, includes consultation with local transit providers, ACE, and UPRR. The Plan shall include specific measures to reduce to the extent feasible possible detour and other impacts on transit service resulting from BART to Livermore Extension construction-related activities. These measures shall limit, to the maximum extent feasible, rerouting of bus routes, changes to bus stops, and altering of train service. Any proposed changes to routes, service, and other operations shall be announced to the public using signs, press releases, on-bus/on-train posters, and other media tools.

CI-TR-3 Construction Impacts to Existing BART System

Construction of the BART extension from the Dublin/Pleasanton end of line would likely be designed to avoid interference with current BART operations. However, the existing tailtracks at the station, which provide train storage and maintenance space, would likely not be available for use during construction as there would be modifications to the tailtracks to accommodate the BART extension. BART would need to temporarily move these operations to another location within the existing BART system until the construction

of the station has been completed. No new storage facilities would be required. Impacts to the existing BART system during construction would be less than significant.

CI-TR-4 Construction Impacts to Pedestrian, Bicycle, and Trail Systems

Construction activities, described above, could interfere with existing pedestrian, bicycle, and trail routes, as the project would require construction within or across areas where these facilities exist. The extent of these impacts would need to be evaluated during the project-level analysis; however, examples of potential conflicts with pedestrian or bicycles would include during reconstruction of the Las Colinas road overpass (Alternative 1), new underpasses (from at-grade) at North L Street and Junction Avenue (Alternative 1a and 1b), new underpass (from at-grade) at Vasco Road (Alternative 1b), during construction of aerial structure along Las Positas Road (Alternative 2), and during construction of subway along Portola Avenue and Junction Avenue. During construction, there is the potential for closure of a sidewalk or bicycle lane, and some facilities may need temporary relocation. The impacts would have a potentially significant temporary effect on pedestrian, bicycle.

MITIGATION MEASURE. The following measure would reduce construction-related impacts on pedestrians, bicycles, and trails to less than significant. (LTS)

CI-TR-4.1 Maintain Pedestrian, Bicycle, and Trail Access During Construction. While construction impacts are temporary, they can continue for a considerable period of time particularly when extensive modifications are proposed. Construction under all alternatives has the potential to impact pedestrians, bicycles, and trails both along the designated alignment and at station sites. Routes shall be designated for pedestrians, bicycles, and trails during construction to maintain connectivity to the extent feasible and ensure safety. Necessary detours should be clearly marked.

Visual Quality

CI-VQ-1 Visual Quality

Potential construction yards and staging areas have not been identified at this time. However, construction yards and staging areas would typically include security lighting and fencing enclosing areas for temporary construction offices, stored materials, and equipment. The yards would include multiple modular office units, trailers and storage containers, and worker parking. These temporary facilities would require utility power and communication services, fueling depots, and be used for the delivery of bulk materials and debris transfer. Some may include fabrication facilities. At other locations, construction access to the I-580 median would be required from the interior lane for both eastbound and westbound traffic. Night work could be required on specific occasions for material deliveries and traffic sensitive work that would require illuminated site areas.

Because of the change from current conditions during periods of construction, and the presence of residential and commercial uses throughout the study area, construction activities are considered a potentially significant visual impact. This construction impact, although significant, would be localized and short-term, lasting intermittently during the actual phased periods of construction at specific locations within the project corridor construction areas.

MITIGATION MEASURE. The following mitigation measure would reduce project construction visual impacts to a less-than-significant level. (LTS)

CI-VQ-1.1 Visually Screen Construction Yards and Staging Areas. Views of stockpiled and stored construction materials and equipment shall be minimized to the extent feasible. Staging areas shall be located internal to the designated area to the extent feasible, but away from local residential and commercial areas, as close to or within the areas of construction as possible, yet out of the way of community traffic, pedestrian use, and local views.

CI-VQ-1.2 Use Vegetation to Reduce Impacts to Land Disturbed by Construction of Alignments. Seed and plant areas that are affected by cut, fill, or grading.

Cultural Resources

CI-CR-1 Archaeological Resources, Including Human Burials, and Significant Historic-Age Built Environment Resources

Potential permanent impacts to cultural resources, including prehistoric and historic-period archaeological resources and historic-period buildings, structures, and other objects, during the construction period are discussed in Section 3.6, Cultural Resources. However, there is also the potential for temporary impacts that could result from construction activities, including from construction laydown areas, which have not been identified at this time. Temporary impacts during construction could include impacts associated with temporary degradation of the resource setting from construction activities, including dust and construction noise and vibration. Temporary impacts could also include restricted access to historic properties during construction. Project-level analysis would be required to provide a thorough assessment of potential temporary impacts on significant cultural resources during construction. However, because these impacts would be temporary and would not result in permanent damage or degradation of the resource setting, temporary construction impacts are considered less than significant.

Geology, Soils, and Seismicity

CI-GEO-1 Soil Erosion

The study area is underlain by erosive soils, as described in Section 3.7, Geology, Soils, and Seismicity, which may present design and construction constraints. When surface

portions of the study area are excavated or otherwise disturbed by construction activities, erosion and sediment transport could occur during heavy rain or wind conditions. Soil erosion has the potential to impact water quality; water quality impacts from erosion are addressed in Section 3.8, Hydrology and Water Quality.

Figure 3.8-7 in Section 3.8, Hydrology and Water Quality, depicts the areas in the study area and vicinity that have highly erodible soils. Table 3.8-5, Direct Quantitative Impacts, and Table 3.8-6, Indirect Quantitative Impacts, in Section 3.8, Hydrology and Water Quality, identify Alternatives 1, 1a, and 1b as disturbing the largest acreage of highly erodible soils; as much as 54 acres of highly erodible soils would be indirectly disturbed and over 72 acres of highly erodible soils would be directly disturbed by the BART extension alternatives.

Excessive soil erosion can lead to damage of building foundations and roadways if soil loss occurs adjacent to existing structures or roads. Deposition of eroded soils could disrupt or cause damage to properties downslope from the eroded sites. Specifically, construction of elevated tracks adjacent to the gravel mining activities adjacent to El Charro Road could erode soils that could be deposited in the pits. However, the pits that are adjacent to portions of Alternatives 1a, 1b, 2a, 3a, and 5 along El Charro Road have been fully extracted and are not in use. The pit areas are in Yolo loam, a soil type that is well drained and has a "slight" erosion hazard.[1]

As explained in Section 3.8, Hydrology and Water Quality, the BART Facility Standards Section 01 57 00 (Temporary Controls, 1.08 - Erosion and Sediment Control, 1.09 - Dust Control, and 1.10 - Mud Control) and Section 31 00 00 (Earthwork, 1.11 - Site Conditions and 3.03 - Earthwork General Requirements) includes requirements for erosion and sediment controls for construction operations. The San Francisco Bay Regional Water Quality Control Board (RWQCB) would require BART to obtain coverage under an NPDES General Permit for Construction Discharges of Stormwater Associated with Construction Activities. As part of the RWQCB requirements, BART would develop and implement a Storm Water Pollution Prevention Plan (SWPPP) prior to construction, which would describe:

- Standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas;
- Personnel training;
- Scheduling and implementation of Best Management Practices (BMPs) throughout the construction phases and during the rainy season; and

[1] Parikh Consultants, *Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California,* 2009

- Mitigation and monitoring throughout the construction period.

Standard erosion measures would be incorporated in the SWPPP, and could include, but would not necessarily be limited to:

- Temporary erosion control measures such as slope stabilizers, dust suppression and sediment barriers;
- Dust erosion control measures to reduce wind erosion and loss of soil;
- Sediment barriers to slow runoff and trap sediment; and
- Temporary erosion control devices installed in accordance with the required construction SWPPP prior to site clearing and inspected during regular site compliance inspections.

Required compliance with the BART Facility Standards and Construction General Permit would ensure erosion and sediment controls were implemented, and erosion-related impacts would be less than significant**.**

Hydrology and Water Quality[2]

CI-HY-1 Construction-Related Flooding

Construction of the BART extension alternatives would involve typical construction practices and drainage feature crossings. These practices could result in on- and off-site flooding. On-site flooding could occur where excavations are below the local high water table or where stormwater runoff could enter excavated trenches, pits, or tunnels. Off-site flooding could occur when dewatering water is discharged to the local drainage system or where temporary damming and diversion or other dewatering of drainage features are required at non-aerial watercourse crossings.

Construction or expansion of non-aerial water crossings could result in flooding at off-site locations by temporary damming and diversion or other dewatering process, depending upon whether or not the drainage feature is perennial or intermittent/ephemeral[3] and the timing of construction (e.g., wet season or dry season). Diversions and dewatering would not result in greater downstream flows than under existing conditions; natural flows would simply be bypassed around the active work area. If the drainage is intermittent or ephemeral, construction activities can be scheduled during the non-flowing season and avoid the requirement for dewatering activities. All drainage features crossing the study area are ephemeral/intermittent; however, the actual flow regime in the Arroyo Mocho depends upon releases from Zone 7.

[2] See Section 3.8, Hydrology and Water Quality, for a description of the methodology used for this analysis.

[3] A perennial stream exhibits year-round flow; intermittent streams flow only for part of the year; and, ephemeral streams flow only in response to a rain event or other episodic discharge.

BART Facility Standards Section 31 00 00 (Earthwork) and Section 31 23 19 (Dewatering) require prevention of runoff into excavated pits and trenches (31 00 00 3.06.A. – Excavation and 31 23 19 1.08.B. – Surface Drainage), minimizing ponding of surface water (Section 30 00 00 1.11.B.2. – Site Conditions), and drainage of excavations if water ponds within them (31 23 19 1.08.C. - Drainage of Excavated Areas). Therefore, where excavations are below the local high water table, temporary dewatering would be required during construction. These requirements would prevent substantial on-site flooding during construction of the BART extension alternatives, including any associated tunnels.

Where natural drainageways are intercepted by construction activities, BART Facility Standards require that such drainageways shall be protected so that runoff from the site or water from construction activities is not allowed to enter the natural drainageway (Section 01 57 00 Temporary Controls, 1.08.C.-Prevention of Erosion). Consequently, construction site discharges would not result in increased water flow to natural drainageways that could cause or contribute to off-site flooding.

All dewatering activities would be subject to either the Construction General Permit for small discharges or an individual Waste Discharge Requirement (for discharges to the land surface) or NPDES Permit (for discharges to surface waters) issued by the SFBRWQCB for large discharges, as applicable. In accordance with BART Facility Standards (Section 31 23 19 Dewatering, 3.03 – Records) dewatering flow rates must be monitored and submitted to BART during the period that the dewatering system is in operation. Monitoring and reporting of discharge flow rates would ensure that permit conditions are complied with and reduce the potential for off-site flooding from construction dewatering activities if the allowable flow rates do not exceed the capacity of the drainage system. These WDRs/permits would set limits on the acceptable discharge rates to protect water quality, which would also serve to reduce discharges that could cause or contribute to off-site flooding. However, even though direct discharges at natural water crossings would not be allowed by BART Facility Standards, dewatering activities could still result in more water discharged to the storm drain system and cause or contribute to downstream flooding.

Placement of structures or other fill material within drainage features, as required for expansion of existing or construction of new non-aerial drainage crossings, would require a USACE Section 404 permit and associated SFBRWQCB Section 401 Water Quality Certification. Additionally, work within a stream or on a streambank would require a CDFG Streambed Alteration Agreement. The permit applications must include a discussion of construction BMPs, including damming and diversions or other dewatering activities, and the permit would include any additional requirements for protection of water quality as deemed necessary by the review agency. However, if the diversion is insufficient to handle all required bypass flows, upstream flooding could still occur.

The potential for significant off-site construction flooding impacts depends primarily upon the number of non-aerial crossings, whether or not discharges are made to the Arroyo Mocho or other tributaries, and whether or not dewatering would likely be required.

Alternative 1 – Greenville East. Table 3.8-5 in Section 3.8, Hydrology and Water Quality, shows that this alternative would result in nine non-aerial creek crossings and three other local drainage crossings. Although all watercourses and drainages are ephemeral or intermittent, if construction occurs during the wet season, construction of all crossings would have the potential for flooding impacts associated with water diversions. Upstream land uses along the drainage features are primarily agriculture or vacant lands. Potential flooding associated with insufficient bypass capacity would not be expected to be substantial or cause a substantial effect and impacts would be less than significant. Further, no on-site flooding would be expected with implementation of BART Facility Standards.

Since the seasonal high soil water table is within five feet of the surface, dewatering of trenches and pits may also be required for wet season construction activities, but the amount of discharge would not be expected to be substantial. The depth to the upper groundwater aquifer varies along this alignment, but is typically about 10 to 20 feet bgs (or deeper) from the beginning until about First Street, where it is less than 10 feet bgs until about Vasco Road. Therefore, it is not likely that substantial construction groundwater dewatering would be required along the majority of the Alternative 1 alignment.

From about First Street to about Commerce Way, the depth to the upper groundwater aquifer could be within 10 feet of the ground surface. However, Alternative 1 would be constructed at-grade and substantial groundwater dewatering in this area would not be expected. Furthermore, in accordance with BART Facility Standards, no dewatering or project site runoff would be allowed to discharge to any creeks within this area. Therefore, impacts under this alternative would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Potential construction-related flooding impacts under this alternative would be similar to those under Alternative 1, except that this alternative would result in affecting five less non-aerial creek crossings and two less local drainage crossings. This alternative would cross the Arroyo Mocho in an aerial configuration, and would require construction of support columns and foundations near the Arroyo Mocho. However, substantial dewatering would not be likely because the depth to the upper groundwater aquifer is expected to be at least 10 feet bgs and typically more than 20 feet bgs along the entire corridor; excavations would not likely extend to substantially below the upper groundwater aquifer water table. At the program level, the amount of dewatering and discharge to drainages that would be required under this alternative is unknown, and off-site flooding impacts would be potentially significant.

Alternative 1b – Downtown-Greenville East via SPRR. Potential construction flooding impacts under this alternative would be the same as for Alternative 1a, except that one more non-aerial creek crossing would occur. Therefore, impacts under this alternative would also be potentially significant for the same reasons identified under Alternative 1a.

Alternative 2 – Las Positas. Potential construction flooding impacts under this alternative would be similar to those as for Alternative 1, except that three fewer non-aerial creek crossings would be required; and one less local drainage crossing would be required for this alternative. Impacts would be less than significant under Alternative 2.

Alternative 2a – Downtown-Vasco. Potential construction flooding impacts under this alternative would be the same as for Alternative 1a, except two less creek crossings and no local drainage crossing would be required for this alternative. Therefore, with Alternative 2a, impacts would also be potentially significant.

Alternative 3 – Portola. Potential construction flooding impacts under this alternative would be similar to those as for Alternative 1, except that four less creek crossings and no local drainage crossings would be required. Additionally, there would be areas where substantial dewatering is expected for the underground tunnel section along Portola Avenue. Along Portola Avenue, groundwater depths are estimated at 30-to 0- feet below the tunnel bottom. Additionally, the one creek crossing along the Portola Avenue section of this alternative would be underground and subject to flooding if the creek culvert is cracked and the creek is flowing (wet season). Since on-site flooding could occur under this alternative because of groundwater dewatering, construction-related flooding impacts under this alternative would be potentially significant.

Alternative 3a – Railroad. Potential construction flooding impacts under this alternative would be the same as for Alternative 1a, except for two fewer creek crossings with this alternative. Impacts under Alternative 3a would be potentially significant.

Alternative 4 – Isabel/I-580. Potential construction flooding impacts under this alternative would be similar to those as for Alternative 1, except that four less creek crossings and no local drainage crossings would be required, and there would be no areas where substantial groundwater dewatering would be likely. Therefore, impacts would be less than significant.

Alternative 5 – Quarry. Potential construction flooding impacts under this alternative would be similar to those as under Alternative 1a, except that five less creek crossings and no local drainage crossing would be required. Impacts under Alternative 5 would be potentially significant.

MITIGATION MEASURES. Alternatives 1a, 1b, 2a, 3, 3a, and 5 could require dewatering. Discharges to surface waters or the storm drain system could cause or contribute to downstream flooding. BART Facility Standards prevent the direct discharge to creeks within the study area. In addition, Livermore staff has indicated that storm drains lead to

local drainage ways, and discharges to the local storm drain system may exceed the storm drain system capacity and cause flooding or result in an increase flow in further downstream local creeks and drainages. Where undercrossings of creeks would occur, potential leakage from the creek bed or breaches in the creek channel bottom from construction activities, by construction of Alternative 3, could also contribute to on-site flooding during construction activities. The following mitigation measures would ensure that construction dewatering for Alternatives 1a, 1b, 2a, 3, 3a, and 5 is reduced, that the potential for on-site flooding for Alternative 3 is reduced, and would reduce this impact to less-than-significant levels. (LTS)

CI-HY-1.1 Reduce Groundwater Dewatering (Alternatives 1a, 1b, 2a, 3, 3a, and 5). The Contractor shall reduce the need for groundwater dewatering, to the extent feasible, by construction scheduling, construction BMPs to prevent collection of water within excavated pits, trenches, and tunnels, and compliance with BART Facility Standards, the Construction General Permit or an individual NPDES Permit/Waste Discharge Requirements (WDR) for dewatering activities, and any other applicable permits. Groundwater dewatering BMPs shall be incorporated into the SWPPP. In addition, the Contractor shall test and monitor water quality to ensure that any water discharge meets the applicable water quality requirements of agencies with jurisdiction. The Contactor shall be responsible for compliance with this mitigation measure and BART shall monitor the project site for Contractor compliance.

CI-HY-1.2 Reduce the Potential for On-site Flooding During Undercrossing of Arroyo las Positas (Alternative 3). The Contractor shall reduce, to the extent feasible, the potential for on-site flooding from seepage from the bottom of the Arroyo las Positas at the undercrossing. The Contractor shall obtain and comply with any applicable permits required for undercrossing of the Arroyo las Positas, which would include, at a minimum, a CDFG Streambed Alteration Agreement. The Contractor shall implement construction BMPs to prevent damage to the Arroyo las Positas culvert during undercrossing activities.

CI-HY-2 Construction Erosion and Siltation

When portions of the BART extension alternatives are excavated or otherwise disturbed by construction activities, the potential for erosion and sediment transport from the alignments could increase during heavy rain or wind conditions, if the excavated area is not below-grade (below ground surface). Stormwater runoff (or wind), could carry the eroded sediments to the storm drain system and to local creeks, drainage channels, or impoundments. Additionally, work within channels or increased runoff from the project site could contribute to increased bed and bank erosion.

Some of the components of the BART extension alternatives are located in and around the bed and banks of drainage features. Station proximity to streams would also affect the

potential for sediment transport from an alternative and associated stations and facilities and siltation of surface water features. Additionally, portions of the BART extension alternatives would have direct or indirect effects on highly erodible soils.

All construction activities associated with the BART extension alternatives would be required to comply with the NPDES Construction General Permit (described above, under "Applicable Policies and Regulations"), which contains standards to ensure that water quality degradation would not be substantial. As part of compliance with this permit, specific erosion control and sediment transport BMPs would be required and additional stormwater quality BMPs identified in a SWPPP and implemented during construction to reduce erosion, sediment transport, and siltation of water features. Any wetland fill activities (e.g., stream crossings) would require a USACE Section 404 permit and associated RWQCB Section 401 Water Quality Certification. Additionally, work within a stream or on a streambank would require a CDFG Streambed Alteration Agreement. These permit applications must include a discussion of construction BMPs, including erosion and sediment control BMPs, and the permit would include any additional requirements for protection of water quality as deemed necessary by the review agency. Compliance with these permits would reduce potential project site and streambed and bank erosion and sedimentation during construction activities.

Commonly practiced BMPs may consist of a wide variety of measures taken to reduce pollutants in stormwater and other nonpoint-source runoff. Measures range from source control (minimize introduction of pollutants to stormwater runoff), to treatment of polluted runoff (remove pollutants from stormwater runoff). Typical BMPs for erosion and sediment control include dust control measures on disturbed areas during the dry season to control wind erosion; street sweeping to prevent sediment tracked onto road surfaces from being washed into the storm drain system; installing sediment transport control measures (such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, and sandbag dykes) to prevent sediment runoff to public roadways, storm drains, or waterways; erosion control measures (such as surface cover protection with mulch, geotextile fabrics, or temporary vegetation; diversion of stormwater around disturbed areas; soil stabilizers to prevent soil particle detachment; and flow velocity dissipaters to prevent erosion by concentrated flows) to prevent soil particle detachment for transport in runoff waters; work over water controls to prevent direct detachment of soil in water bodies; work during the dry season to minimize the potential for rainfall-induced sediment detachment and transport to surface waters; and, construction traffic controls to prevent tracking of soil onto road surfaces.

BART Facility Standards Section 01 57 00 (Temporary Controls, 1.08 - Erosion and Sediment Control, 1.09 - Dust Control, and 1.10 - Mud Control)) and Section 31 00 00 (Earthwork, 1.11 - Site Conditions and 3.03 - Earthwork General Requirements) includes requirements for erosion and sediment controls from construction operations. In accordance with the BART Facility Standards, the Contractor shall prevent erosion of excavated areas, embankments, stockpiled earth materials, and other erodible areas, and

shall provide control of runoff sediment from siltation and pollution of the drainage system (Section 01 57 00 1.08.A.1); prevent erosion of excavated areas, embankments, stockpiled earth materials, and other erodible construction areas, and prevent pollution of drainage systems by diversion of storm runoff around construction activities, by trapping or retaining sediment delivered by storm runoff (Section 01 57 00 1.08.A.2., Section 31 00 00 1.11.B.1., Section 31 00 00 3.03.B., Section 31 23 19 1.08.C.), by protecting open earth areas and excavated piles (Section 01 57 00 1.08.C.); provide control of construction operations so that excessive sediment or siltation shall not be introduced into the drainage systems from storm runoff (Section 01 57 00 1.08.A.3.); implementation of sediment control (01 57 00 1.08.D.); provide dust control even when sites are inactive or abandoned (Section 01 57 00 1.09 and Section 31 00 00 3.03.A.); prevent mud tracking onto impervious surfaces by mitigating on-site muddy areas, maintaining dry egress areas, wheel washing, and clean up operations (Section 01 57 00 1.10.A.-D.); and comply with all applicable federal, state, and local laws, orders, and regulations concerning the prevention, control, and abatement of water pollution (Section 01 57 00 1.08.A.4.). Additionally, an Erosion and Sediment Control Plan is required (Section 01 57 00 1.08.B.) and slope stabilization and protection would be required for all areas of cut and fill activities (Section 31 35 00 Slope Protection).

Except for the Arroyo Mocho, all study area natural creeks are susceptible to hydrograph modification. Changes in flow rate or duration at these natural drainage ways could result in stream bed or bank erosion, or other alterations in aquatic habitat and channel form or function. Where natural drainage ways are intercepted by construction activities, BART Facility Standards require that such drainage ways shall be protected so that runoff from the site or water from construction activities is not allowed to enter the natural drainage way (Section 01 57 00 Temporary Controls, 1.08.C.-Prevention of Erosion). In accordance with the Municipal NPDES Permit, flow duration controls shall be designed such that post project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project two-year peak flow, up to the pre-project 10- year peak flow, except as allowed for under the Municipal NPDES Permit.

Therefore, the potential for significant construction erosion and siltation impacts depends primarily upon the amount of highly erodible soils that could be exposed, the linear feet of streams disturbed, the amount of cut or fill required for grade separation structures, proximity of stations to surface water features, and the potential for increased flow rates in susceptible streams.

Alternative 1 – Greenville East. Off-site erosion could occur if there is direct work within or adjacent to drainage features or if discharges from the construction activities increase the rate or amount of stormwater runoff. This alternative would directly affect approximately 11,393 linear feet of stream beds or banks soils (see Table 3.8-6 in Section 3.8, Hydrology and Water Quality) and indirectly affect approximately 16,393 linear feet (see Table 3.8-7 in Section 3.8, Hydrology and Water Quality). As discussed above, work

within creeks or adjacent riparian areas would require a CDFG Streambed Alteration Agreement and/or CWA Section 404 permit and associated Section 401 Water Quality Certification. These permits would include BMPs for protection of creeks and streams from erosion and siltation.

In accordance with BART Facility Standards, no construction activity discharges to natural creeks would be allowed. Discharges of dewatering water to the local storm drain system would not directly cause or contribute to off-site streambed or bank erosion; however, the local storm drain system could discharge to a susceptible creek or channel. Only the easternmost portion of this alignment would likely require dewatering and this would not be expected to substantially increase the rate or duration of flow in susceptible downstream reaches. Compliance with existing regulations would reduce potential creek erosion and siltation to less-than-significant levels.

This alternative would directly disturb approximately 54.4 acres of highly erodible soils (see Table 3.8-6 in Section 3.8, Hydrology and Water Quality) and indirectly disturb approximately 72.1 acres of highly erodible soils (see Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Additional exposed surfaces would be susceptible to erosion and sediment transport from all disturbed areas within the study area (e.g., station areas). No cut and fill (potentially unstable slopes) are expected, except for the approach to the Greenville East Station. Implementation of BART Facility Standards, and compliance with the Construction General Permit and Municipal and County Codes and Ordinances (Alameda County Code Chapter 15.36 – Grading Erosion and Sediment Controls; City of Pleasanton Municipal Code Section 20.08.082 Appendix Chapter J amended – Grading; and, City of Livermore 18.08.250 Grading ordinance) would ensure fill area stability and that erosion and sediment controls are implemented. Consequently, potential on-site erosion hazards and off-site sediment transport would not be substantial and impacts would be less than significant.

Alternative 1a – Downtown-Greenville East via UPRR. Potential construction erosion and siltation impacts for this alternative are similar to those for Alternative 1 except that more stream length would be directly and indirectly impacted during construction activities and more highly erodible soils would be disturbed (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality); more fill areas would be required for grade separations (e.g., along the UPPR ROW) with the potential for more unstable slopes; and, no groundwater dewatering is expected. As with Alternative 1, existing regulatory requirements and BART Facility Standards would prevent substantial erosion in these areas and impacts would be less than significant.

Alternative 1b – Downtown-Greenville East via SPRR. Potential construction erosion impacts under this alternative would be the same as for Alternative 1a, except that the direct and indirect impact to streams (linear feet) would be slightly lower and the amount of highly erodible soils impacted would be slightly higher (see Table 3.8-6 and Table 3.8-7 in

Section 3.8, Hydrology and Water Quality). Existing regulatory requirements and BART Facility Standards would ensure that impacts would remain less than significant.

Alternative 2 – Las Positas. Potential construction erosion and siltation impacts under this alternative would be the similar as for Alternative 1, except for more cut and fill areas within the eastern portion of the alignment that would require slope stabilization, slightly higher direct and indirect impacts to streams (linear feet), substantially less highly erodible soils affected (five to 10 times lower, indirect and direct impacts, respectively), and no groundwater dewatering discharges to the storm drain system is expected (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Existing regulatory requirements and BART Facility Standards would ensure that impacts are less than significant.

Alternative 2a – Downtown-Vasco. Potential construction erosion and siltation impacts under this alternative would be the same as for Alternative 1a, except the direct and indirect impacts to streams (linear feet) would be slightly higher and the amount of highly erodible soils impacted would be about five to 10 times lower for indirect and direct impacts, respectively (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Existing regulatory requirements and BART Facility Standards would ensure that impacts are less than significant.

Alternative 3 – Portola. Potential erosion and siltation impacts under this alternative would be the similar as for Alternative 1 –Greenville East, except that substantially less direct and indirect impacts to streams (linear feet) would occur and less highly erodible soils would be affected (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Additionally, where this alternative leaves the I-580 corridor, until the Downtown Livermore Station, the alignment would be below-grade in a cut and cover tunnel requiring substantial cut and fill activities. The below-grade cuts would not be susceptible to erosion and off-site sediment transport. BART Facility Standards would include measures to prevent runoff of water into excavated areas, ensure slope stability, and provide for erosion and sediment control. Existing regulatory requirements (Construction General Permit, Municipal and County Codes and Ordinances) and BART Facility Standards would reduce potential effects on erosion and siltation within the study area.

However, if substantial dewatering for construction of the tunnel would be required, discharges to the storm drain system could cause or contribute to erosion in downstream hydrograph modification susceptible creeks (e.g., the Arroyo las Positas), which would be a potentially significant impact.

Alternative 3a – Railroad. Potential construction erosion and siltation impacts under this alternative would be the same as for Alternative 1a, except the amount of direct and indirect impacts to streams (linear feet) and highly erodible soils (acres) would be less (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Existing

regulatory requirements and BART Facility Standards would ensure that impacts are less than significant.

Alternative 4 – Isabel/I-580. Potential construction erosion and siltation impacts under this alternative would be the same as for Alternative 1, except the direct and indirect impacts to streams (linear feet) would be substantially lower, there would be no highly erodible soils disturbed, no fill material for grade separations would be required, and no groundwater dewatering discharges to the storm drain system is expected (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Existing regulatory requirements and BART Facility Standards would ensure that impacts would be less than significant.

Alternative 5 – Quarry. Potential construction erosion and siltation impacts under this alternative would be the same as for Alternative 1a, except the direct and indirect impacts to streams (linear feet) would be substantially lower, there would be no highly erodible soils impacted, and the extent of fill requirements would be substantially lower (see Table 3.8-6 and Table 3.8-7 in Section 3.8, Hydrology and Water Quality). Existing regulatory requirements and BART Facility Standards would ensure that impacts are less than significant.

MITIGATION MEASURE. Alternative 3 could require substantial groundwater dewatering during construction of subgrade tunnels. BART Facility Standards prevent the direct discharge to all natural drainages, which would prevent direct streambed and bank erosion. However, discharges to the storm drain system could indirectly cause or contribute off-site erosion in hydrograph modification susceptible creeks; dewatering water discharged to the local storm drain system could outlet to a susceptible creek and cause or contribute to stream bed or bank erosion. Implementation of the following mitigation measure under Alternative 3, in conjunction with Mitigation Measure HY-1.1, would ensure that potential discharges do not cause or contribute to downstream bed or bank erosion and would reduce impacts to less-than-significant levels. (LTS)

CI-HY-2.1 Limit Discharge From Dewatering (Alternative 3). Dewatering for tunnel excavation shall not cause or contribute to exceedence of the Hydromodification Management (HM) Standard (as contained in the Hydromodification Management Plan prepared by the Alameda County Clean Water Program) in the downstream susceptible surface water that ultimately receives the dewatering discharge.

CI-HY-3 Groundwater Quality, Recharge, and Depletion of Groundwater Resources

The potential for BART extension alternatives to cause or contribute to reductions in groundwater supplies depends primarily upon the amount of construction dewatering required. The seasonal high, perched soil water table may require dewatering in excavations and trenches during the wet season. This dewatering would be minor and

temporary and effects on the water table or groundwater resources would not be substantial. However, within the eastern portion of the study area, from about First Street to about Commerce Way, the upper groundwater aquifer is within 10 feet of the ground surface in some locations. Excavations may require dewatering in these locations. Additionally, sub-grade structures (e.g., tunnels) may encounter groundwater in areas where groundwater is more than 10-feet bgs. All construction dewatering activities would be temporary and not be substantial.

The delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could also introduce a risk for stormwater contamination that could affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination, and some hydrocarbon compound pollution associated with oil and grease can be toxic at low concentrations. Staging areas or building sites can also be the source of pollution due to the use of paints, solvents, cleaning agents, and metals during construction. Pollutants in stormwater runoff could infiltrate through exposed surfaces and migrate to groundwater resources. The depth to groundwater in the majority of the study area is more than 10 feet bgs and as noted in the setting of Section 3.8, Hydrology and Water Quality, soils have a high runoff rate (Hydrologic Groups C and D). A water table distance separation of 10-feet in California presumptively poses negligible risk for stormwater not associated with industrial activity or high vehicular traffic.[4]

Existing regulatory requirements (Construction General Permit) would require materials and waste management BMPs, including spill prevention and control and materials storage and handling, which would minimize pollutants in stormwater runoff that could infiltrate to groundwater and the deposition of pollutants onto exposed surfaces that could be washed into groundwater during a subsequent rain event. Furthermore, BART Facility Standards require BMPs to minimize pollution potential (Section 01 57 00 Temporary Controls, 1.07 – Pollution Abatement) and prevent stormwater run-on into excavated pits and trenches (31 23 19 Dewatering, 1.08 – Site Conditions; 31 00 00 Earthwork, 3.06 – Excavation). The potential for groundwater quality degradation during construction of the BART extension alternatives would not be substantial and impacts would be less than significant for all extension alternatives.

CI-HY-4 Violation of Water Quality Standards or Waste Discharge Requirements

Construction of the BART extension alternatives would be subject to waste discharge requirements including the Construction General Permit and potentially an individual WDR that may be required for groundwater dewatering activities. Additionally, because the BART extension alternatives would also occur within the Caltrans ROW, oversight by Caltrans would be required within these areas and compliance with conditions of the

[4] State Water Resources Control Board, *Water Quality Order No. 2003-0005-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (General Permit)*, Attachment 4, 2003, p. 10.

Caltrans Statewide Permit would be required. Discharges from an alternative would be subject to the water quality standards as set forth in the Basin Plan, including any adopted TMDLs.

Exposure of soil surfaces to erosion during clearing, grubbing, grading and excavation could result in transport of sediment directly or indirectly (via the storm drain system) to surface waters. Erosion and sedimentation affects water quality through interference with photosynthesis, oxygen exchange, and the respiration, growth, and reproduction of aquatic species. Other pollutants, such as nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported downstream, which could also contribute to degradation of water quality.

In addition to potential pollutant contributions from disturbed areas, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could introduce a risk for stormwater contamination that could affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination, and some hydrocarbon-compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas or building sites can be the source of pollution because of the use of paints, solvents, cleaning agents, and metals during construction. Materials from demolition of existing structures and soil excavation could contain hazardous materials that may be exposed to stormwater. Furthermore, concrete for structures and footings and other paving materials would be used and could pose potential sources of water quality pollution, if any of these materials were spilled or deposited on unprotected surfaces or washed into the storm drain system. Larger pollutants, such as trash, debris, and organic matter, are additional pollutants that could be associated with construction activities.

Effects associated with metals in stormwater include toxicity to aquatic organisms, such as bioaccumulation, and the potential contamination of drinking supplies. Introduction of other chemicals, such as concrete and paving materials could also be toxic to aquatic life. Pesticide use (including herbicides, fungicides) associated with site preparation work (as opposed to pesticide use for landscaping) is another potential source of stormwater contamination. Pesticide effects on water quality include toxicity to aquatic species and bioaccumulation in larger species. Other potential effects could include health hazards and aquatic ecosystem damage associated with introduction of bacteria, viruses, and vectors if waste management is not adequately implemented.

Within the study area, both the Arroyo Mocho and Arroyo las Positas have been listed (Section 303(d) list) as impaired by urban pesticides and a TMDL is in effect. The proximity of alternatives to these creeks and use of pesticides during construction would affect the potential violation of TMDL-based regulatory requirements.

All construction within the Caltrans I-580 corridor would require oversight by Caltrans and an encroachment permit. The encroachment permit would specify BMPs required to

comply with Caltrans Statewide Permit and preparation of a Caltrans-approved SWPPP. A Caltrans SWPPP would also serve for compliance with the Construction General Permit. In non-Caltrans portions of the BART extension alternatives, local agencies and the County of Alameda also require compliance with the NPDES permits in Municipal and County Codes and Ordinances. As mentioned previously, BART Facility Standards for erosion and sediment control, materials and waste management, prohibition of oils and chemicals for dust control, tracking controls, sediment clean up, dewatering reporting and monitoring requirements, and source controls, would also ensure compliance with the Construction General Permit and any individual permit for dewatering, if applicable.

The SWRCB has identified compliance with the Construction General Permit requirements as protective of water quality during construction activities. The SFRWQCB would include necessary requirements in any individual WDR for construction dewatering, if an individual WDR for construction dewatering is necessary. Therefore, the BART extension alternatives would not violate water quality standards. By compliance with existing regulatory requirements and BART Facility Standards, construction impacts resulting from violation of WDRs, water quality standards, and other regulatory requirements would be less than significant.

Biological Resources

CI-BIO-1 Jurisdictional Wetlands, Other "Waters of the U.S." and "Waters of the State"

Construction impacts to wetlands, other "waters of the U.S." and "waters of the State" are those impacts that are temporary in nature and can mostly be avoided by best management practices (BMPs) such as silt fencing, waddles, straw mats, dewatering stations, etc. These BMPs tend to be applied to prevent encroachment, runoff from construction areas into wetlands or stream corridors. As shown in Figures 3.9-2a through Figure 3.9-2f in Section 3.9, Biological Resources, all alternatives have the potential for temporary impacts on wetlands, since all alternatives either cross creeks, or their construction footprints are in close proximity to ponds, swales, and seasonal wetlands that could be impacted by construction related activities. These effects and associated mitigation measures are described in Section 3.9, Biological Resources.

MITIGATION MEASURES. Mitigation Measures BIO-1.1, BIO-1.2, and BIO-1.3, all discussed in Section 3.9, Biological Resources, would reduce the impacts to less than significant. (LTS)

CI-BIO-2 Special-Status Species (Plants, Vernal Pool Invertebrates, California Tiger Salamander, California Red-Legged Frog, Western Pond Turtle, and California Central Coast Steelhead) and Their Habitat

Temporary, construction related impacts on special status species and their habitat could include encroachment into suitable habitat, siltation of suitable aquatic habitat, construction related run-off, etc. Construction-related impacts on special status plants, CRLF, and

WPT could occur along any of the alternatives, as suitable habitat is present along all of them.

Special-status vernal pool invertebrates could occur along Alternatives 1, 1a, 1b, 2, 2a, 3a, and 4. Suitable habitat for CTS occurs along Alternatives 1, 1a, 1b, 2, and 2a. Suitable habitat for California Central Coast Steelhead occurs in the Arroyo Mocho near Alternatives 1a, 1b, 2a, 3a, and 5.

Construction activities associated with the BART extension alternative could result in a potentially significant impact on special-status species and their habitat. These effects and their associated mitigation measures are discussed in Section 3.9, Biological Resources.

MITIGATION MEASURES. Mitigation Measures BIO-2.1, BIO-2.2, BIO-2.3, BIO-4.1, BIO-4.2, BIO-4.3, BIO-5.1, BIO-7.1, and BIO-7.2, all described in Section 3.9, Biological Resources, would reduce the impacts to less than significant. (LTS)

CI-BIO-3 Special-Status Nesting Birds

A variety of special-status birds are likely to be present throughout the BART to Livermore Extension study area; some are resident species and some are migratory species that breed within the area. The special-status birds include the white-tailed kite, burrowing owl, tricolored blackbird, yellow-headed blackbird, and loggerhead shrike.

During PBS&J site visits to the study area, burrowing owls, white-tailed kites, northern harriers, and red-tailed hawks were observed foraging within the grassland, ruderal, and agricultural areas along the BART extension alternatives. The presence of foraging birds indicates the potential for nesting activity within the study area. Existing trees within the proposed station and yard areas, riparian vegetation located within the arroyos, and the grassland areas are suitable nesting habitats for the above species.

Areas within the proposed Isabel/I-580 Station, Isabel/Stanley Station, Vasco Road Station, Vasco Yard, Greenville East Station, and Greenville Yard contain suitable nesting habitat that include nest trees, riparian vegetation, and grassland. Most bird nests are protected under the MBTA. Construction of the BART extension alternatives would require grading and could require removal of trees and ruderal and grassland habitat within the footprint of the tailtracks, proposed stations, and yards. Therefore, construction of the BART extension alternatives could result in the loss of active nests, a significant impact on special-status bird species and birds protected under the MBTA. However, since construction of the BART extension alternatives would only remove or grade limited areas (station footprints, tracks, access roads), remaining nesting habitat would still be present for the use by special-status bird species once construction is finalized.

MITIGATION MEASURES. The following measures would reduce the impact on nesting birds to less than significant. Mitigation Measures CI-BIO-3.1 through CI-BIO-3.3 address different bird species. Mitigation Measures CI-BIO-3.1 and CI-BIO-3.3 would apply to all

of the alternatives as suitable habitat for nesting birds exists along all of them. Mitigation Measure CI-BIO-3.2 would only apply to Alternatives 1a, 1b, 2a, 3a, and 5. (LTS)

CI-BIO-3.1 Protect Burrowing Owl Burrows. No more than 30 days prior to project-related grading a qualified biologist shall conduct focused surveys for burrowing owls in areas of suitable habitat on and within 500 feet of the selected BART extension alternative. Surveys shall be conducted in accordance with prevailing CDFG protocol.[5] If no occupied burrows are found in the survey area, a letter report documenting survey methods and findings shall be submitted to CDFG, and no further mitigation is necessary.

If surveys demonstrate the presence of burrowing owls, BART will consult with the appropriate regulatory agencies to identify project-level mitigation requirements, based on the agencies' standards and policies as then in effect. Mitigation may include the following, based on current agency standards and policies.

a) Impacts to the burrowing owl would be avoided, if feasible, by establishing a buffer of 165 feet during the non-breeding season (September 1 through January 31) or 300 feet during the breeding season (February 1 through August 31). The size of the buffer area may be adjusted if a qualified biologist and CDFG determine that construction activities would not adversely affect the owl(s). No project activity would commence within the buffer area until a qualified biologist confirms that the burrow is no longer occupied.

b) If impacts to occupied burrows are unavoidable, on-site passive relocation techniques would be used if approved by CDFG to encourage owls to move to alternative burrows outside of the impact area. However, no occupied burrows would be disturbed during the nesting season unless a qualified biologist verifies through non-invasive methods that the birds are not nesting.

c) If relocation of the owls is approved for the project by CDFG, BART would hire a qualified biologist to prepare a plan for relocating the owls to a suitable site. The relocation plan must include: (1) the location of the nest and owls proposed for relocation; (2) the location of the proposed relocation site; (3) the number of owls involved and the time of year when the relocation is proposed to take place; (4) the name and credentials of the biologist who would be retained to supervise the relocation; (5) the proposed method of capture and transport for the owls to the new site; (6) a description of the site preparations at the relocation site (e.g.,

[5] California Department of Fish and Game. Staff Report on Burrowing Owl Mitigation. www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf, 1993, accessed April 22, 2009.

enhancement of existing burrows, creation of artificial burrows, one-time or long-term vegetation control, etc.); and (7) a description of efforts and funding support proposed to monitor the relocation. Relocation options may include passive relocation to another area of the site not subject to disturbance through one-way doors on burrow openings, or construction of artificial burrows in accordance CDFG guidelines.

CI-BIO-3.2 Protect Tricolored Blackbird and Yellow-Headed Blackbird Nests. If initiation of site grading is proposed during the tricolored blackbird's or yellow-headed blackbird's nesting season (April 1 – July 1), BART shall retain a qualified biologist to conduct focused surveys for nesting blackbirds in areas of suitable habitat on and within 300 feet of the selected BART extension alternative through El Charro Road (adjacent to the quarries). If no occupied nests are found in the survey area, a letter report documenting survey methods and findings shall be submitted to CDFG, and no further mitigation is necessary.

If surveys demonstrate the presence of nesting blackbirds, BART will consult with the appropriate regulatory agencies to identify project-level mitigation requirements, based on the agencies' standards and policies as then in effect. Mitigation may include the following, based on current agency standards and policies.

- BART would install brightly colored construction fencing that establishes a boundary 200 feet (as defined by CDFG) from the active nest or colony.
- No disturbance associated with the BART extension alternative would occur within the 200-foot fenced area during the nesting season of April 1 through July 1 or until a qualified biologist has determined that the young have fledged or that the nest is no longer occupied prior to disturbance of the nest site or colony area.

CI-BIO-3.3 Protect Birds Covered by the Migratory Bird Treaty Act (Including White-Tailed Kite, Loggerhead Shrike, and Other Special-Status Species). Between March 1 and September 15, BART shall have a qualified biologist conduct nest surveys no more than 30 days prior any demolition/construction or ground-disturbing activities that are within 500 feet of potential nest trees or suitable nesting habitat (i.e., trees, tule, cattails, grassland). A pre-construction survey report shall be submitted to CDFG that includes, at a minimum: (1) a description of the methodology including dates of field visits, the names of survey personnel with resumes, and a list of references cited and persons contacted; and (2) a map showing the location(s) of any bird nests

observed on the project site. If no active nests of Migratory Bird Treaty Act covered species are identified, then no further mitigation is required.

If active nests of protected bird species are identified in the focused nest surveys, BART will consult with the appropriate regulatory agencies to identify project-level mitigation requirements, based on the agencies' standards and policies as then in effect. Mitigation may include the following, based on current agency standards and policies.

a) BART, in consultation with CDFG, would delay construction in the vicinity of active nest sites during the breeding season (March 1 through September 15) while the nest is occupied with adults and/or young. A qualified biologist would monitor any occupied nest to determine when the nest is no longer used. If the construction cannot be delayed, avoidance measures would include the establishment of a non-disturbance buffer zone around the nest site. The size of the buffer zone would be determined in consultation with the CDFG, but will be a minimum of 100 feet. The buffer zone would be delineated with highly visible temporary construction fencing.

b) No intensive disturbance (e.g., heavy equipment operation associated with construction, or use of cranes) or other project-related activities that could cause nest abandonment or forced fledging would be initiated within the established buffer zone of an active nest between March 1 and September 15.

c) If construction activities are unavoidable within the buffer zone, BART would retain a qualified biologist to monitor the nest site to determine if construction activities are disturbing the adult or young birds. If abandonment occurs, the biologist would consult with CDFG or USFWS (who monitor compliance with the MBTA) for the appropriate salvage measures. BART would be required to fund the full costs of the salvage measures.

d) If fully protected species (white-tailed kites) are found to be nesting near the selected BART extension alternative, their nests would be completely avoided until the birds fledge. Avoidance would include the establishment of a non-disturbance buffer zone of 250 feet, or as determined in consultation with the CDFG.

CI-BIO-4 Special-Status Bats

No bat surveys have been conducted for the BART extension alternatives. However, highway structures along the BART extension alternatives and some trees may represent potentially suitable roosting habitat for a variety of regionally occurring bat species. A comparison among the alternatives for the potential to disturb these potential roosting

habitats is adequate at this program-level analysis to inform BART and the public of the potential impacts to bats. The only special-status bat species that has the potential to occur within the study area is the pallid bat. The pallid bat is commonly found roosting under bridges and in trees. Other regionally occurring special-status bats were determined to be unlikely to occur within the study area based on an apparent lack of suitable roosting habitat.

A bat roost habitat assessment was conducted in February 2006 as part of the environmental surveys for the I-580 Eastbound HOV Lane Project. Several highway structures present within I-580 represent potential bat roosting habitat and the visual inspection conducted in February 2006 resulted in observations of several active bat roosts. No special-status bats were observed.[6]

Removal of trees and/or alteration of highway structures from the BART extension alternatives could impact roosting sites for this species. These roosting sites can also be used as maternal roosts. Disturbance of roosting sites during the maternity season (May 1st – October 1st) could result in a potentially significant impact. A more detailed description of the impacts associated with each alternative is provided below.

MITIGATION MEASURE. The following measure would reduce the potentially significant impact on special-status bats and their roost sites to less than significant. Mitigation Measure CI-BIO-4.1 would be applicable to all alternatives; Mitigation Measure CI-BIO-4.2 would apply based on the results of Mitigation Measure CI-BIO-4.1. (LTS)

CI-BIO-4.1 Conduct Bat and Bat Roosting Site Surveys. Prior to construction activities, BART shall retain a qualified biologist to conduct a focused survey for bats and potential roosting sites along the selected BART extension alternative. The surveys can be conducted by visual identification and can assume presence of pallid bats or the bats can be identified to a species-level with the use of an "Anabat" unit. If no roosting sites or bats are found along the selected BART extension alternative, a letter report confirming absence shall be sent to CDFG and no further mitigation is required.

CI-BIO-4.2 Perform Monitoring and Implement Exclusion Measures if Bat Roosts are Identified. BART will consult with the appropriate regulatory agencies to identify project-level mitigation requirements, based on the agencies' standards and policies as then in effect. Mitigation may include the following, based on current agency standards and policies.

If bats are found roosting along the selected BART extension alternative outside of nursery season (May 1st through October 1st), then they would be evicted using bat exclusion techniques developed by Bat Conservation International (BCI) and in consultation with CDFG, that allow the bats to exit

[6] Caltrans, 2006.

the roosting site but prevent re-entry to the site. This would include but not be limited to the installation of one-way exclusion devices. The devices would remain in place for seven days and then the exclusion points and any other potential entrances shall be sealed. This work would be completed by a BCI recommended exclusion professional. The exclusion of bats would be timed and carried concurrently with any scheduled bird exclusion activities.

If bats are found roosting during the nursery season, then they shall be monitored to determine if the roost site is a maternal roost. Monitoring by either visual inspection of the roost bat pups, if possible, or monitoring the roost after the adults leave for the night to listen for bat pups. If the roost is determined to not be a maternal roost, then the bats would be evicted as described above. Because bat pups cannot leave the roost until they are mature enough, eviction of a maternal roost cannot occur during the nursery season. A buffer zone as determined in consultation with CDFG would be established around the roosting site within which no construction shall occur.

Noise and Vibration

CI-NO-1 Construction Noise

Depending on the alternative, construction for the BART extension alternatives would occur primarily along the median of I-580, El Charro Road, Portola Avenue, Las Positas Road, Greenville Road, and UPRR and SPRR rights of way. At this program level of analysis, detailed construction schedule and activities are not known. However, in general, construction of the alternatives would likely involve a range of noise-generating equipment including dump trucks, scrapers, water trucks, bulldozers, graders, truck-mounted cranes, loaders, excavators, rollers, concrete mix trucks, lubrication/fueling service trucks, concrete pumps, diesel generators, and compressed air units. In addition, haul trucks would bring in sub-ballast and structural concrete. Pile drivers, which typically generate the most noise, would also be used as part of the BART extension alternatives.

The study area contains residential, park, institutional, commercial, and industrial areas. The most stringent significance criterion is for residential areas. While detailed construction plans are not currently available, Table 3.16-5 shows the predicted distance at which the significance criteria identified in Table 3.16-2 would be exceeded for the following assumed likely scenarios: (1) one pile driver; (2) the two noisiest equipment types (excluding pile drivers); (3) the noisiest equipment (excluding pile drivers); and (4) the two equipment types with average noise levels.

Table 3.16-5
Distance of Significant Noise Impact during Proposed Construction for Residential, Commercial, and Industrial Receptors

		Distance of Significant Impact (ft)			
	Acceptable Hourly Noise (dBA)	Pile Driver	Noisiest Two (excluding pile drivers): Drill and Scraper	Noisiest One: Drill	Two "Average": Scraper & Water Truck
Residential					
Daytime	= < 90	170	130	120	60
Nighttime	= < 80	530	400	375	180
Commercial/ Industrial					
Daytime	= < 100	55	40	40	20
Nighttime	= < 100	55	40	40	20

Source: ERM, 2009. Calculated using FTA Guidelines.

Some commercial, industrial, residential areas may be as close as 50 feet from primary construction activities. Even without pile driving, impacts may be significant near residential and business areas. The exact locations of the impact would depend on number and type of equipment used on each segment at any particular time. The most significant impacts would occur at night near residential areas.

In addition to construction activities along the tracks, stations, and maintenance facility, activities at staging areas would also generate noise. While noise from activities in staging areas would typically be less than in other areas of construction, depending on the equipment being brought in and out of the staging area, impacts from the staging area may be significant, also depending on the proximity of the staging area to sensitive receptors. In addition, noise generated by haul trucks may have significant impacts on residential receptors, depending on the routes used to carry material to the site. For example, haul trucks may generate a noise level of more than 90 dBA at a distance of 35 feet, which would be significant for residential receptors during daytime operations.

Alternative 1 – Greenville East. Alternative 1 would require the construction of 11.6 miles of track along I-580, one at-grade station, one station on an aerial structure, and one maintenance facility. About 9.8 miles of the track would be constructed at grade, with the rest of the eastern portion of the tracks primarily constructed as an aerial in addition to some retained fill and retained cut areas near the Greenville East Station.

The aerial structures may require the need for pile drivers, which can generate the highest level of noise compared to other types of construction equipment. However, the aerial structure would be in an area with limited sensitive receptors, the closest ones being hotels

about 500 feet away. A maintenance facility would be constructed north of I-580, east of Laughlin Road. With construction activities being conducted right across from residential receptors along Laughlin Road, noise impacts during construction of the maintenance facility would likely be significant. The rest of the alignment also has residential, commercial, and industrial receptors located adjacent to I-580. Business receptors would be located more than 100 feet from the alignment and therefore, according to Table 3.16-5, construction activities at this distance would have a less-than-significant impact on these receptors. Residential receptors are located as close as 120 feet and may potentially be exposed to significant levels of noise from construction activities along the median of I-580.

Alternative 1a – Downtown-Greenville East via UPRR. Similar to Alternative 1, Alternative 1a would require construction of two aboveground stations (Downtown Livermore Station and Greenville East Station, although the Greenville East Station would be constructed on retained fill), about 13.2 miles of track, and one maintenance facility. However, after traveling along I-580 from Hacienda Drive to El Charro Road, the alignment departs I-580 and parallels El Charro Road until reaching the UPRR tracks. At this point, the alignment follows the UPRR right of way on the northern side of the tracks until it reaches the Greenville East Station. An aerial structure would be constructed on the portion of the alignment along El Charro Road, while the rest of the alignment off of I-580 would be constructed primarily on retained fill. The aerial structure may require the use of pile drivers near two residential receptors located approximately 100 feet from the proposed alignment. Depending on the proximity of the pile drivers to these receptors, construction noise impacts from the pile drivers may be significant. Even without the use of pile drivers, construction equipment may still have significant noise impacts on these residential receptors. In addition, the alignment along El Charro Road crosses through industrial (quarry) property and thus may have significant impacts on these industrial receptors. Also, the portion of the alignment near and within downtown Livermore is as close as 50 feet to residential receptors; therefore, construction activities may significantly impact these receptors. There are also two schools in the downtown area that may be significantly impacted by construction activities. Given that this alignment runs closely through residential, school, and industrial land uses, Alternative 1a is expected to have greater construction noise impacts to receptors than Alternative 1.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would be constructed similarly to Alternative 1a up to Candy Court and thus would have a similar, potentially significant level of impact to nearby sensitive receptors. Near Candy Court, the alignment departs the UPRR right of way and parallels the SPRR right of way until reaching the Greenville East Station (which would be constructed on an aerial structure). This alignment would put construction activities farther away from residential receptors and closer to the less sensitive industrial receptors east of Candy Court. The industrial receptors east of Candy Court are about 100 feet from the alignment and so, according to

Table 3.16-5, construction of the tracks on this portion of the alignment would not significantly impact these industrial receptors.

Alternative 2 – Las Positas. Two at-grade stations, one maintenance facility, and about 10.2 miles of track would need to be constructed for Alternative 2. Construction noise impacts for Alternative 2 would be similar to those for Alternative 1 between Hacienda Drive and North Livermore Avenue. East of North Livermore Avenue, the alignment would be constructed as an aerial and primarily would follow Las Positas Road until reaching the UPRR right of way. About 2,000 feet east of that point, the alignment would be constructed on retained fill parallel and south of the UPRR tracks (unlike Alternative 1a, which runs parallel and to the north of the UPRR tracks). The Vasco Road Station and maintenance facility would be constructed at the end of the alignment near Vasco Road.

Pile drivers may be used for the aerial portion of the alignment, which comes within about 75 feet of residential receptors. According to Table 3.16-5, at this distance, pile driving may have significant construction noise impacts on these receptors. Even without the use of pile drivers, at this distance from residential receptors, construction noise impacts may still be significant. Portions of the alignment that intersect with business property may also experience significant construction noise impacts depending on where pile drivers are used. East of Candy Court, construction noise impacts would be greater for Alternative 2 compared to Alternative 1a, because the residential receptors along Patterson Pass Road are closer to the alignment and because a portion of that alignment would require the construction of an aerial and possibly the use of pile drivers. Daytime construction activities would be less than significant along Patterson Pass Road, but potentially significant during nighttime construction activities. The construction of the maintenance facility and Vasco Road Station would be adjacent to businesses and so may have significant construction noise impacts to these businesses.

Alternative 2a – Downtown Vasco. For Alternative 2a, two at-grade stations, 11.2 miles of track, and one maintenance facility would need to be constructed. This alternative would have construction impacts similar to those under Alternatives 1a and 1b from Hacienda Drive approximately up to Candy Court near Patterson Pass Road. East of Candy Court, instead of remaining at grade to the north of the UPRR tracks, the alignment crosses the UPRR tracks via an aerial structure for about 2,000 feet and then returns to grade at the Vasco Road Station south of the UPRR tracks. If pile drivers are needed for the aerial portion of the alignment near Patterson Pass Road, which is about 100 feet from businesses to the north and more than 200 feet from residences to the south, construction noise impacts may be significant for residences if construction is conducted at night. Otherwise, daytime construction activities (not including the use of pile drivers) for this segment of tracks are not expected to result in significant noise levels, except possibly from trucks traveling along nearby roadways. Similar to Alternative 2, the construction of the maintenance facility and Vasco Road Station would be adjacent to businesses and so may have significant construction noise impacts on these businesses.

Alternative 3 – Portola. Alternative 3 would require the construction of one below-grade station (but not covered), one underground station, one maintenance facility, and 7.5 miles of track. Construction activities between Hacienda Drive and just west of the Isabel/I-580 Station would be similar to those for Alternatives 1 and 2. From east of Isabel/I-580 Station to the south of the Downtown Livermore Station, the tracks and station would be constructed underground, so would likely have less-than-significant construction noise impacts along this segment where construction equipment is used underground. However, any aboveground activities along Portola Avenue, where residential receptors run along the street, may result in significant construction noise levels. The two schools in the downtown area may also be significantly impacted by construction activities, particularly from construction of the station near Junction Avenue. The maintenance facility would be constructed about 200 feet from residential receptors on Silver Oaks Way and adjacent to residential receptors along Gardella Plaza. Noise levels associated with the construction of the maintenance facilities may not be significant for the residences along Silver Oaks Way, but would likely have significant impacts on residences on Gardella Plaza. In addition, the maintenance facility would be constructed adjacent to businesses and so may have significant construction noise impacts on those businesses.

Alternative 3a – Railroad. Alternative 2a would require the construction of one at-grade station, one aerial station, 8.2 miles of tracks, and one maintenance facility. Construction activities between Hacienda Drive and Western Avenue west of the Downtown Livermore Station would be similar to those under Alternatives 1a and 1b, except that Alternative 3a would have more activities associated with the construction of the Isabel/Stanley Station. The Isabel/Stanley Station, however, is about 650 feet from the nearest sensitive receptor and so construction of that station is not expected to have significant construction noise impacts on the nearby receptors. East of Western Avenue, the tracks would be supported on an aerial structure and so pile drivers may be needed in the downtown Livermore, further exacerbating already significant construction noise impacts in the area. The construction of the maintenance facility would have similar construction noise impacts as Alternative 3 and so would have significant construction noise impacts on some nearby sensitive receptors.

Alternative 4 – Isabel/I-580. Alternative 4 would require the construction of one at-grade station and 5.49 miles of at-grade track. No maintenance facility would be constructed. Construction noise impacts would be similar to those under Alternatives 1 and 2 between Hacienda Drive and the Isabel/I-580 Station. Along this segment the closest sensitive receptor is about 150 feet from the alignment and so, according to Table 3.16-5, construction at this distance would have a less-than-significant noise impact unless construction is conducted at night. Considering detailed construction plans are not currently available, this program-level EIR assumes construction noise impacts may be significant for this alternative.

Alternative 5 – Quarry. Alternative 5 would require the construction of one at-grade station and 5.6 miles of tracks, a portion of which would be constructed as an aerial structure, similar to Alternative 3a. A maintenance facility would not be constructed. Construction activities for Alternative 5 would be similar to those for Alternative 3a up to the Isabel/Stanley Station (potentially significant).

MITIGATION MEASURES. For all alternatives, the following measures would reduce the potentially significant, although temporary, construction noise impact; however, given the uncertainty in the equipment to be used and the potential proximity to sensitive receptors, temporary impacts may be potentially significant and unavoidable even with these mitigation measures. (PSU)

CI-NO-1.1 Employ Noise-Reducing Construction Practices. The construction contractor shall implement noise-reducing practices. The construction supervisor or other entity appointed by BART shall measure noise levels at nearest sensitive receptors before beginning construction and periodically thereafter. Measurements shall be taken during periods when noisy, heavy equipment is operating. Noise-reducing measures that could be implemented to reduce noise, to the extent feasible, include:

- Minimize nighttime construction in residential areas. Restrict high noise-generating equipment such as drills (which produce 98 dBA at 50 feet) and scrapers (which produce 89 dBA at 50 feet) to daytime hours (7:00 a.m. to 6:00 p.m.);
- Use quieter methods of pile driving including sonic pile drivers where feasible;
- Use equipment with enclosures and high-performance mufflers;
- Locate equipment as far as possible from residential areas;
- Install temporary noise barriers between equipment and residential areas; and
- Select haul truck routes to minimize impact to residential areas.

CI-NO-1.2 Designate a Noise-Disturbance Coordinator, Disseminate Information to Residences and Businesses, and Implement a Response/Tracking Program. A noise-disturbance coordinator shall be responsible for receiving noise complaints, determining the cause of the complaints, and ensuring reasonable measures are taken to address the complaints. Residences and businesses within at least 530 feet and 50 feet of construction area, respectively, shall be notified in writing prior to construction. In addition, contact information for the coordinator shall be posted at the construction site and provided to the affected residences and businesses.

CI-NO-2 Construction Vibration

Groundborne vibration from construction activities can result in both human annoyance (as measured in VdB) and damage to fragile structures (as measured in Peak Particle Velocity [PPV in inches per second]). During construction, the greatest concern is potential structural damage from the use of equipment, such as pile drivers, vibratory rollers, and tracked equipment (e.g., bulldozers). At this time, detailed construction plans are not currently available. However, using FTA Guidelines, Table 3.16-6 provides the most conservative vibration criteria and the predicted distances at which vibration levels may be significant from the operation of pile drivers, vibratory rollers, bulldozers, and drilling.

Table 3.16-6
Distance of Significant Vibration Impact during Construction (feet)

		Distance of Significant Impact (ft)			
	Acceptable Vibration	**Impact Pile Drivers**	**Vibratory Roller**	**Caisson Drilling/Large Bulldozer**	**Loaded Trucks**
Annoyance: Sensitive Equipment	= <65 VdB	900	225	130	125
Annoyance: Residence	= <72 VdB	525	130	80	75
Annoyance: Institutional	= <75 VdB	425	105	65	60
Damage to fragile buildings	= <0.12 in/sec	135	40	20	20
	=<90 VdA	125	35	20	20

Source: ERM, 2009.

Note:

Acceptable vibration related to "annoyance" based on "frequent events" defined as equivalent to more than 70 vibration events per day.

Depending on the alternative, sensitive receptors may be as close as 50 feet. Based on the distances identified in Table 3.16-6, at this distance, pile drivers may result in significant vibration impacts where vibration-sensitive equipment is used (e.g., dental office), where fragile buildings are located, and in areas where other vibration-sensitive residential and institutional receptors are common. Other equipment may also have significant vibration impacts depending on where they are used. For example, fully loaded haul trucks that drive within 20 feet of fragile buildings (such as some historic sites) have the potential to cause structural damage. Impacts to historic resources associated with damage from construction vibration is presented in Section 3.6, Cultural Resources. As presented below, all extension alternatives are expected to have potentially significant construction vibration impacts.

Alternative 1 – Greenville East. Alternative 1 would require the construction of one at-grade station, one station on an aerial structure, one maintenance facility, and 11.6 miles of track along I-580. About 9.8 miles of the track would be constructed at grade, with the rest of the eastern portion of the tracks primarily constructed as an aerial near the Greenville East Station. The aerial structures may require the need for pile drivers, which can generate the highest vibration levels compared to other types of construction equipment. The aerial is located in an area where the closest receptors are hotels located about 500 feet away. A maintenance facility would be constructed north of I-580, east of Laughlin Road. While pile drivers would likely not be needed for the maintenance facility construction, with construction activities being conducted right across from residential receptors along Laughlin Road, vibration impacts during the construction of the maintenance facility would likely be significant. The rest of the alignment has residential receptors located as close as 120 feet and institutional receptors as close as 120 feet. According to Table 3.16-6, depending on the type of construction equipment used, construction activities at this distance may have a significant impact on these residential receptors. For example, the use of rollers may have significant vibration impacts, but the use of drilling equipment may not. In addition, depending on if loaded trucks are required and the truck route taken, any residential receptors within 75 feet and institutional receptors within 60 feet may experience significant vibration impacts.

Alternative 1a – Downtown-Greenville East via UPRR. Similar to Alternative 1, Alternative 1a would require the construction of two aboveground stations, about 13.2 miles of track, and one maintenance facility. However, after traveling along I-580 from Hacienda Drive to El Charro Road, the alignment departs I-580 and parallels El Charro Road until reaching the UPRR tracks. At this point, the alignment follows the UPRR tracks to the north until reaching the Greenville East Station. An aerial structure would be constructed on the portion of the alignment along El Charro Road while the rest of the alignment off I-580 would be constructed primarily on retained fill.

The aerial structure may require the use of pile drivers near two residential receptors located approximately 100 feet from the proposed alignment. Construction vibration impacts from using pile drivers and rollers (or similar equipment) may be significant at these two receptors. In addition, other portions of the alignment are located as close as 50 feet to residential receptors in downtown Livermore and so vibration impacts during construction may be significant at these locations. There are also two schools in the downtown area that may be significantly impacted by vibration during construction. According to Section 3.6, Cultural Resources, historic buildings and structures have been identified in downtown Livermore. Such structures may be sensitive to damage from heavy construction equipment. For example, as shown on Table 3.16-6, rollers used within 40 feet of such structures may have significant vibration impacts. Given that this alignment runs closely through residential land uses, Alternative 1a is expected to have greater construction vibration impacts than Alternative 1.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b would be constructed similarly to Alternative 1a up to Candy Court and so would have a similar level of vibration impact to nearby sensitive receptors (potentially significant). Approximately at Candy Court, the alignment departs the UPRR right of way and parallels the SPRR right-of-way until it reaches the Greenville East Station, which is on an aerial structure. This would put construction activities farther away from residential receptors east of Candy Court and so would have less impact on this portion of the alignment in comparison to Alternative 1a.

Alternative 2 – Las Positas. Two at-grade stations, one maintenance facility, and about 10.2 miles of track would be constructed for Alternative 2. Construction vibration impacts for Alternative 2 would be similar to those for Alternative 1 between Hacienda Drive and North Livermore Avenue. East of North Livermore Avenue, the alignment would be constructed as an aerial and follow Las Positas Road until reaching the UPRR right of way. About 2,000 feet east of that point, the alignment would be constructed on retained fill parallel to the UPRR tracks to the south. The Vasco Road Station and maintenance facility would be constructed near Vasco Road.

Pile drivers may be used for the portion of the alignment constructed as an aerial, which come within about 100 feet of residential property and so, according to Table 3.16-6, would have potentially significant construction vibration impacts on these receptors. East of Candy Court, construction noise impacts would be greater for Alternative 2 compared to those for Alternative 1a, because, the residential receptors along Patterson Pass Road are closer to the alignment and because a portion of that alignment would require the construction of an aerial structure and possibly the use of pile drivers.

The Vasco Road Station is more than 1,000 feet from the nearest residential receptors and so, according to Table 3.16-6, vibration impacts from the construction of the station and maintenance facility to the nearest residence are expected to be less than significant.

Alternative 2a – Downtown Vasco. For Alternative 2a, two at-grade stations, one maintenance facility, and 11.2 miles of track need to be constructed. This alternative would have similar construction impacts as Alternatives 1a and 1b from Hacienda Drive, approximately up to Candy Court near Patterson Pass Road. East of Candy Court, instead of remaining at grade to the north of the UPRR tracks, the alignment crosses the UPRR tracks via an aerial structure for about 2,000 feet and then returns to grade at the Vasco Road Station to the south of the UPRR tracks. If pile drivers are needed for the aerial portion of the alignment near Patterson Pass Road, which is more than 200 feet from residences to the south, construction noise impacts may be significant. The vibration impact from the construction of the station and maintenance facility are anticipated to have a less-than-significant impact as described for Alternative 2.

Alternative 3 – Portola. Alternative 3 would require the construction of one below-grade station (but not covered), one underground station, one maintenance facility, and 7.5 miles

of track. Construction activities between Hacienda Drive and just west of the Isabel/I-580 Station would be similar to those for Alternatives 1 and 2. From east of Isabel/I-580 Station to the south of the Downtown Livermore Station, the tracks and station would be constructed underground. Residential receptors run along Portola Avenue and may be significantly impacted by construction-caused vibration, depending on the type of equipment used. The two schools in the downtown area may also be significantly impacted by construction activities, particularly from construction of the station near Junction Avenue. The maintenance facility would be constructed about 200 feet from residential receptors located on Silver Oaks Way and adjacent to residential receptors along Gardella Plaza. Vibration levels associated with the construction of the maintenance facilities would likely have significant impacts on residences on Gardella Plaza.

Alternative 3a – Railroad. Alternative 3a would require the construction of one at-grade station, one aerial station, 8.2 miles of tracks, and one maintenance facility. Construction activities between Hacienda Drive and Western Avenue west of the Downtown Livermore Station would be similar to those for Alternatives 1a and 1b, except that Alternative 3a would have more activities associated with the construction of the Isabel/Stanley Station. The Isabel/Stanley Station is located about 650 feet from the nearest sensitive receptor and so construction of that station is not expected to have significant construction vibration impacts on the nearby receptors. East of Western Avenue, the tracks would be supported on an aerial structure and so pile drivers may be needed in the downtown Livermore, creating significant construction vibration impacts in the area. Construction of the maintenance facility would have similar construction vibration impacts as Alternative 3 and so would have significant construction vibration impacts on nearby sensitive receptors.

Alternative 4 – Isabel/I-580. Alternative 4 would require the construction of one at-grade station and 5.49 miles of at-grade track. No maintenance facility would need to be constructed. Construction vibration impacts would be similar to those for Alternatives 1 and 2 between Hacienda Drive and the Isabel/I-580 Station. Along this segment, the closest residential receptor is about 150 from the alignment and so, according to Table 3.16-6, construction at this distance would have a less-than-significant vibration impact. However, considering detailed construction plans are not currently available and the exact locations of construction equipment are not known, construction vibration impacts are assumed significant. Overall, this alternative would have less construction vibration impacts than the alternatives already discussed.

Alternative 5 – Quarry. Alternative 5 would require the construction of one at-grade station and 5.6 miles of tracks, a portion of which would be constructed as an aerial similar to Alternative 3a. A maintenance facility would not need to be constructed. Construction activities for Alternative 5 would cause potentially significant impacts on nearby receptors similar to Alternative 3a. Overall, vibration impacts during construction would be greater for Alternatives 1 through 3a in comparison to Alternative 5, given the relatively longer duration of construction required.

MITIGATION MEASURE. For all alternatives, the following measures would reduce the potentially significant, although temporary, construction vibration impact; however, given the uncertainty in the equipment to be used and the potential proximity to sensitive receptors, temporary impacts would be potentially significant and unavoidable even with these mitigation measures. (PSU)

CI-NO-2.1 Employ Vibration-Reducing Construction Practices. The construction contractor shall implement vibration-reducing practices when constructing near sensitive receptors area, including but not limited to those listed below:

- Minimize nighttime construction in residential areas;
- Restrict high vibration-generating equipment such as rollers, drills, and tracked equipment to daytime hours (7:00 a.m. to 6:00 p.m.);
- Use sonic pile drivers where feasible;
- Locate vibration-generating equipment as far as possible from sensitive receptors including homes, schools, churches, and dental offices; and
- Select haul truck routes so that trucks do not come within 20 feet of fragile buildings.

Air Quality

CI-AQ-1 Construction Emissions

Construction activities would generate short-term emissions from vehicle exhaust and fugitive dust. PM_{10} is the pollutant of greatest concern to BAAQMD with respect to construction activities. According to the BAAQMD CEQA Guidelines, CO, ROG, and NOx emissions from construction equipment are accounted for in the regional air quality plans and are not expected to impede the region's attainment status. PM_{10} emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicles travel on paved and unpaved surfaces, and vehicle and equipment exhaust. Construction emissions of PM_{10} can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. BAAQMD's approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures, rather than detailed quantification of emissions, as indicated in the BAAQMD CEQA Guidelines. Mitigation Measure CI-AQ-1.1, which proposes to implement construction-related emission controls, is applicable to all the extension alternatives. The impacts of fugitive dust and vehicle exhaust emissions related to the construction of each alternative are summarized below in Table 3.16-7.

Table 3.16-7
BAAQMD Construction Mitigation Measures

Basic Control Measures (all construction sites)

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Enhanced Control Measures (construction sites greater than 4 acres)

- All "Basic" control measures listed above.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Install sandbags or other erosion-control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

MITIGATION MEASURES For all alternatives, the following measure would reduce the potentially significant construction impact to less than significant. (LTS)

CI-AQ-1.1 *Implement BAAQMD-Recommended Construction Mitigation Measures*. BAAQMD has identified feasible PM_{10} control measures for construction activities, as shown in Table 3.16-7. BART shall adopt these control measures during construction to minimize emissions of PM_{10}. The implementation of the measures listed in Table 3.16-7 would reduce the potentially significant dust impacts to less than significant for all of the extension alternatives.

CI-AQ-1.2 Implement a Construction Emissions Reduction Plan For Heavy Equipment Exhaust. BART's contractor shall be required to design a construction emissions reduction plan and incorporate specific measures that reduce heavy equipment exhaust during construction of the selected alternative. The measures may include, but not be limited to:

- Limit idling to five minutes or less;
- Prohibit engine tampering to increase power; and
- Install oxidation catalysts, particulate traps, or other suitable PM control devices;
- Use low sulfur or other, suitable alternative diesel fuel;

- Tune equipment regularly;
- Place truck staging areas away from sensitive receptors;
- Route trucks away from sensitive receptors; and
- Minimize truck trips.

CI-AQ-2 Construction Odor Emissions

Construction equipment and trucks, mostly diesel-fueled, would create odorous emissions. These odors would be a potential nuisance to the residences and businesses closest to the proposed mainline and staging areas of the BART extension alternatives. All BART extension alternatives would include residential or business areas either along the alignment, or near the stations and maintenance yards, which could be exposed to odorous emissions from construction equipment during the construction period. This would be a potentially significant impact.

MITIGATION MEASURE. Reduction of odors from construction equipment to less-than-significant levels would be accomplished through the measures identified in Mitigation Measure CI-AQ-1.2, which calls for implementation of a construction emissions reduction plan for heavy equipment exhaust. (LTS)

CI-AQ-3 Diesel Particulate Matter Exhaust

A potential health hazard that would occur during construction is exposure to exhaust DPM from diesel-fueled heavy construction equipment. Construction activities near residences and other public access areas would expose the public to DPM emissions, which would be a potentially significant impact depending on the exposure of the receptor. Factors that could influence the exposure risk include distance to the receptor, meteorological conditions in the area, and length of construction period. Construction emissions would be temporary; cancer risk from exposure to carcinogens (exhaust DPM) is evaluated based on 70 years of continuous exposure. As such, construction emissions would not be expected to substantially contribute to an increase in cancer risk. However, because the construction details are not known at this time, the impacts to receptors from a BART extension is conservatively assumed to be potentially significant.

MITIGATION MEASURE. For all alternatives, implementation of the following mitigation measure would reduce diesel PM emissions and any associated cancer risk to less-than-significant levels. (LTS)

CI-AQ-3.1 Implement a Construction Emissions Reduction Plan For Diesel PM. BART shall ensure that the contractor designs a construction emissions reduction plan to incorporate specific measures that reduce diesel particulate matter during the construction of the selected alternative. The conditions may include those listed in Mitigation Measure CI-AQ-1.2.

Health and Safety

CI-HS-1 Routine Transport, Use, or Disposal of Hazardous Materials

Construction activities associated with the BART extension alternatives would involve the transport, use, and disposal of hazardous materials. Construction would involve the use of such materials as paints, solvents, adhesives, caulks, and oils. Without proper precautions, construction activities could degrade the environment or expose construction workers and the public to these hazardous materials.

While construction would involve the use of hazardous materials, this would not create a potentially significant public or environmental hazard. Exposure would not pose a significant health risk because of the limited volumes anticipated to be used during project construction. In addition, the project contractor would complete a Hazardous Materials Business Plan (HMBP) for facilities using or storing 55 gallons or more of hazardous materials, and would be required to comply with applicable regulations. Therefore, impacts related to routine construction activities associated with the BART extension alternatives would be less than significant.

CI-HS-2 Upset or Accidental Release of Hazardous Materials

Soil excavation and removal for construction of roadway/track grade separations, trackbeds, and below-grade sections of the alignment could expose workers to contaminated soil if excavation would encounter contaminants from nearby known or suspected hazardous waste sites (see Tables 3.12-1 and 3.12-2 in Section 3.12, Public Health and Safety). Extensive dewatering of construction areas, particularly the cut-and-cover subway sections, could also cause groundwater inflow to the area, causing migration of off-site contaminants to soil and groundwater within the construction footprint.

In addition to potential impacts from the listed hazardous waste sites, other potential hazardous materials could exist along the project alignments, such as soils impacted by Aerially-Deposited Lead (ADL) from historical vehicular activity; soils or groundwater impacted by herbicides and pesticides as a result of historical agricultural operations; contaminated soil and groundwater with lead, petroleum hydrocarbons, and chlorinated solvents from historical railroad operations; and soil impacted by undiscovered leaking petroleum pipelines. Some of the alternatives could also involve modification to or demolition of existing structures and/or infrastructure. These structures could have asbestos-containing materials (ACM), which construction workers could be exposed to during modification and demolition activities.

Construction contractors are responsible for emergency plans during project construction, and the BART System Safety Department would provide emergency support. Emergency plans during project construction would outline procedures to ensure coordination with local jurisdictions in evacuating areas and notifying BART and emergency response

personnel. In addition, an accidental release during construction would be required to comply with applicable federal, State, and local regulations.

As shown in Figure 3.12-1, in Section 3.12, Public Health and Safety, there are two known NPL (Superfund) sites within ½-mile of the alternatives: 1) at the Lawrence Livermore National Laboratory, just south of the proposed Vasco Yard, and 2) at the Hexcel Corporation, just east of the proposed Portola/Railroad Maintenance Yard. As shown in Table 3.12-1 in Section 3.12, Public Health and Safety, 71 sites in the study area are listed on the Cortese List under Government Code Section 65962.5. There may also be potentially contaminated sites that have yet to be identified in the study area, and exposure could occur if previously unknown contamination is encountered. Even with the aforementioned measures, the BART extension alternatives would still have a potentially significant impact related to the upset or accidental release of known or unidentified hazardous materials during construction.

MITIGATION MEASURES. The following measures would be applicable to all of the BART extension alternatives and would reduce the significant accidental release of hazardous materials impacts during construction to less than significant. (LTS)

CI-HS-2.1 Conduct File Review and a Phase I ESA Prior to BART Extension Alternatives Construction. Prior to commencing construction, an environmental site assessment shall be conducted to further analyze the identified potential hazardous materials and waste sites. BART shall ensure that additional research, including a file review with the Alameda County Department of Environmental Health and the RWQCB and a Phase I ESA for the BART extension alternatives footprint, is performed. If the file review reveals no potential impact from environmental contamination, no further action to remedy soil or groundwater contamination would be necessary.

CI-HS-2.2 Conduct Further Soil and Groundwater Investigations Prior to any Construction Activities. If the file review under Mitigation Measure CI-HS-2.1 above, reveals potential environmental contamination along or beneath the project alignment or other facilities, BART shall evaluate the sites to determine the level of investigation appropriate to evaluate the possible presence of hazardous chemicals in soil and groundwater. In the event soil and/or groundwater testing is deemed appropriate, BART shall ensure that a Phase II soil and groundwater investigation is conducted in the affected areas, including field sampling and laboratory analysis, to evaluate conditions where excavation and grading will take place. In addition, a Phase II soil and groundwater investigation may be completed for other areas where excavation and grading will take place. The Phase II investigation shall be completed prior to any construction or excavation work, and a schedule shall be developed in the pre-design phase of the project to ensure that a sufficient amount of time is allotted prior to site development to identify and implement actions to investigate the

presence of hazardous substances in soil and groundwater, and to identify design and contingency measures in the event that the results of the investigation indicate the need for further testing, site controls, or remediation.

The number, location of field samples, and constituents tested for would depend on the size of the impacted site, site activities, and possible transport or migration routes. Field samples may include soil, soil gas, or groundwater, depending on the nature of the contaminants suspected to be present. The sampling plan shall specify that all soil and groundwater chemical analyses shall be performed by a California-certified laboratory, using standard EPA and California chemical testing methods. The investigation results shall, if necessary, lead to preparation of a:

- Remedial Action Plan for soil and groundwater treatment and disposal;
- Health and Safety Risk Assessment; and
- Soil management plan with criteria for ADL-impacted soils, in consultation with DTSC and RWQCB.

If necessary, a Remedial Action Plan shall be developed to determine the selection of the remedy for a contaminated site. If the proposed remedial approach does not involve complete source removal, a Health and Safety Risk Assessment shall be completed. Work in impacted areas will be conducted in accordance with applicable Cal OSHA requirements.

CI-HS-2.3 Remediate the Contaminated Sites Prior to Construction as Recommended by the Soil and Groundwater Investigations. If hazardous materials are identified in soil and groundwater at levels that present a risk to the public, to construction workers, or to the environment, based on the investigations described in Mitigation Measure CI-HS-2.2 above, BART shall ensure that remediation is conducted at contaminated sites pursuant to applicable laws and regulations.

A Remedial Action Plan may be developed if warranted to address potential air and health impacts from soil excavation activities, potential transportation impacts from the removal of remedial activities, and potential risks of public upset should there be an accident at excavation sites. During excavation activities, construction workers or the public may be exposed to contaminants in the soil through incidental ingestion, dermal contact, inhalation of fugitive dust, and inhalation of volatile emissions. The Site-Specific Health and Safety Plan will include measures to mitigate these potential impacts, such as cordoning off excavation sites to prevent public access, water misting to control dust during removal activities, perimeter air monitoring for dust along the site boundaries both upwind and immediately downwind of site excavation

and stockpiling activities, and air monitoring of volatile organic compounds (VOC). All exposed contaminated materials shall be covered at the end of each day. Excavation work shall be performed in compliance with all OSHA rules and regulations. In addition, a Health and Safety Plan shall be prepared to address worker health and safety, including physical and chemical hazards at excavation sites and requirements for worker personal protective equipment (PPE), criteria for upgrades to PPE, minimum training requirements for site workers, emergency information such as directions to the nearest hospital and emergency telephone numbers, and specific administrative requirements such as documentation and training and daily health and safety tail gate meetings.

CI-HS-2.4 Conduct an Asbestos-Containing Materials Survey Prior to Demolition Work, or Upgrading or Reconstruction of Existing Structures. If construction of the BART extension alternatives requires the demolition of existing structures, BART shall ensure that the contractor conducts an ACM survey prior to demolition, upgrading, or modification of existing structures. The ACM survey shall be performed by an inspector who is Asbestos Hazardous Emergency Response Act-certified under Toxic Substances Control Act (TSCA) Title II and California Occupational Safety & Health Administration (Cal OSHA)-certified under Section 1529 of the CCR. If asbestos-containing materials (that may become airborne) are found, subsequent demolition, renovation, or asbestos removal activities must be performed in accordance with the proper notification and emission control requirements. Prior to demolition, the permitting process with the Bay Area Air Quality Management District shall be initiated through the submittal of the ACM survey results.

CI-HS-3 Release Hazardous Pollutants or Risks near Schools

As shown in Table 3.12-4 in Section 3.12, Public Health and Safety, 12 schools are located within one-quarter mile of the study area. During construction, existing hazardous materials present in the soil or groundwater could accidentally be disturbed and released, as discussed under Impact CI-HS-2. A minor release of contaminated materials would typically be localized and would only pose risks to the immediate vicinity; however, a major accidental spill or release during construction could impact nearby schools. As such, a major accidental spill or release could result in a potentially significant impact on schools within one-quarter mile of the BART extension alternatives.

MITIGATION MEASURES. Mitigation Measures HS-2.1, HS-2.2, HS-2.3, and HS-2.4 would be applicable to all of the BART extension alternatives and would reduce hazardous materials exposure at schools during construction to a less-than-significant level. (LTS)

CI-HS-4 Interference with an Emergency Response or Evacuation Plan

The construction of the BART extension alternatives could impact access for emergency response vehicles. Potential public safety impacts may exist if construction traffic and activities along local roads and I-580 impede the movement of emergency response vehicles. If roadways are blocked or closed due to construction activities, emergency response vehicles may be slowed and response times may potentially suffer. Potential impacts would be temporary and would occur only during the construction phases. Nonetheless, emergency vehicles may be detoured or response times may be affected, which would result in a potentially significant impact.

MITIGATION MEASURES. Mitigation Measure CI-TR-1.1 would be applicable to all BART extension alternatives and would reduce the significant impacts on emergency response to less than significant. Mitigation Measure CI-TR-1.1 calls for the preparation and implementation of a Traffic Management Plan (TMP) to define how traffic operations and circulation will be handled during each phase of construction. Implementation of this mitigation measure would reduce potential impacts to emergency response times during construction to a less-than-significant level.

CI-HS-5 Rupture of Unknown Oil and Gas Pipelines

The Trackwork and Systems Composite Utilities Key Plan prepared for BART identified PG&E-owned gas pipelines that cross and run longitudinally along segments of I-580, the UPRR and SPRR tracks, and also at Las Positas Road, Arroyo Vista, Greenville Road, East Airway Boulevard, and Portola and Junction Avenues. The Plan, however, does not include information on non-PG&E-owned gas transmission and other fuel transmission lines within the study area.

Extensive excavation required for the construction of tunnels and deep foundations could encounter undiscovered oil and gas pipelines that may not have been identified through the Plan, and cause potential rupture of these pipelines. In the event of rupture and accidental release of oil and gas, BART would respond immediately by assessing whether the release must be reported to a regulatory agency, as required by local, State, or federal laws, and would follow procedures set forth in emergency plans created to minimize exposure and risk to public health and safety. Even with these appropriate responses, construction activities may cause significant impacts to undiscovered oil and gas pipelines.

MITIGATION MEASURES. The following measures would reduce the potentially significant impact of rupturing unknown oil or gas pipelines to less than significant. Since this potential exists for all of the BART extension alternatives, these measures would apply to all. (LTS)

CI-HS-5.1 Confirm The Location Of Underground Utilities Prior To Ground-Disturbing Activities Associated With Project Construction. Prior to ground-disturbing activities, construction personnel shall contact the Underground Service Alert

(USA) to obtain information on the existence of underground utilities where ground-disturbing activities will take place along the BART extension alternatives corridor. USA will notify PG&E and other utilities so they can identify whether they have underground facilities at the excavation sites. Potential hazards associated with the rupture of pipelines or the discovery of hazardous materials releases from pipelines, as well as emergency procedures to respond effectively to a potential release, shall be included in the Health and Safety Plan for the selected BART extension alternative.

Utilities

CI-UT-1 Disruption of Utility Services

All BART extension alternatives would originate at the existing end-of-track just east of the Dublin/Pleasanton BART Station and proceed at grade in I-580 median. The alternatives would then diverge from I-580 at different points east of El Charro Road.

Construction of each of the alternatives in I-580 median would involve the following activities that could encroach into utility alignments: 1) minor grading for the installation of track sub-ballast, ballast, ties, rails, and an underdrain system; and 2) approximately 46 feet of widening of I-580 median to accommodate BART operations.

Under all alternatives, there is a likelihood of encountering utilities during construction. Relocation of these utilities could potentially result in disruptions to utility service. However, the construction contractors would be required under the California Government Code (Sections 4216–4216.9) to notify and coordinate with affected utility providers prior to commencement of construction, to minimize impacts on utility service. Fixed facilities such as electrical substations, power stations, and wastewater treatment plants, which would have more significant constraints regarding any potential conflict, such as routing the alignment around, over or under the facility or relocating the fixed facility to another location, have not been identified in the alignments for any of the alternatives.

The following provides a discussion of major utility lines in the study area:

- Water Lines – Major Zone 7 pipelines within the study area include a 42-inch SWP water line that cuts across I-580 east of Arroyo Las Positas and an 18-inch and a 24-inch casing that crosses I-580 west of Vasco Road. In addition to existing utilities, Zone 7 commenced construction of the initial 5-mile phase of the Altamont Water Treatment Plant and Pipeline Project within the City of Livermore in August 2008, expected to be completed in one year. The pipeline will run from Kitty Hawk Road to the vicinity of Vasco Road in Livermore, north of I-50, and would traverse I-580 (east of Las Colinas Drive), which is also the proposed alignment for Alternatives 1 and 4.

  An 8-inch California Water Service Company (Cal Water) line transects the study area. This line runs along Las Positas Road, crosses I-580 west of the Las Colinas overpass,

then parallels I-580 to the north along Las Colinas Road, feeding the properties at the east end of Las Colinas Road. From there, the water line runs southeast before crossing I-580 to Las Positas Road.

Several Livermore Municipal Water lines cross I-580 at various segments along the BART extension alternatives. These lines include a 6-inch water pipeline in a 12-inch pipe casing, located south of Herman Avenue, and a 20-inch water pipeline in a 33-inch pipe casing, located south of Laughlin Road. Another pipeline of unknown size crosses the UPRR at Greenville Road.

A water pipeline of unknown size relevant to the BART extension alternatives parallels I-580 along Rosewood Drive within the City of Pleasanton limits. A future Zone 7 transmission pipeline is proposed and would cross I-580 to the east of Santa Rita Road.[7]

- Wastewater Lines – Several sewer lines in the city run along and cross I-580 at various locations. These include a 33-inch casing that crosses I-580 and runs along Las Positas Road.

  Two 20-inch Dublin San Ramon Services District DSRSD wastewater lines within the study area run along and cross I-580. One of the lines crosses I-580 at Fallon Road, and the other runs parallel to, and south of I-580. Other wastewater pipelines within I-580 right-of-way include a 24-inch water line that crosses I-580 at the Santa Rita Road interchange. No wastewater utility lines transecting or adjacent to the BART extension alternatives have been identified within the City of Pleasanton limits.

- Storm Drainage – The existing storm drain system in the City of Livermore consists of more than 171 miles of underground pipeline, ranging in size from eight to 66 inches in diameter, and local creeks. The facilities carry runoff within the drainage basin to nearby flood control channels. Storm drainpipes are generally concrete, although some are corrugated metal pipes. New storm drainage facilities would be sized per the City of Livermore's Storm Drainage Facility Guidelines. Numerous storm drains within the City of Livermore parallel and cross I-580 right-of-way, which include 18-inch, 24-inch, and 36-inch Asbestos Cement Pipe, a double 20 by 84 inch Re-enforced Concrete Box (RCB), and a double 120 by 84 inch RCB. Major storm drains cross I-580 at the following locations: I-580/Airway Boulevard interchange, Isabel Avenue, North Livermore Avenue, First Street, Vasco Road, and Mines Road.

  Existing drainage facilities in the immediate vicinity of I-580 consist of a longitudinal underdrain system collecting stormwater flows, and discharge points at various existing highway cross culverts along the freeway. The following waterways cross I-580 within the study area:

[7] Zone 7 Water Agency, *Zone 7 Water Transmission System Facility Map*, 2007

- Tassajara Creek: Tassajara Creek crosses I-580 approximately 0.4 miles west of the Tassajara Road/Santa Rita Road interchange (within the City of Pleasanton).

- Arroyo Mocho Tributary: The tributary conveyed through triple box culverts crosses I-580 approximately 0.28 miles east of the Tassajara/Santa Rita interchange (within the City of Pleasanton).

- Arroyo Las Positas: Arroyo Las Positas crosses I-580 at locations within the study area (within the City of Livermore) as follows:
  - 1.15 miles east of the Airway Boulevard interchange (conveyed through a continuous concrete tee-beam bridge);
  - At Cayetano Creek;
  - Approximately 0.7-miles east of the North Livermore Avenue interchange (conveyed through a continuous concrete tee-beam bridge); and
  - Approximately 0.3 miles east of the Vasco Road interchange at Northfront Road (conveyed through a double reinforced box concrete culvert).

- Arroyo Seco: Arroyo Seco crosses I-580 approximately 0.37 miles west of the Livermore Boulevard interchange. Arroyo Seco is conveyed through triple reinforced concrete box culverts with approximate dimensions of 14 feet by 9 feet.

- Cayetano Creek: The confluence of Cayetano Creek and Arroyo Las Positas is approximately 0.60 miles west of the North Livermore Avenue interchange.

- Communication Lines – In the communities surrounding the BART extension alternatives, residential and commercial telephone service is provided by AT&T and Sprint. AT&T and Comcast provide other telecommunication services such as Digital Subscriber Lines (DSL), Internet Service Provider (ISP), web hosting, virtual private networking, and wireless/cellular and paging services. Several Comcast fiber optics occur at various locations crossing and parallel to the alternative alignments in the study area. Fiber optic lines crossing the alternative alignments occur west of I-580/Airway Boulevard interchange, at the Vasco Road interchange, and immediately to the west of the proposed Downtown Livermore Station area. Fiber optics lines also cross the UPRR at North Livermore Avenue, North "K" Street, and North "L" Street. To the east of downtown Livermore, a fiber optic line crosses UPRR tracks along Junction Avenue. Two 2-inch polyvinyl chloride (PVC) Comcast fiber optic lines (inside one 8-inch steel casing) run along Constitution Drive immediately north of I-580.

- Natural Gas Lines – Pacific Gas and Electric Company (PG&E) supplies natural gas to the cities of Pleasanton, Dublin, and Livermore via three main pipelines: a 24-inch natural gas pipeline that crosses the City of Livermore from southwest to northeast and two separate 36-inch and 22-inch pipelines that enter the City of Livermore from north

of Vasco Road, extend south until approximately Tesla Road, and head west through the City. In addition to these utilities, PG&E also maintains six natural gas regulator stations (regulate gas pressure prior to distribution) within these cities.

Numerous PG&E gas lines also run along and cross I-580 at various locations: 50 feet in length of a 12-inch gas pipeline casing,[8] 27 feet in length of 12-inch gas pipeline casing, 35 feet in length of 12-inch gas pipeline casing, and 25 feet in length of 12-inch gas pipeline casing west of Santa Rita Road; a major line to the south of the right-of-way from east of Santa Rita Road to the east of East Airway Boulevard; and a 6-inch pipe in a 10-inch steel casing pipeline crosses I-580 to the east of Herman Avenue. In addition, several gas lines run parallel and cross the UPRR alignment within the study area. These include a series of 2-inch, 3-inch, 6-inch, and 8-inch gas lines.

- Electrical Lines – PG&E provides electricity to the cities of Livermore, Dublin, and Pleasanton. PG&E obtains its energy supplies from power plants and natural gas fields in northern California and from energy purchased outside the service area and delivered through a distribution system of high voltage transmission lines. The PG&E utility system in the study area consists of overhead and underground transmission lines rated at 12 kilovolts (kV) and 21 kV, supported by wooden poles, and 6-inch concrete casing, and the Vasco Substation, located south of I-580 and east of Vasco Road. PG&E utilities cross I-580 at several locations along the study area.

  California has established laws to protect infrastructure from damage caused by construction activities. According to the California Government Code (Sections 4216-4216.9) contractors are required to notify and coordinate appropriate groups before beginning ground disturbing construction activities. Contractors are required to paint the area to be disturbed and notify Underground Services Alert (USA) at least two days prior to commencing any digging. USA then notifies its subscribing members of the proposed excavation.

Alternative 1 – Greenville East. Alternative 1 would have the longest alignment in I-580 median and would require widening to accommodate the 46-foot-wide corridor for BART operations; this alignment would extend approximately 10.7 miles eastward at grade within a widened freeway median from the end-of-track east of the Dublin/Pleasanton Station to a terminal in the vicinity of Greenville Road and I-580. Also, Alternative 1 would require construction for the maintenance facility, the Greenville East Station, and the Isabel/I-580 Station (including a station platform at grade within I-580). Lastly, Alternative 1 would include segments of retained cuts and fills, box culverts, and aerial structures at I-580/Southfront Road interchange, parallel with and immediately west of the existing UPRR alignment to the site of the proposed Greenville East Station.

[8] Pipeline casings are used to protect the utility lines.

The following lines may be encountered during construction:

- Water Lines – As previously described, utilities in the study area include Zone 7 pipelines, including a 42-inch SWP water line that cut across I-580 east of Arroyo Las Positas, and an 18-inch and a 24-inch casing that crosses I-580 west of Vasco Road.

  Several Livermore water lines cross I-580 at various including a 6-inch water pipeline in a 12-inch pipe casing south of Herman Avenue and a 20-inch water pipeline in a 33-inch pipe casing south of Laughlin Road.

- Wastewater Lines – Two 20-inch DSRD wastewater lines within the City of Pleasanton run along and crosses I-580 at Fallon Road and another runs parallel to and south of I-580, and a 24-inch water line transverse I-580/Santa Rita Road interchange.

  Several sewer lines in the City of Livermore run along and cross I-580 at various locations, including a 33-inch casing that crosses I-580 and immediately runs along Las Positas Road.

- Storm Drainage – Numerous storm drains within the City of Livermore parallel and cross I-580 right-of-way, which include 18-inch, 24-inch, and 36-inch Asbestos Cement Pipe (APC), a double 20 by 84 inch Re-enforced Concrete Box (RCB), and a double 120 by 84 inch RCB. Major storm drains cross I-580 at the following locations: I-580/Airway Boulevard interchange, Isabel Avenue, North Livermore Avenue, First Street, Vasco Road, and Mines Road.

- Communication Lines – Fiber optic lines occur to the west of I-580/Airway Boulevard interchange, and at the Vasco Road interchange.

- Natural Gas Lines – Numerous PG&E gas lines also run along and cross I-580 at various locations including: 50 feet length of a 12-inch gas pipeline casing;[9] 27 feet in length of 12-inch gas pipeline casing, 35 feet of 12-inch gas pipeline casing, and 25 feet in length of 12-inch gas pipeline casing west of Santa Rita Road; major line to the south of the right-of-way from East of Santa Rita Road to the east of East Airway Boulevard; 6-inch pipe in a 10-inch steel casing pipeline crosses I-580 to the east of Herman Avenue.

In the event that utility lines would be encountered, service would need to be temporarily disrupted in order to safely relocate affected underground utilities. Potential relocation of underground natural gas and communication utilities for construction of the below-grade structures, and potential relocation of overhead electrical utilities for the construction of aerial structures could result in a disruption of service, therefore resulting in potentially significant impacts.

[9] Pipeline casings are used to protect the utility line.

Two separate Environmental Assessment/Initial Studies (EA/IS) were completed in 2006 and 2009, respectively, for the eastbound and westbound I-580 High Occupancy Vehicle (HOV) widening project, from east of Greenville Road to Hacienda Drive, and from west of Greenville Road to west of San Ramon Road, respectively.

- The 2006 assessment of the eastbound HOV widening project identified 86 existing utilities in I-580 right-of-way and adjacent to I-580. The report concluded that, of the known utilities, no utility relocation was expected.[10] However, where existing utility crossings occur at locations of proposed mainline widening due to HOV/auxiliary lane additions, utility casings may have to be extended. Utility casing extensions were proposed for the two sewers that cross I-580 between El Charro Road and Airway Boulevard (an 18-inch and a 30-inch corrugated metal pipe casing, respectively), and 10-inch and 30-inch steel casing underground gas lines traversing I-580 between Vasco Road and Commerce Way.[11]

- The 2009 EA/IS completed for the westbound I-580 HOV widening project identified utilities that would need to be relocated to avoid utility conflicts. Utilities identified for relocation include approximately 1,400-feet of DSRSD water line, 412 feet of DSRSD water utility line, and 613 feet of DSRSD sewer line.[12] Furthermore, the study anticipates that, where existing utility crossings occur at the location of the proposed mainline widening due to the HOV and auxiliary lane additions, utility casings may have to be extended.

  The 2006 EA/IS and the 2009 EA/IS acknowledged that coordination efforts with utility providers would include planning for utility relocations, identification of any other potential conflicts, and formulation of strategies for overcoming problems that may arise to ensure minimum disruption of utility service or operation during utility work and project construction.

  However, widening of I-580 to accommodate the BART extension alternatives and the associated infrastructure for the Isabel/I-580 Station under Alternative 1 is likely to encounter additional underground natural gas, water, communication, sewer utilities, or overhead power lines that may not have been identified in the 2006 and 2009 CEQA documents and would require utility relocation. In addition, construction of the elements of Alternative 1 outside of I-580 right-of-way, such as the Isabel/I-580 Station area (north and south of I-580), Greenville East Station, and the maintenance facility are most likely to encounter overhead and underground utilities.

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10 Caltrans, *Environmental Assessment/Initial Study, I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive,* 2006.

11 Caltrans, *Environmental Assessment/Initial Study, I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive,* 2006.

12 Caltrans, *I-580 Westbound HOV Lane Project Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment,* 2009.

A Trackwork and Systems Composite Utilities Key Plan (Plan)[13] prepared for the engineering drawings for the BART extension alternatives identified extensive electrical, underground gas, overhead electrical, sanitary sewer, television cable, sanitary sewer, water and storm drain utility lines that occur longitudinally and cross the various alignments of the BART extension alternatives. The Plan, however, does not include information on fiber optics/telecom/cable utilities outside of I-580 right of way.

In particular, notable utilities that cross the site of the proposed Isabel/I-580 Station area include overhead electrical, existing storm drains (various 18-inch, 24-inch, and 36-inch ACP; 18-inch MPC; and 18-inch RCB lines), and a electrical line (21kV). In addition, a storm drain traverses the site of the proposed Greenville East Station, east of the UPRR tracks.

Aerial structures for the Alternative 1 are proposed east of Greenville Road and immediately south of the Greenville East Station. No overhead utilities have been identified in this area at this time. Furthermore, no underground utilities are identified at I-580 location where the track is proposed to pass under I-580 to align with the UPRR track.

Because the Alternative 1 alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact of this alternative.

Alternative 1a – Downtown-Greenville East via UPRR. Alternative 1a would proceed at grade along I-580 for approximately 1.7 miles, and would depart I-580 corridor at El Charro Road. As with the Alternative 1, this alternative would also have utility impacts within I-580 corridor for 1.7 miles of trackwork. Outside I-580 median, Alternative 1a would require construction for approximately 1.9 miles of aerial structure, the Downtown Livermore and Greenville East Stations and associated maintenance facility, and segments of retained cuts and fills.

Aerial structures for Alternative 1a would occur within various segments of the corridor. No overhead utilities have been identified within the segment of the corridor between El Charro Road and the UPRR Oakland Subdivision. However, overhead electrical lines exist within the segment east of North Murietta Boulevard and the location of the proposed Downtown Livermore Station. Overhead electrical lines run parallel and to the north of the ACE track. In addition, underground utilities exist at the site of the proposed Downtown Livermore Station area. These include two sanitary sewer lines that cross the proposed Downtown Livermore Station area, and fiber optic lines that run north and south of North “I” Street. Excavation

[13] Plans prepared by AECOM with information of utilities owned by the City of Livermore, PG&E, Livermore Water Company, Cal Water, and Zone 7

required for the construction of the Downtown Livermore Station and associated facilities may impact underground utilities.

This alternative would include a short tunnel to provide passage beneath I-580 leading to the Greenville maintenance yard. No underground utilities have been identified at this location. As with the Alternative 1, this alternative would include a Greenville East Station and would therefore share similar station features and utility impacts.

Although Alternative 1a would have more utility impacts on overhead utilities because of the length of aerial structures, and would have a longer alignment (13.25 miles) in comparison with Alternative 1, Alternative 1a would have less utility impacts because 1) it would have a short tunnel in an area that has not been identified to have known underground utilities and 2) would require only 1.7 miles of I-580 widening, compared to 10.75 required for the Alternative 1.

Because the Alternative 1a alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 1b – Downtown-Greenville East via SPRR. Alternative 1b is similar to Alternative 1a. The primary difference is that the proposed alignment would occupy a right-of-way formerly operated by the SPRR, and would include two box structures to provide passage beneath I-580 freeway lanes to the Greenville East maintenance yard. As with Alternative 1a, no underground utilities have been identified within this segment of the corridor. Alternative 1b would therefore not have additional utility impacts beyond those identified for Alternative 1a.

Because the Alternative 1b alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, as described above under Alternative 1a, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 2 – Las Positas. Alternative 2 would proceed at grade within I-580 median for approximately six miles. From there, the alignment crosses Livermore Avenue, ascends into a retained fill and transitions into an aerial structure.

The aerial structure crosses the eastbound I-580 freeway lanes at the vicinity of Las Colinas Road overpass to the area immediately south of the UPRR. The aerial structure continues along the centerline in this segment of Las Positas Road and descends into a retained fill. Overhead utilities in this portion of the alignment include lines that cross I-580 at the North Livermore Avenue interchange, cross the UPRR tracks east of Las Positas Road and run parallel to and north of the UPRR tracks. Therefore, construction of the aerial features of Alternative 2 may impact overhead utility lines.

Other features within I-580 right-of-way include an Isabel/I-580 Station, which has the same configuration as under Alternative 1 and thus would have similar station construction impacts.

Alternative 2 would have a different easternmost station than the previously discussed alternatives, the Vasco Road Station. The station would be bisected by the east-west running UPRR/ACE tracks. Known utilities that cross the proposed station area include a 48-inch storm drain, 21-inch sanitary sewer lines, 21 kV electrical lines, and 4-inch and 8-inch PG&E gas lines. Construction for connecting the alignment with the Vasco Road Station may impact these utilities.

Because the Alternative 2 alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 2a – Downtown Vasco. Alternative 2a would predominantly have similar construction features for the Downtown Livermore Station as described above for Alternative 1a, and thus this alternative would have similar utility impacts for this station.

Additional features associated with Alternative 2a include aerial features where the alignment moves from the northern side of the UPRR tracks to the southern side near the Vasco Road Station. Alternative 2a would also include a Vasco Road Station and thus similar construction impacts as Alternative 2 at this station. Overhead utilities in this area include 21 kV lines that run parallel to Junction Avenue and to the north of the UPRR tracks. Alternative 2a would therefore have potentially significant overhead utility impacts associated with construction of the aerial segment.

Because the Alternative 2a alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 3 – Portola. Alternative 3 would proceed at grade within I-580 median for approximately 6.9 miles. Alternative 3, east of the Isabel/I-580 Station, would exit I-580 median and transition into a tunnel until it reaches the Downtown Livermore Station. Several underground utilities occur within this segment. These include several 18-inch, 24-inch APC lines; a 30-inch gas line crosses I-580 immediately to the east of Isabel/I-580 Station, a 3-inch gas line runs south of the UPRR tracks; 21-kV electric lines cross the alignment to the south of Portola Road, at North Livermore Avenue, at Woodhaven, and at Enos Way; several water lines of unknown size cross the alignment at Murrieta Boulevard and North "P" Street; 8-inch sanitary sewer lines cross the alignment at Rincon Avenue, and at North "P" Street, Pine Street, Film Street, and Walnut Street.

Alternative 3 would have fewer I-580 median utility impacts compared to Alternative 1, because of its shorter alignment within I-580. However, this alternative would have additional utility impacts associated with the below-grade platform proposed for the Isabel/I-580 Station,

and the underground alignment to the vicinity of the Downtown Livermore Station. Because it would include below-grade construction, this alternative would have the potential to encounter more underground utilities than described above.

Because the Alternative 3 alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 3a – Railroad. Alternative 3a would proceed for 1.7 miles along I-580 freeway median and exit at El Charro Road along an aerial structure before crossing the UPRR Oakland Subdivision, to the Isabel/Stanley West Station. Beyond this, Alternative 3a would extend 2.4 miles further east to a Downtown Livermore Station. Additional features associated with Alternative 3a include an aerial structure running from the crossing of Ventura and Western Avenues to the Downtown Livermore Station area. Known utilities within this segment include 21kV overhead electrical lines that run north and south of and parallel to the proposed tracks. Alternative 3a would therefore have potential utility impacts on overhead electrical lines.

The site of the proposed Isabel/Stanley Station is undeveloped. The only existing utility identified at this location is a 21kV electrical line.

Alternative 3a would include the Downtown Livermore Station and would have similar construction features to Alternatives 1a and 1b, and thus similar utility impacts associated with construction of this station and associated maintenance facility. However, Alternative 3a would have minimal utility impact associated with construction of the Isabel/Stanley Station because of the lack of utility lines in this area.

Because the Alternative 3a alignment and stations would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 4 – Isabel/I-580. Alternative 4 would proceed at grade within I-580 median for approximately 4.6 miles and would also include the Isabel-I/580 Station similar to Alternatives 1, 2, and 3. Thus, Alternative 4 would have similar construction impacts within I-580 median up until the Isabel/I-580 Station. Overall, this alternative would have fewer potentially significant utility impacts within I-580 median than the preceding alternatives, since it would: 1) not include underground or aerial features; 2) only include one station and no maintenance facility; and 3) compared to the Alternative 1 , require 5.2 miles of I-580 widening instead of 10.7 miles. However, because the Alternative 4 alignment and station would be constructed in the vicinity of numerous overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

Alternative 5 – Quarry. Like Alternative 3a, Alternative 5 would proceed for 1.7 miles along I-580 freeway median and exit at El Charro Road along an aerial structure before crossing the UPRR. Alternative 5 would include an Isabel/Stanley Station, similar to Alternative 3a. The

only utility line identified within the vicinity of this station is a storm drain that runs parallel to the unnamed creek to the north of East Stanley Boulevard.

In comparison to all the alternatives, Alternative 5 would have the least utility impacts because 1) it only requires construction of one station and no maintenance facility; 2) apart from potential impact to the storm drain described above, there are no other identified aboveground or underground utilities that would be impacted by construction of the station area; and 3) it would only require 1.7 miles of I-580 widening. Nevertheless, because the Alternative 5 alignment and station would be constructed in the vicinity of overhead and underground utilities, this alternative would have the potential to disrupt service for these utilities. This would be a potentially significant impact.

MITIGATION MEASURES. The following measures would reduce the potentially significant utility impacts that were identified for all BART extension alternatives to less than significant. (LTS)

CI-UT-1.1 *Restrict Service Interruptions to Off-Peak Periods*. BART shall ensure that, if feasible, the contractor schedules utility work to be performed during periods of off-peak service demand, when the least number of people demand the service. Low-demand periods occur during late evening and early morning hours.

CI-UT-1.2 *Arrange Temporary Backup Service*. If it is not feasible to schedule service interruption to avoid substantial inconvenience to customers, BART shall ensure that the contractor coordinates with the responsible utility provider to maintain service.

CI-UT-1.3 *Notify Customers of Service Interruptions*. Residential and business notifications to commercial and residential customers shall be delivered/mailed at least two weeks in advance of service interruption and shall contain information on the selected BART extension alternative, anticipated schedule for service interruption, likely duration of service interruption, and individuals to contact regarding utility service or other construction-related issues.

Energy

CI-EN-1 *Construction Energy Demand*

The construction of one or two new stations per alternative, a new maintenance facility for all but two alternatives, tracks, and associated utilities and infrastructure would demand energy. Additional energy would be consumed by equipment (e.g., dump trucks, scrapers, bulldozers, loaders, rollers, generators) and vehicles (e.g., construction worker commuter vehicles) used during construction. Alternatives 1, 1a, 1b, 2, 2a, 3, and 3a, with two stations and one maintenance facility each, are expected to consume more energy for construction than Alternatives 4 and 5, with only one new station each.

At this early stage of alternatives consideration, energy conservation practices have not been developed for the construction of the BART extension alternatives. It is expected that construction would follow good construction practices and energy management techniques such as minimizing the number of material deliveries required, maintaining equipment in good condition, and minimizing equipment idling. However, because a detailed conservation plan is not currently in place, it is conservatively assumed that construction of any of the extension alternatives may result in potentially significant energy consumption impacts.

MITIGATION MEASURE**.** The following measure would apply to all alternatives and would reduce the potentially significant construction energy impact to less than significant. (LTS)

CI-EN-1.1 Develop and Implement a Construction Energy Conservation Plan. Prior to construction of the selected alternative, BART shall ensure all contractors prepare and implement a construction energy conservation plan, subject to BART approval, that may include measures such as, but not limited to:

- Use of energy-efficient equipment and incorporate energy-saving techniques during construction;
- Limit idling of construction equipment to 5 minutes;
- Reduce the number of vehicle/truck trips by consolidating material deliveries, as appropriate, and encourage construction worker carpooling (e.g., provide at least two incentives such as set aside parking spaces and/or provide free lunch for carpooling construction workers);
- Schedule delivery of materials during non-rush hours to minimize time vehicles/trucks are idling on the roads; and
- Maintain equipment in good working condition as recommended by manufacturers.

Effect of UP Commuter Access Principles

As described in Section 2, Alternatives, the UPRR has developed guidelines for use of its right-of-way by commuter rail services. While not officially adopted rules or regulations of a state or federal agency, these guidelines, if applied during subsequent project-level planning, engineering, and environmental review, could modify the impacts identified in this section. Specifically, adherence to the UP Commuter Access Principles would shift Alternatives 1a, 1b, 2, 2a, 3, and 3a north of the UPRR ROW. The additional right-of-way that would be needed to accommodate the BART extension would be approximately 36 feet, running 1.7 miles from Murrieta Boulevard to First Street and then about 3,500 feet east of Mines Road. Because a larger construction area would be required for these alternatives, the construction-period impacts would be more noticeable and greater than if these alternatives did not have to respond to the UP principles. Impacts that would be greater are those related to traffic congestion; disruption to transit, pedestrians, and bicyclists; views of construction

sites and activities; temporary impacts to cultural resources; soil erosion; stormwater runoff; drainage capacity and localized flooding; disturbance to nesting birds and special status bats; construction noise and vibration; air emissions and odors; accidental release of hazardous materials and exposure to contaminated soils and/or groundwater; interference with emergency response vehicles; interruption of utility services; and energy consumption. The mitigation measures identified below for these impacts would apply and be equally effective at reducing the effects to less than significant.

Section 4
Other CEQA Considerations

4.1 INTRODUCTION

This section of the document provides other discussions that are required by CEQA, beyond the description of the program and the topic-specific environmental analyses presented in Sections 2 and 3 of this document, respectively. These other discussions include a summary of significant impacts resulting from implementation of the BART to Livermore Extension that cannot be mitigated to a less-than-significant level; an assessment of the irreversible and irretrievable commitment of resources; presentation of potential growth-inducing impacts; and identification of an environmentally superior alternative.

4.2 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Section 3 of this document identifies impacts considered potentially significant, and the mitigation measures recommended to reduce those impacts to a less-than-significant level. The significant impacts of the BART to Livermore Extension Program that cannot or may not be mitigated to a less-than-significant level are identified below.

- Congestion along some freeway segments (all alternatives)
- Congestion along some arterials and study area intersections (all alternatives)
- Unacceptable level of service at Portola Avenue/Livermore Avenue (Alternatives 3, 3a, 4)
- Possible land use conflicts/incompatibility with residential and historic areas (Alternatives 3 and 3a)
- Loss of agricultural resources with possible future station area development (Alternatives 1, 1a, and 1b)
- Visual incompatibility due to height, scale, and mass associated with aerial structures and possible sound walls (Alternatives 1, 1a, 1b, 2, and 3a)
- Possible disturbance to historic resources (Alternatives 1, 1a, 1b, 2, 2a,3, 3a, and 5)
- Encroachment into mineral resource area and possible interference with access to resources (Alternatives 3a and 5)
- Possible disturbance from BART train noise (Alternatives 1, 1a, 1b, 2, 2a, 3a, and 5)
- Possible disturbance from BART equipment noise, including ventilation shafts (Alternative 3) and traction power substations (all alternatives)
- Possible disturbance from traffic noise by vehicles traveling to and from stations (all alternatives)

- Possible disturbance from vibration related to BART operations (Alternatives 1a, 1b, 2a, 3, and 3a)
- Possible disturbance from noise and vibration during construction (all alternatives)

4.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

Pursuant to Section 15126.2(c) of the CEQA Guidelines, this section discusses the extent to which the primary and secondary effects of a project would irretrievably commit nonrenewable sources. Irreversible commitment of resources must be evaluated to assure that current consumption is justified. Actions that may be considered significant and irreversible include:

- Uses of nonrenewable resources (e.g., land, energy, and construction materials) during the construction and operational phase of a proposed project or program may be irreversible (since a large commitment of such resources makes removal or non-use thereafter unlikely);
- Primary impacts, and particularly, secondary impacts, that will commit future generations to similar use; and
- Irreversible damage due to environmental accidents.

Commitment of Nonrenewable Resources

Construction of the proposed infrastructure and transit facilities would require a substantial commitment of construction materials for the alignment, stations, and maintenance yard, such as asphalt, steel, cement, lumber, and fabricated materials.

In addition to building materials, the BART to Livermore Extension Program would involve the consumption of fuels necessary to generate the electricity required for train propulsion and station and maintenance yard operation. As reported in Section 3.15, Energy, the BART extension alternatives would consume 193 to 459 billion British Thermal Units (BTUs) annually. This commitment of energy resources to generate this electricity demand should be weighed against the reduced fossil fuel consumption that would occur when motorists divert from automobiles and trucks to transit with the BART extension alternatives. Section 3.15 indicates that there would be a net reduction in energy demand (and, hence, commitment of nonrenewable fossil fuels) with the BART to Livermore Extension Program. The BART extension alternatives have the potential to reduce annual energy consumption by 624 to 919 billion BTUs.

Commitment of Land Resources and Land Uses

The BART extension alternatives would result in an irreversible commitment of land resources for development of the tracks and tailtracks, stations, parking lots, and maintenance yard. The “full” build alternatives consisting of two stations and a maintenance yard could require up to approximately 215 acres for these facilities. The shorter build alternatives that would extend BART service one station could require up to approximately 50 acres for station facilities; no maintenance facilities or yards are

proposed in the study area for the one-station alternatives, so that they would involve substantially less land commitment than the two-station alternatives. Thus, a BART extension would commit the station areas from their current uses (generally undeveloped lands at the Isabel/I-580 Station, Isabel/Stanley Station, and Greenville Yard; partially developed lands at Greenville East; residentially or commercially developed areas at the Downtown Livermore Station and Portola/Railroad Yard; and industrially developed lands at the Vasco Road Station and Vasco Yard) to transportation-related uses. The vast majority of the land to be used by the BART extension alternatives – that part associated with the track work along the alignment – would occur on freeway or railroad rights-of-way that are already committed to transportation uses.

The consideration of irreversible changes should also take into account lands that are currently in open space or have soil characteristics that qualify them to be suitable for agricultural activities. Conversion of these lands for the BART extension alternatives would result in commitment of open space and productive resource lands. As presented in Section 3.3, Land Use, loss of important farmlands and Williamson Act lands (lands that are committed to remain in open space in exchange for tax assessments based on open space rather than their potentially "highest and best use") would occur with the Isabel/I-580 Station (20 acres of important farmland that would be affected under Alternatives 1, 2, 3, and 4) and with the Greenville East Station/Yard (305 acres of Williamson Act lands that would be affected under Alternatives 1, and 250 acres of Williamson Act lands that would be affected under Alternatives 1a and 1b). In addition, the Isabel/I-580 Station area and Greenville East Station area include agricultural resources that could be indirectly converted to urban uses by future development pressures and by the benefits of being near a BART station. While the area near the Isabel/I-580 Station has already been designated for multi-family residential and light industrial uses in the Livermore General Plan, the 250 acres of Williamson Act land in the Greenville East Station area would be at risk of conversion due to the potential for TOD. The possible conversion of these lands for urban uses to take advantage of BART would only occur if the Urban Growth Boundary established for North Livermore was modified. A public service facility, like a BART station, would be permitted outside the Urban Growth Boundary; however, supportive TOD land uses would not be permitted unless the boundary was changed. Such an adjustment would require approval by the City voters. Thus, there may be indirect pressure to alter land uses around the station area and commit open space resources to urban development; however, the ultimate use of the land will depend on future citywide and Council actions.

Environmental Accidents

Hazardous materials are normally required for the maintenance of transit systems and vehicles; however, in this case, accidents stemming from the inadvertent release of these materials are not considered to be significant because of the minimal volumes and concentrations that would be used by the BART to Livermore Extension Program, existing regulations that govern the accidental release and spill of hazardous materials, and proposed mitigation (see Section 3.12, Public Health and Safety). Moreover, BART follows standard operating procedures and emergency response activities in the event of an accidental release. These procedures include development of communication and response protocols with the local emergency response teams. Compliance with the existing hazardous materials

handling, disposal, and transport regulations, the emergency response protocols, and the identified mitigation measures would collectively provide for containment of accidental releases and quick and coordinated response to environmental accidents. As a result, while environmental accidents may occur, they are not expected to result in irreversible damage to the public or to the environment.

4.4 GROWTH-INDUCING IMPACTS

Pursuant to Section 15126.2(d) of the CEQA Guidelines, this section discusses the growth-inducing effects of the BART to Livermore Extension. A project is considered growth inducing if has the potential to directly or indirectly foster economic or population growth, or the construction of additional housing. For example, extension of urban services or transportation facilities into previously unserved or underserved areas, or removal of obstacles to growth and development, are considered factors that contribute to growth inducement. Growth could occur in the form of land development or increased numbers and concentrations of housing and jobs.

The analysis in this section evaluates whether the BART to Livermore Extension would directly or indirectly induce economic, population, or housing growth adjacent to the project corridor, as well as a description of the BART extension's potential to re-distribute regional population growth in a more compact manner (i.e., "smart growth" as defined below in this section).

Growth, Land Use, and Transportation Systems

Growth rates and patterns within an area are influenced by various local, regional, and nationwide forces that reflect ongoing social, economic, and technological changes. Ultimately, the amount and location of population growth and economic development that occurs within a specific area is regulated by city and county governments through zoning, land use plans and policies, and decisions regarding development applications. Local government and other regional, State, and federal agencies also make decisions regarding the provision of infrastructure (e.g., transportation facilities, water facilities, sewage facilities) that may influence growth rates and the location of future development.

Transportation projects can have a wide range of growth-inducing effects. A project may hasten growth in certain areas, retard it in others, intensify development in certain locations, or shift growth from one locality to another. Generally, transportation improvements support growth, whereas land use development generates new travel demand and therefore contributes to the need for new transportation capacity. Transportation infrastructure is one component of the overall infrastructure that may serve to accommodate planned growth. This infrastructure may also serve to accelerate or shift planned growth or encourage and intensify unplanned growth (i.e., growth not specifically identified in an adopted general or specific plan) within an area. Such shifts in growth patterns can occur by extending roadways and, hence, accessibility to unserved areas, or by providing substantially more capacity than would be needed to support the land development. Other factors, particularly local planning and community standards or environmental initiatives, may also direct the location and timing of transportation investments. A prime example of this is the Urban Growth Boundary of the City of Livermore and of the East County Area of Alameda County that limit the encroachment of urban

development onto open spaces and agricultural lands. The goal of the Urban Growth Boundary is to focus urban development in or near existing cities, where it will be efficiently served by existing facilities.[1] Future adjustments to the City's Urban Growth Boundary require approval through a citywide vote, a standard set to ensure that future expansion of urban development would be carefully considered and reviewed against citywide values regarding urban development, resource protection, and growth management.

The BART to Livermore Extension occurs in a corridor that is largely urbanized; however, there are extensive areas that could accommodate new development, particularly along I-580 on the north side between Isabel Avenue and First Street, and along Altamont Pass Road and Greenville Road at the eastern end of the corridor. Association of Bay Area Governments (ABAG) projects substantial population and employment growth in Alameda County over the next 20 years. These forecasts, which are documented in Section 3.4, Population and Housing, of this document, show that the cities of Dublin, Pleasanton, and Livermore, are expected to increase substantially at a rate faster than the rest of the County. The heavy commute flow between the Central Valley and the Bay Area over the Altamont Pass is served by I-580, but the capacity of this facility is typically maximized during peak commute periods, causing this stretch of Alameda County to experience some of the worst congestion in the San Francisco Bay Area. The BART to Livermore Extension is planned to serve the existing corridor's transit needs as well as accommodate planned development in the Tri-Valley area and in the Central Valley.

While the BART to Livermore Extension would serve regional and corridor-wide growth and travel demand, it is reasonable to also expect that new development in addition to that already planned or proposed could be fostered by improved transit services and accessibility to BART's regional transit system. Proximity to the BART to Livermore Extension offers major access improvements, and thus the BART extension's presence in the corridor is likely to enhance development along the corridor and primarily around the station areas. This development may occur regardless of the BART to Livermore Extension, but the location and intensity of growth would likely shift to take advantage of the BART extension. Population or employment growth stimulated by the proximity to the proposed stations could, in turn, put pressure on existing community services and facilities. Presented below are the growth-inducing impacts of the BART to Livermore Extension.

Growth-Inducing Impacts

The following analysis concludes that the BART to Livermore Extension would:

- not affect overall growth in the Bay Area region;
- not directly foster unanticipated population or housing growth except in selected station areas;
- not directly foster unanticipated economic growth except in selected station areas;
- indirectly and adversely result in potential growth-related impacts in the project corridor; and
- indirectly and positively contribute to smart growth patterns in the project corridor.

[1] County of Alameda, *East County Area Plan*, November 2000, p. ii.

Regional Growth Inducement. BART's original vision was to shape regional economic growth on a large-scale, area-wide basis. An explicit goal was to encourage and support large economic and redevelopment plans in the downtown areas of San Francisco and Oakland and in suburban centers along major corridors – effectively becoming an integrated transit system that the Bay Area needed. Thirty-five years later, the original economic focus of Bay Area rail investment has largely succeeded; San Francisco and Oakland's central business districts added millions of square feet of office uses during the 1970s and 1980s. However, many expectations of growth in outlying areas did not occur, even in planning policy, until recently.

As mixed-use centers became accepted by the development community in the mid-1980s, commercial and employment-oriented development occurred more frequently around several suburban centers, notably Concord, Hayward, and Walnut Creek. As the Bay Area's chronic housing shortage worsened, and given that many BART stations exist in redevelopment areas, more multifamily housing, especially affordable housing, began to be included near BART stations.

A large number of general plan updates and redevelopment plan amendments occurred in cities around the Bay Area during the mid to late 1990s, some of which had not been substantially revised for decades. With the refinement of smart growth principles in urban design and planning, the focus shifted to transit-oriented development with higher employment and housing densities within walking distance of rail stations. The late 1990s economic boom led to the creation of many transit-oriented development plans, which ultimately were adopted into updated general plans.

The BART to Livermore Extension is designed to serve the current and planned growth in population, housing, and employment in the next 25 years in Alameda County, as well as the travel demand that occurs between the Bay Area and the Central Valley through the Altamont Pass. The BART to Livermore Extension would provide a key segment in the Bay Area's regional rail transportation network between San Francisco, East Bay communities already served by BART, and eventually the South Bay by providing a link as part of an integrated system.

Growth in San Joaquin County, in part driven by the relative affordability of housing compared to that of the Bay Area, has occurred at an even faster pace that in the Bay Area. As a result, commute travel over the Altamont Pass has become ever more congested. It is conceivable that a BART extension to Livermore would allow employed residents in the Bay Area to relocate to San Joaquin County and other parts of the Central Valley because they would be able to drive to the BART to Livermore Extension terminus and then complete their commute on BART. Thus, the BART to Livermore Extension could induce some level of growth in San Joaquin County. The magnitude of this growth inducement is highly sensitive to household income, desires for subjective quality of life factors, and tolerance for commute times.

The shortage of housing in the Bay Area provides perspective on why much of San Joaquin County's growth is fueled by Bay Area conditions. According to the ABAG 2006 report, "A Place to Call Home," between 1999 and 2006, Alameda County had a regional housing needs assessment (RHNA) allocation of 46,793. During that same period, housing production is reported at 29,446; resulting in an unmet housing need of 17,347 units. While Contra Costa County reported housing production

2,444 over the RHNA allocation, the net unmet housing need between these two counties was just under 15,000 units. For the nine-county Bay Area region, between 1999 and 2006 the RHNA allocation was 230,743 units and housing production was 173,648 units, resulting in an unmet housing need of 57,095 units.

While housing in San Joaquin County may be less expensive than the Bay Area, the job location of the employed resident and the time of commute will affect the number of households willing to relocate. Many residents in San Joaquin County spent an average of 1.37 hours one-way daily along the Interstate 205/Altamont Pass and I-580 corridors to the Bay Area.[2] As indicated by 2000 Census Journey to Work data, Alameda, Contra Costa, and Santa Clara counties are the major Bay Area worker importers from San Joaquin County: Stanislaus (6,640) and Sacramento (6,296) counties also import a fair number of workers from San Joaquin County. More than 19,000 workers commute to Alameda County, 3,669 commute to Contra Costa County, and 7,046 commute to Santa Clara County. Overall, San Joaquin County has more workers leaving than arriving in the County.

These historical trends are expected to continue. Anticipated population and household growth in the County, as reflected in the San Joaquin Council of Government forecasts for the San Joaquin County shows the County growing from about 626,900 in 2005 to 1,069,100 in 2030 and Tracy, the nearest San Joaquin County, over the Altamont Pass, growing from about 70,300 in 2005 to 181,300 in 2030.[3] Thus, future projections in the County anticipate substantial new development, and reflect the interregional connection between the Bay Area and San Joaquin County. These projections were made independent of the BART to Livermore Extension. Given the interplay of above factors, it is speculative to definitively say that a BART extension would induce substantial new growth, since so much is already forecast.

Direct Growth Inducement in the Local Study Area. The BART to Livermore Extension would introduce approximately 5 to 13 miles (depending on the alternative) of service east from the current BART terminus at the Dublin/Pleasanton BART Station.

Intensified Development Around Station Areas. The BART to Livermore Extension includes proposed new stations at Isabel Avenue/I-580, Isabel Avenue/Stanley Boulevard, Downtown Livermore, Vasco Road, and Greenville Road, and proposed new maintenance yards at Portola Avenue, Vasco Road, and Greenville Road (for a complete listing of which station and maintenance yards are proposed with each alternative, see Section 2, Alternatives). The BART to Livermore Extension is an improvement to the existing transportation system because it would extend rail transit. The BART to Livermore Extension would not directly induce substantial population, housing, or economic growth to Livermore overall. New residential and retail development with associated demands for public services is already anticipated near three of the station areas: I-580/Isabel, Downtown Livermore, and Vasco Road. The I-580/Isabel Station area is planned for new business parks and light industrial uses. The Downtown Livermore Station area is in the midst of the Livermore Downtown Specific Plan, and the Vasco Road Station area is near proposed light industrial uses and the higher density Brisa Neighborhood Plan area.

[2] San Joaquin Council of Governments, 2007 Regional Transportation Plan, May 2007, p. 3-1.

[3] San Joaquin Council of Governments, 2007 Regional Transportation Plan, May 2007, p. 3-2.

Higher density development and new growth would be complementary to the land use plans around these station areas. There are two stations, however, where the Livermore General Plan does not anticipate transit-supported land uses and could experience pressures to allow more development if possible. The Isabel/Stanley Station area is proposed predominantly for water/resource management and agriculture and the southern portion of the station area lies outside the Urban Growth Boundary for South Livermore. The Greenville East is proposed predominantly for agriculture, and the majority of the station area lies outside the Urban Growth Boundary for North Livermore. Development pressures to take advantage of BART stations at these latter two locations could induce local growth, but there are multiple hurdles to overcome before additional development could occur at these station areas; including voter approval to modify the Urban Growth Boundary to allow expansion of urban development, determination of consistency with the Airport Protection Area at the Isabel/Stanley Station, nonrenewal of Williamson Act contracted lands at the Greenville East Station, environmental review for loss of agricultural, mineral, and biological resources, and City Council approval of development plans for the station areas.

Citywide and Study Area Growth. As described in Section 3.4, Population and Housing, as of 2010, the cities of Dublin, Pleasanton, and Livermore are projected to have an employment base of 140,820 jobs, and a combined 74,460 households. According to ABAG, these cities will add approximately 73,250 jobs and 31,480 households between 2010 and 2035. BART estimates that the alternatives would generate between approximately 150 and 400 full-time equivalent (FTE) positions, including train operators, maintenance personnel, and other employees.[4] If each new employee conservatively required a separate housing unit, consistent with a ratio of 1.46 employed residents per household in the study area, the BART extension alternatives could also indirectly generate demand for up to approximately 275 additional housing units in the study area resulting from increased BART employment. This represents about 0.9 percent of projected household growth in the cities of Dublin, Pleasanton, and Livermore by 2035 and, like employment, would be minimal in the context of total households.

The BART to Livermore Extension would therefore not directly foster substantial economic growth. While the amount of new growth surrounding the proposed stations could be substantial, it is being addressed through specific planning processes by the cities of Dublin and Pleasanton for the existing Dublin/Pleasanton BART Station, and by Livermore for the new stations. The growth that could occur around the stations may be more than what is currently envisioned by the City for those areas; however, the overall growth in the City is not expected to be greater than projected by the City's General Plan. The station locations along the BART extension alternative alignments would have the effect of redistributing growth that is already forecast for the City, a redistribution that would result in a more compact and transit-oriented configuration, which is considered smart growth and consistent with the City's development policies. Limited growth is envisioned by Livermore at the Isabel/Stanley and Greenville East Stations, in large part because they are outside the Urban Growth Boundary. It is noted that the City in anticipation of a BART to Livermore Extension did designate a different area in its General Plan for TOD around Greenville Road. That area is on the north side of I-580 and is

[4] Tumola, Thomas, Senior Planner, BART, email communication with BAE, May 29, 2009.

approximately where the Greenville Yard is proposed. As a result, a substantial amount of General Plan development potential is assigned to that site which would not be used for TOD. The development potential could be redistributed to station locations proposed in this Program EIR, provided that such development would be consistent with City development policies.

Summary. In conclusion, the BART to Livermore Extension would not directly induce substantial population, housing, or economic growth beyond that currently defined in the General Plans for the cities of Dublin, Pleasanton, and Livermore, and Alameda County. The growth that is projected to occur may be redistributed to take advantage of the regional accessibility afforded by the BART station, and that intensification at the infill stations of I-580/Isabel, Downtown Livermore, and Vasco Road would be consistent with City land use policies that have anticipated a BART to Livermore Extension. Intensification could also occur at Isabel/Stanley and at Greenville East, but would not be consistent with current policies for those station areas.

BART's adopted System Expansion Policy requires the preparation of one or more Ridership Development Plans around the proposed stations in order to ensure a desired level of ridership (unless the existing General Plan land use designations in the station areas would already generate sufficient BART passengers). The desired ridership levels are defined for the entire corridor and it is up to the local jurisdiction, not BART, to determine what land use and access changes are needed to achieve the targets. Thus, for the two-station BART extension alternatives, the requisite development to achieve the ridership target can be shared between the two stations equally or one can accommodate a substantially greater proportion to reflect local conditions and opportunities. Accordingly, the extension of BART into the City of Livermore under the BART to Livermore Extension would not be considered without the Ridership Development Plans for the station areas. Since the BART to Livermore Extension facilitates transit-oriented growth and development around the proposed stations, by attracting more development at these locations, both the BART to Livermore Extension and Ridership Development Plans have a direct effect on smart growth around the proposed stations. Those alternatives that involve a combination of the I-580/Isabel, Downtown Livermore, or Vasco Road Stations (namely, Alternatives 2, 2a, and 3) would induce growth that would be most consistent with current City policies, since these areas already anticipate land use intensification.

Indirect Adverse Growth-Inducing Impacts in the Local Project Area. Smart growth along the project corridor, especially around the proposed stations, would indirectly induce growth in east Alameda County and San Joaquin County by alleviating highly congested transportation systems. Smart growth would also improve access to existing neighborhoods, civic resources, and employment centers from regional public transit that may grow as a result. It would also provide incentives for development on vacant and underutilized land in the vicinity. However, this indirect growth effect is not considered adverse under CEQA definitions, because the principal effect is increased accessibility and not a physical change to the environment.

To the extent that improved transit systems encourage development by removing obstacles to mobility or improving access in the region, the BART to Livermore Extension could have an indirect growth-inducing effect by accelerating planned growth in a more compact, transit-oriented form, along the chosen corridor and particularly in and around the proposed station areas. The indirect growth caused

by the BART to Livermore Extension could cause indirect adverse growth-related impacts associated with construction and implementation of new development projects in the local project area (i.e., air and noise impacts from construction of new housing or other development, etc.). As noted above, BART will work with the City in the formulation of Ridership Development Plans, if necessary, for the stations at I-580/Isabel, Downtown Livermore, and Vasco Road. For stations at Isabel/Stanley and Greenville East, which are in both the City and unincorporated Alameda County, both Livermore and Alameda County may be involved in this planning effort. These plans, which could take the form of a specific plan, must undergo environmental review, and will have to document the physical changes to the environment. For those stations entirely in the City, changes in land use intensity, traffic generation, development massing and heights, demand for services and utilities, and air and noise emissions are expected to be important. For those stations that are in both the City and County, additional issues related to modifications to the Urban Growth Boundary, loss of mineral or agricultural resources, and biological impacts will need to be evaluated. Section 3.3, Land Use, and Section 5, Program Merits, explore these issues further. Thus, the indirect effects of the BART to Livermore Extension related to land use intensification and access improvements in the station areas would be addressed through the environmental review process for the Ridership Development Plans.

Indirect Positive Contribution to Smart Growth Patterns in the Local Project Area. A major objective of the BART to Livermore Extension is to improve regional transit access and transportation services to accommodate planned and future growth in Alameda County. As outlined in Section 1, Introduction, of this document, the objectives of the BART to Livermore Extension reflect BART's cooperation with other government entities, and serve to advance multi-jurisdictional efforts to plan and implement transit-oriented development.

New development, defined through the creation of Ridership Development Plans for areas surrounding the proposed station areas, is intended to reflect a more pedestrian-oriented, compact, and mixed-use development. The BART to Livermore Extension access plans providing multi-modal access to regional rail emphasize public space and infrastructure improvements that are designed to encourage private sector developers, who increasingly specialize in transit-oriented projects around BART and other rail stations. In essence, the proposed stations become catalysts to support local development plans promoted by the cities of Dublin, Pleasanton, and Livermore.

Proximity to one of the proposed stations offers major incentives to attract business, entertainment, commercial/retail, and other employment-generating land uses, along with unique opportunities for meeting local growing housing needs. While development may occur without the BART to Livermore Extension, it most likely will be auto-oriented and thus will not be smart growth. The BART to Livermore Extension thus meets the major policy goals of smart growth being endorsed by State, regional, county, and city agencies by providing an incentive for local transit-oriented planning, which is being led by the cities of Dublin, Pleasanton, and Livermore, and Alameda County. The environmental benefits of smart growth will be measured through these separate planning efforts, while this document identifies how the BART to Livermore Extension contributes to the probability of such future development patterns.

4.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The State CEQA Guidelines (Section 15126.6(a) and (e)(2)) require that an EIR's analysis of alternatives identify the "environmentally superior alternative" among all of those considered. In addition, if the No Build Alternative is identified as the environmentally superior alternative, then the EIR must also identify the environmentally superior alternative among the other alternatives. Under CEQA, the goal of identifying the environmentally superior alternative is to assist decision-makers in considering project approval. CEQA does not require an agency to select the environmentally superior alternative (CEQA Guidelines Section 15042-15043).

Based on the evaluation presented in Section 3, Environmental Analysis, the No Build Alternative would include projects that are approved and environmentally cleared under CEQA and/or the National Environmental Policy Act. As such, the No Build Alternative would not involve new development or infrastructure improvements that could cause physical environmental effects in the study area that were not previously addressed in the environmental documents prepared for those projects. Thus, the No Build Alternative would avoid new impacts related to natural resources, cultural resources, and encroachment into hazardous areas such as environmentally contaminated sites, floodprone areas, or ground rupture zones. On the other hand, the No Build Alternative would not improve future travel conditions along I-580 or reduce air emissions, greenhouse gas emissions, or energy consumption. In addition, the No Build Alternative would not obtain any of the objectives identified in Section 1, including improving air quality, reducing vehicle miles traveled and enhancing mobility along I-580, reducing greenhouse emission, and providing connections to ACE and potential high-speed train services. While the No Build Alternative would avoid new "footprint" impacts (those based on the land area required to accommodate a proposed improvement), the continuation of "transportation" impacts (those related to vehicle miles traveled, congestion, and air and greenhouse gas emissions, and energy consumption) indicate that the No Build Alternative would not be environmentally superior.

Of the BART extension alternatives, Alternative 2a – Downtown Vasco is considered to be the environmentally superior alternative. Alternative 2a would operate in the median of I-580 to the El Charro Road interchange and then veer southeast along El Charro Road toward Downtown Livermore along the UPRR right-of-way to a Downtown Livermore Station and terminate at the Vasco Road ACE Station. This alternative would result in the second highest increase in BART ridership with 31,600 passengers per day (Alternative 2a has the greatest daily ridership at 31,700). Alternative 2a would also produce the greatest reduction in vehicle miles traveled at over 860,200 miles per day. Accordingly, Alternative 2a would also have among the greatest air quality benefits, energy savings, and reductions in greenhouse emissions. Energy savings would amount to 919 billion BTUs annually and greenhouse emissions reductions would be over 591,500 pounds per day of CO_2, compared to the No Build Alternative.

The alignment of Alternative 2a through Downtown Livermore on retained fill has the potential to disturb some of the residences and cultural resources in the Downtown area, although these impacts would occur with all of the other alternatives as well, except Alternatives 1 and 4, which run within the median of I-580, and Alternative 5, which stops at Isabel/Stanley, west of the downtown area.

Alternative 2a would avoid any indirect effects on agricultural resources and encroachment into airport-related safety zones. At the program-level evaluation when a precise alignment and station areas have not yet been defined, impacts to cultural, biological, and water resources (the "footprint" impacts) are identified primarily on the basis of whether these resources occur within the study area. In this regard, Alternative 2a is similar to Alternatives 1, 1a, 1b, and 2, with less potential to affect special-species plant habitats and California red-legged frogs and greater potential to affect the California tiger salamander, special-status invertebrate species, and hazardous materials sites.

While Alternative 2a rates highest in terms of reducing vehicle miles traveled and related emission and energy benefits, it is important to recognize that Alternatives 2 – Las Positas and 3 - Portola are environmentally superior in areas where Alternative 2a does not rate as highly. Alternative 2 performs well in terms of reducing vehicle miles travelled, emissions reductions, and energy savings, but also would have the lowest residential displacement effect (10 units) and among the lowest potential noise impacts, potentially affecting sensitive receptors along 6,500 feet of the alignment (compared to 28,000 feet for Alternative 2a). Alternative 3 would not provide the same benefits in terms of vehicle miles traveled, air emissions, and energy savings that both Alternative 2 or 2a provide; however, in terms of natural resources, Alternative 3 would have the fewest impacts on wetlands (5 acres), California tiger salamander and western pond turtle habitat, and streams (five stream crossings). In addition, the underground alignment of Alternative 3 as it approaches the downtown would result in minimal visual impacts and avoid noise impacts, except around ventilation shafts.

While Alternative 2a is the environmentally superior alternative, it is noted that Alternative 4 – Isabel/I-580, being one of the shorter alternatives (slightly greater than 5 miles with one station at Isabel/I-580) and potentially serving as a first phase for Alternatives 1 – Greenville East, 2 – Las Positas, and 3 – Portola, would be expected to have fewer footprint impacts. This alternative remains within the I-580 median. The potential to disturb historic resources and prehistoric archaeological resources is less because of the shorter length of the alternative and its avoidance of the Downtown Livermore area. Similarly, Alternative 4 rates well in terms of avoiding wetlands, stream crossings, and California tiger salamander habitat, and would have among the least effects on wetlands. With respect to land use and visual compatibility, noise and vibration impacts, and land acquisition, Alternative 4 has relatively few adverse impacts. This alternative is not, however, as successful as the two-station alternatives at achieving reductions in vehicles miles traveled (Alternative 2a would result in a reduction of 860,200 miles per day; Alternative 4 would result in a reduction of 404,200 miles per day, the lowest of the BART extension alternatives). As a result, Alternative 4, while still improving air quality, reducing energy consumption, and lowering greenhouse gas emissions, would offer considerably less benefit in these environmental areas than the other extension alternatives. Finally, Alternative 4, as a stand-alone alternative, would not satisfy the program objectives particularly well. This alternative would result in the smallest increase in BART ridership (19,900 daily system riders, compared to the environmentally superior Alternative 2a at 30,900), worsening congestion along four freeway segments (compared to one under Alternative 2a), and no connection to ACE.

Section 5
Program Merits

5.1 INTRODUCTION

Introduction

As mentioned at the beginning of this document, EIRs are intended to be informational documents, providing information to the public and the decision-makers about the project, its physical environmental effects, and measures or alternatives that can reduce these effects. More specifically, an EIR prepared pursuant to CEQA must address the significant *adverse* impacts on the environment (Public Resources Code, Section 21068). Information on whether a project is "desirable" is usually regarded as a discussion of the project's merits and strays from the intent of an EIR to provide objective, independent evaluation of a project's environmental implications.

Accordingly, the identification of beneficial effects of the BART to Livermore Extension Program, while useful in understanding the program's merits, is not an environmental "impact" in the sense of CEQA and an EIR is not required to evaluate these relative benefits. Nevertheless, BART wishes to emphasize, for the benefit of the public and decision makers, the extent to which the BART to Livermore Extension Program may improve upon existing conditions or those conditions that would occur under a No Build scenario. In these cases, the change to the environment is reported in the Draft Program EIR as a benefit.

Similarly, the ability of the BART to Livermore Extension Program to satisfy the objectives established for the program, the BART System Expansion Policy, and the Metropolitan Transportation Commission's Resolution #3434 may be viewed as describing the project's merits. In the current instance, it is instructive to touch upon these topics so that the differences among the nine BART extension alternatives can be discerned and so that the BART Board of Directors (Board) have information at their disposal to make a more informed decision about whether a particular alternative, if any, might be preferable to advance to more detailed planning, engineering, and project-level environmental review.

5.2 PROGRAM BENEFITS

Beneficial effects of the BART to Livermore Extension Program include effects that enhance or improve upon the existing conditions. As discussed in more detail in Section 3 of this document, the BART extension program would have the beneficial impacts identified in Table 5-1 and summarized below:

- improved freeway operations compared to the No Build conditions in 2035;
- net reduction in regional air emissions that would be consistent with and supportive of the goals of the Clean Air Plan and the Bay Area 2005 Ozone Strategy;
- net reductions to regional greenhouse gas emissions that would be supportive of the goals of Senate Bill 375; and
- net reduction in energy and petroleum consumption.

5.3 ATTAINMENT OF BART TO LIVERMORE EXPANSION PROGRAM OBJECTIVES

Given the transportation characteristics and future travel demand in east Alameda County in general and in the BART to Livermore study area in particular, the following objectives have been identified by BART for extension of transit service to Livermore:

- Increase BART ridership.
- Provide congestion relief along the I-580 corridor through the Tri-Valley area.
- Provide convenient intermodal connections between BART, the Altamont Commuter Express, and the Livermore Amador Valley Transit Authority.
- Support local efforts, initiatives, and policies to promote transit-oriented development.
- Enhance economic benefits, contributing to local investment and development opportunities.
- Provide a cost effective transit system, recognizing budget constraints and available funding.
- Conform with the BART System Expansion Policy and with the Metropolitan Transportation Commission's Resolution #3434 – Transit-Oriented Development Policy for Regional Transit Extension Projects.
- Protect and enhance the environment.
- Improve transit mobility between the Silicon Valley, the Tri-Valley area, the East Bay Area, and San Francisco in support of efforts to reduce greenhouse gas emissions, consistent with Senate Bill (SB) 375.

In general terms, the objectives involve reducing environmental impacts related to traffic within the I-580 corridor including congestion and greenhouse gas emissions, increasing transit usage and connections for the BART system and area transit providers, stimulating transit-oriented development planning and economic investment for station areas, and conforming with the BART system expansion policy (SEP) and the Metropolitan Transportation Commission's Resolution #3434 (Resolution #3434). Table 5-2 presents a comprehensive assessment of the degree to which each of the program alternatives meet those objectives. As described in Table 5-2, the No Build Alternative would do the least in satisfying the program objectives.

Table 5-1
Beneficial Effects of the BART Extension Alternatives

Issue	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry
Transportation									
Increase in BART System Ridership (daily riders)	31,700	30,900	30,900	29,800	31,600	29,900	29,700	19,900	20,800
Reduction in Vehicle Miles Traveled (per day)	687,877	742,836	742,836	742,494	860,211	704,246	633,485	404,159	620,992
# of Improved Segments along I-580 (in Peak Hour)	7	7	7	6	7	5	6	5	4
# of Improved Local Intersections (in Peak Hour)	8	8	8	6	8	8	7	8	7
Possible Station Connection to ACE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Air Quality									
Reduction in Regional Emissions (lbs/day)									
NOx	267	287	287	290	339	273	243	149	247
ROG	46	50	50	49	57	47	42	27	41
Reduction in Greenhouse Gas Emissions (lbs/day)	429,694	459,473	463,658	493,946	591,522	483,098	412,010	261,429	468,866
Energy									
Reduction in Regional Energy Consumption (Billion BTUs/year)	628	668	678	754	919	756	624	402	770

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Increase BART ridership.	**Not Satisfied.** This alternative would not increase ridership beyond the anticipated increases at the West Dublin and Dublin/Pleasanton BART Stations.	**Satisfied.** This alternative would add 31,700 daily riders to the BART system.	**Satisfied.** This alternative would add 30,900 daily riders to the BART system.	**Satisfied.** This alternative would add 30,900 daily riders to the BART system.	**Satisfied.** This alternative would add 29,800 daily riders to the BART system.	**Satisfied.** This alternative would add 31,600 daily riders to the BART system.	**Satisfied.** This alternative would add 29,900 daily riders to the BART system.	**Satisfied.** This alternative would add 29,700 daily riders to the BART system.	**Satisfied.** This alternative would add 19,900 daily riders to the BART system.	**Satisfied.** This alternative would add 20,800 daily riders to the BART system.
Provide congestion relief along the I-580 corridor through the Tri-Valley area.	**Not Satisfied.** Because BART service would not extend further to the east within the Tri-Valley area, this alternative would not divert commuters from driving on I-580.	**Satisfied.** Although this alternative would worsen 1 segment, 7 segments would improve.	**Satisfied.** Although this alternative would worsen 1 segment, 7 segments would improve.	**Satisfied.** Although this alternative would worsen 1 segment, 7 segments would improve.	**Satisfied.** Although this alternative would worsen 2 segments, 6 segments would improve.	**Satisfied.** Although this alternative would worsen 1 segment, 7 segments would improve.	**Satisfied.** Although this alternative would worsen 4 segments, 5 segments would improve.	**Satisfied.** Although this alternative would worsen 2 segments, 6 segments would improve.	**Satisfied.** Although this alternative would worsen 4 segments, 5 segments would improve.	**Satisfied.** Although this alternative would worsen 4 segments, 5 segments would improve.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Provide convenient intermodal connections between BART and the Altamont Commuter Express.	**Not Satisfied.** No new intermodal connections would occur under this alternative.	**Satisfied.** The Greenville East Station would include a connection to a new ACE station at this location. The existing ACE station at Vasco Road would be removed to the new Greenville East site.	**Satisfied.** The Downtown Livermore Station would include a connection to the ACE system.	**Satisfied.** The Downtown Livermore Station would include a connection to the ACE system.	**Satisfied.** The Vasco Road Station would include a connection to the ACE system.	**Satisfied.** The Downtown Livermore and Vasco Road Stations would include connections to the ACE system.	**Satisfied.** The Downtown Livermore Station would include a connection to the ACE system.	**Satisfied.** The Downtown Livermore Station would include a connection to the ACE system.	**Not Satisfied.** The Isabel/I-580 Station would not include a connection to the ACE system.	**Satisfied.** The Isabel/Stanley Station would include a connection to a new ACE station.
Provide convenient intermodal connections between BART and the Livermore Amador Valley Transit Authority (LAVTA).	**Not Satisfied.** No new intermodal connections would occur under this alternative.	**Satisfied.** The Isabel/I-580 Station and the Greenville East Station would include connections to LAVTA bus services.	**Satisfied.** The Downtown Livermore Station and Greenville East Station would include connections to LAVTA bus services.	**Satisfied.** The Downtown Livermore Station and the Greenville East Station would include connections to LAVTA bus services.	**Satisfied.** The Isabel/I-580 Station and the Vasco Road Station would include connections to LAVTA bus services.	**Satisfied.** The Downtown Livermore Station and the Vasco Road Station would include connections to LAVTA bus services.	**Satisfied.** The Isabel/I-580 Station and the Downtown Livermore Station would include connections to LAVTA bus services.	**Satisfied.** The Isabel/Stanley Station and the Downtown Livermore Station would include connections to LAVTA bus service.	**Satisfied.** The Isabel/I-580 Station would include connections to LAVTA bus services.	**Satisfied.** The Isabel/Stanley Station would include connections to LAVTA bus services.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Enhance economic benefits, contributing to local investment and development opportunities.	**Not Satisfied.** As with the previous objective, the absence of new BART stations would not promote local and investment opportunities that could otherwise occur around the stations.	**Partially Satisfied.** This alternative would include two new stations at Isabel/I-580 and Greenville East. These stations would be constrained in their development potential, as described in Section 5.4.	**Partially Satisfied.** This alternative would include two new stations at Downtown Livermore and Greenville East. The Downtown Station would support this objective; however, the Greenville East Station is constrained in its development potential, as described in Section 5.4.	**Partially Satisfied.** This alternative would include two new stations at Downtown Livermore and Greenville East .The Downtown Station would support this objective; however, the Greenville East Station is constrained in its development potential, as described in Section 5.4.	**Partially Satisfied.** This alternative would include two new stations at Isabel/I-580 and Vasco Road. The Isabel/I-580 is constrained in its development potential as described in Section 5.4; however, the Vasco Road Station has some potential to support this objective.	**Satisfied.** This alternative would include two new stations at Downtown Livermore and Vasco Road. These stations would support this objective.	**Partially Satisfied.** This alternative would include two new stations at Isabel/I-580 and Downtown Livermore. The Isabel/I-580 Station would be constrained in its development potential as described in Section 5.4; however, the Downtown Station would support this objective.	**Partially Satisfied.** This alternative would include two new stations at Isabel/Stanley and Downtown Livermore. The Isabel/Stanley Station would be constrained in its development potential, as described in Section 5.4; however, the Downtown Station would support this objective.	**Partially Satisfied.** This alternative would include a new station at Isabel/I-580, which is constrained in its development potential, as described in Section 5.4.	**Not Satisfied.** This alternative would include a new station at Isabel/Stanley which is constrained in its development potential, as described in Section 5.4.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Provide a cost effective transit system, recognizing budget constraints and available funding.[a]	**Not Satisfied.** No new BART extension to Livermore would occur; thus, this alternative would not provide a cost effective transit system.	**To Be Determined.** $2,920 million	**To Be Determined.** $3,610 million	**To Be Determined.** $3,650 million	**To Be Determined.** $3,280 million	**To Be Determined.** $3,800 million	**To Be Determined.** $3,470 million	**To Be Determined.** $3,380 million	**To Be Determined.** $1,120 million	**To Be Determined.** $1,610 million
Conform with the BART System Expansion Policy.	**Not Applicable.** Since no new BART extension to Livermore would be constructed, the SEP would not be applicable.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 19,050 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 17,650 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 17,650 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 17,700 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 17,550 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 17,150 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 15,850 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 25,100 new trips per station along the extension.	**Satisfied.** The alternative would satisfy the SEP by generating an average total of 23,100 new trips per station along the extension.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Conform with the Metropolitan Transportation Commission's Resolution #3434 – Transit-Oriented Development Policy for Regional Transit Extension Projects.	**Not Applicable.** Since no new BART extension to Livermore would be constructed, the MTC Resolution #3434 would not be applicable.	**Not Satisfied.** An average of 2,138 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 824 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 824 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 1,819 housing units would be needed to achieve the MTC target.	**Not Satisfied.** An average of 505 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 438 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 787 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 1,282 housing units per station area would be needed to achieve the MTC target.	**Not Satisfied.** An average of 1,806 housing units per station area would be needed to achieve the MTC target.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Protect and enhance the environment	**Not Satisfied.** This alternative would not reduce traffic, air emissions, greenhouse gas emissions, or energy consumption as the BART extension alternatives would.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to agricultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to agricultural, cultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to agricultural, cultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to cultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to cultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to cultural, biological, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD. There may be adverse effects to cultural, biological, mineral, and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD, although not to the degree of the two-station alternatives. There may be adverse effects to biological and water resources, but the overall effect on the environment is positive.	**Satisfied.** This alternative would reduce VMT, air and greenhouse gas emissions, and energy consumption, and promote smart growth and TOD, although not to the degree of the two-station alternatives. There may be adverse effects to biological, mineral, and water resources, but the overall effect on the environment is positive.

Table 5-2
Satisfaction of Program Objectives for the No Build and BART Extension Alternatives

Objectives	No Build Alternative	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/ I-580	Alternative 5 Quarry
Improve transit mobility between the Silicon Valley, the Tri-Valley area, the East Bay Area, and San Francisco in support of efforts to reduce greenhouse gas emissions, consistent with Senate bill (SB) 375.	**Not Satisfied.** This alternative would not extend BART service to Livermore. Therefore, BART ridership from San Joaquin commuters would be less than the BART extension alternatives and VMT would be higher. Increased VMT would not support the reduction of greenhouse gas emissions.	**Satisfied.** This alternative would extend BART service east into Livermore by 11.5 miles, reduce VMT by 687,877 miles per day, and reduce greenhouse gas emissions by 429,694 pounds per day (lbs/day).	**Satisfied.** This alternative would extend BART service east into Livermore by 13.1 miles, reduce VMT by 742,836 miles per day, and reduce greenhouse gas emissions by 459,473 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 13.2 miles, reduce VMT by 742,836 miles per day, and reduce greenhouse gas emissions by 463,658 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 10 miles, reduce VMT by 742,494 miles per day, and reduce greenhouse gas emissions by 493,946 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 12 miles, reduce VMT by 860,211 miles per day, and reduce greenhouse gas emissions by 591,522 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 7.2 miles, reduce VMT by 704,246 miles per day, and reduce greenhouse gas emissions by 483,098 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 7.9 miles, reduce VMT by 633,485 miles per day, and reduce greenhouse gas emissions by 412,010 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 5.2 miles, reduce VMT by 404,159 miles per day, and reduce greenhouse gas emissions by 261,429 lbs/day.	**Satisfied.** This alternative would extend BART service east into Livermore by 5.5 miles, reduce VMT by 620,992 miles per day, and reduce greenhouse gas emissions by 468,866 lbs/day.

Source: BART and PBS&J, September 2009.

Note:

a Preliminary cost effectiveness ratings are being determined in accordance with BART's System Expansion Policy, based on ridership forecasts and estimated capital and operational costs. These ratings will be presented in the Preferred Alternative Memorandum and Final Program EIR, prior to selection of the preferred alternative.

5.4 REGIONAL TRANSIT-ORIENTED DEVELOPMENT POLICIES

Introduction

Both BART and the Metropolitan Transportation Commission (MTC) have adopted policies to encourage transit-oriented development (TOD) in association with transit system expansion projects. These policies seek to establish that the development capacity of station areas serving a proposed extension will both support acceptable ridership levels and accommodate growth resulting from the extension.

The BART and MTC policies approach the evaluation of TOD potential from different sides of the issue: BART's System Expansion Policy (SEP) establishes a series of ridership thresholds to evaluate extension performance and identify whether TOD-oriented development strategies, known as Ridership Development Plans (RDPs), are needed. MTC's Resolution #3434 uses corridor-level housing thresholds to establish whether or not proposed extension station areas contain adequate residential growth potential, and then, if necessary, identify measures to increase that potential. Because the possible outcome of both policy evaluations is the identification of new growth strategies, both are potential drivers of new development that could lead to subsequent environmental impacts.

At this program-level stage of environmental review, sufficient information is not available to draw definitive conclusions about the specifics of future land use or access changes that may be initiated in the station areas. Rather, the following analyses are used to gain initial insight into the TOD-related constraints of each alternative, and to establish directions and options for improving station area development potential and overall extension performance.

BART System Expansion Policy

The 1999 BART System Expansion Policy (SEP) identifies goals, strategies, and project advancement criteria to guide expansion of the transit system. Evaluation criteria considers potential ridership in the context of project cost effectiveness, surrounding land use, project access, connectivity with other transit systems, effects on the existing BART system, and degree of inter-agency partnering and community support. The system expansion criteria are designed to contend with the pressures of growth in the Bay Area and to address the dispersal of jobs and housing while reinvesting in BART and other transit systems. BART has developed and applies the adopted criteria in order to meet the following goals:

- Enhance regional mobility, especially access to jobs.
- Generate new ridership on a cost-effective basis.
- Demonstrate a commitment to transit-supportive growth and development.
- Enhance multi-modal access to the BART system.

As noted, a chief element of the SEP is the comparison of BART's corridor-wide ridership development thresholds to ridership forecasted for proposed extension corridors. This comparison is used to evaluate the development capacity of extension station areas in terms of achieving adequate ridership. If the corridor-wide ridership threshold is not already projected to be met under existing land use plans and policies, local jurisdictions must adopt and implement Ridership Development Plans (RDPs), which can take the form of General Plan amendments, Specific Plans, zoning amendments, access improvements, or other actions selected at the discretion of the local jurisdictions. RDPs, which are normally completed by relevant local agencies concurrent with the project-specific environmental review process, must consider land use or access changes to encourage TOD in station areas and demonstrate that as a result of such changes, BART's corridor-wide ridership threshold can be achieved.

Under the SEP, projected average daily trips for the extension (daily entries and exits associated with new stations) are rated into five grades from low to high:

- Low – less than 5,000 average daily trips
- Low-Medium – 5,000 to 9,999 average daily trips
- Medium – 10,000-13,999 average daily trips
- Medium-High – 14,000 to 20,000 average daily trips
- High – above 20,000 average daily trips

Table 5-3 contains ridership levels (daily entries and exits) at the West Dublin/Pleasanton and Dublin/Pleasanton BART Stations, as well as forecasted ridership at the five proposed BART to Livermore stations. These figures are used to tabulate corridor-wide averages for each of the nine BART to Livermore extension alternatives, which are then evaluated against BART thresholds in Table 5-3.

All BART Extension Alternatives. Based on the current projected ridership for each BART extension alternative, the BART SEP would be satisfied, with each of the alternatives attaining either a "Medium High" or "High" rating. The projected ridership numbers reflect the current development potential contained in the ACCMA countywide transportation model, which in turn incorporates information from each of the jurisdictions' adopted general plans. Based on this preliminary assessment, RDPs would not be required of the local jurisdictions to fulfill BART's ridership targets. However, there are other reasons for pursuing such plans, such as to ensure that the future TOD helps fulfill the design vision of the community, that the means for implementing the proposed uses are in place, and that the mechanisms for meeting infrastructure and transportation improvements are defined. Moreover, the RDP process as envisioned in the SEP would assist in meeting the MTC Resolution #3434 target which are not met by any of the alternatives based on the current development potential, as discussed below.

Table 5-3
Existing Station Total Trips and Proposed Station Total Trip Forecasts

	Existing Stations		New Extension Stations					
Alternative	**West Dublin/ Pleasanton**	**East Dublin/ Pleasanton**	**Isabel/ I-580**	**Greenville East**	**Isabel/ Stanley**	**Downtown Livermore**	**Vasco Road**	**Average Total Trips per New Station**
1 – Greenville East	16,800	21,900	16,200	21,900	NA	NA	NA	19,050 *Medium-High*
1a - Downtown-Greenville East via UPRR	17,200	23,200	NA	12,300	NA	23,000	NA	17,650 *Medium-High*
1b - Downtown-Greenville East via SPRR	17,200	23,200	NA	12,300	NA	23,000	NA	17,650 *Medium-High*
2 - Las Positas	17,200	22,200	16,000	NA	NA	NA	19,400	17,700 *Medium-High*
2a – Downtown-Vasco	17,200	23,900	NA	NA	NA	18,600	16,500	17,550 *Medium-High*
3 - Portola	17,100	23,700	15,100	NA	NA	19,200	NA	17,150 *Medium-High*
3a - Railroad	17,300	23,500	NA	NA	8,500	23,200	NA	15,850 *Medium-High*
4 - Isabel/I-580	16,800	22,100	25,100	NA	NA	NA	NA	25,100 *High*
5 - Quarry	17,100	25,800	NA	NA	23,100	NA	NA	23,100 *High*

Source: Wilbur Smith Associates, 2009.

Note:

a. Average daily trips is the number of entries and exits at each station. *Italicized* ratings of Medium-High and High reflect the qualitative ratings assigned by the BART System Expansion Policy for the average number of new BART entries and exits at stations associated with a proposed extension.

MTC Resolution #3434

The Metropolitan Transportation Commission (MTC) is responsible for financing and coordinating public transportation in the nine-county San Francisco Bay Area. Resolution #3434 is MTC's Regional Transit Expansion Program. Upon adoption in 2001, Resolution #3434 earmarked $10.5 billion in funding for a series of rail and express/rapid bus transit projects in the Bay Area, including nine rail extensions. The resolution was amended in July 2005 to include a Transit-Oriented Development (TOD) Policy. Under the policy, all transit extensions funded under MTC Resolution #3434 are conditioned on a series of land use and housing criteria.

Specifically, the MTC Resolution #3434 TOD Policy is predicated on corridor-level housing thresholds. Each extension funded under Resolution #3434 must plan for a minimum number of housing units along proposed transit corridors. These thresholds require that, within one-half mile of all stations, a combination of existing land uses and planned land uses meets or exceeds the corridor housing threshold. Thresholds, listed below, vary depending on the type of service proposed.

The corridor-level housing threshold for BART extensions utilizing BART technology is 3,850 housing units on average per station area. Meeting this threshold requires that, on average, areas around stations within one-half mile serving a given corridor are able to accommodate a minimum of 3,850 units, including the current housing stock.

In Table 5-4, existing (2008) housing units and estimates of planned (2030) housing units are tabulated for the existing Dublin/Pleasanton BART Station area and for each of the five proposed BART to Livermore station areas. Table 5-4 also presents the extension-wide housing average for each of the nine alternatives, and a comparison of this average to MTC's threshold of 3,850 units.

As stressed above, this program-level environmental review only provides an initial assessment of whether current housing development in the station areas would meet the minimum station average of MTC's TOD policy. For that reason, the following analysis of consistency with MTC policy utilizes housing projection estimates based on generalized growth assumptions from the City of Livermore General Plan, as well as various Specific and Neighborhood Plans and, where available, planned development projects.

The City of Livermore identified "Change Areas" throughout Livermore as an analytic tool in preparing the General Plan Update EIR. Change Areas were areas where additional development was possible, considered desirable and could transform, or change, the existing land use development and intensity. As a result, these areas were expected to house much of the City's future growth. For the EIR, the City calculated the number of units expected to be built in each Change Area during the time horizon of the General Plan. These projections have been used to estimate the future housing units for the station areas presented in Table 5-4. For the most part, proposed BART extension alternative stations are located in Change Areas, and thus are expected to experience future growth.

Table 5-4
Comparison of MTC Resolution #3434 Target with Proposed Station Area Development

	Station Area Housing Units													
	Dublin/ Pleasanton		Isabel/I-580		Isabel/ Stanley		Downtown Livermore		Vasco Road		Greenville East		2030 Average	Comparison of 2030 Average to 3,850 Target
Alternative	2008	2030 Total	2008	2030 Total	2008	2030 Total	2008	2030 Total	2008	2030 Total	2008	2030 Total		
1 – Greenville East	1,351	3,978	468	1,158	NA	NA	NA	NA	NA	NA	0	0	1,712	-2,138
1a – Downtown - Greenville East via UPRR	1,351	3,978	NA	NA	NA	NA	1,841	5,100	NA	NA	0	0	3,026	-824
1b – Downtown - Greenville East via SPRR	1,351	3,978	NA	NA	NA	NA	1,841	5,100	NA	NA	0	0	3,026	-824
2 – Las Positas	1,351	3,978	468	1,158	NA	NA	NA	NA	227	956	NA	NA	2,031	-1,819
2a – Downtown-Vasco	1,351	3,978	NA	NA	NA	NA	1,841	5,100	227	956	NA	NA	3,345	-505
3 – Portola	1,351	3,978	468	1,158	NA	NA	1,841	5,100	NA	NA	NA	NA	3,412	-438
3a– Railroad	1,351	3,978	NA	NA	110	110	1,841	5,100	NA	NA	NA	NA	3,063	-787
4 – Isabel/I-580	1,351	3,978	468	1,158	NA	NA	NA	NA	NA	NA	NA	NA	2,568	-1,282
5 – Quarry	1,351	3,978	NA	NA	110	110	NA	NA	NA	NA	NA	NA	2,044	-1,806

Sources: City of Livermore, 2009*; Livermore General Plan Environmental Impact Report*, 2003; *East Dublin Specific Plan*, 2008; Claritas, Inc, 2008; Bay Area Economics, 2009.

Notes:

NA = this station is not proposed for this alternative and thus is Not Applicable to the station area development estimates.

a. 2008 housing units are for ½ mile radius around station location, as projected by Claritas, 2008.

b. 2030 housing units include existing (2008) and planned units

c. Based on projected number of units in the Livermore General Plan Change Area in which station would be located. Change Areas exceed the size of the ½ mile station areas; therefore, not all housing realized in the areas would be located in station areas.

d. Dublin/Pleasanton Station planned units based on Transit Village and Hacienda planned developments, from East Dublin Specific Plan, Chapter 4, amended 2008.

The potential of each alternative to comply with MTC's TOD policy is assessed below. Based on the information contained in Table 5-4, none of the alternatives would satisfy the current MTC TOD threshold. Alternatives 2a and 3 have shortfalls that could be addressed by increasing the development potential at the other stations along these extensions. All other alternatives face development constraints that may make it difficult to attain the current MTC threshold. Physical and regulatory constraints to residential growth surrounding proposed stations are identified. Finally, where necessary, initial strategies for overcoming these constraints are proposed and would be appropriate to consider during the subsequent project-specific effort.

The strategies outlined here are not decisions within BART's jurisdiction, but are decisions to be made by the City of Livermore or, in certain cases, by the voters or by private property owners, as discussed below. In addition, other developments may occur, by the time a specific BART to Livermore project is proposed, which would enable the project to achieve the MTC Resolution #3434 targets, or the targets themselves may be modified by MTC. However, to the extent that no such other developments occur and the City or its residents decline to adopt such strategies, some alternatives could prove ineligible for MTC funding.

Alternative 1. Alternative 1 proposes stations at Isabel/I-580 and Greenville East. Alternative 1 would have a deficit of an average of 2,138 units per station (for three stations) as compared to the MTC threshold of 3,850 units. This shortfall is due to low residential growth potential surrounding the proposed Stations. The entire Isabel/I-580 Station area is located within Livermore's Airport Protection Area (APA) and a portion lies outside the City of Livermore Urban Growth Boundary (UGB). Policy LU-4.4.P2 of the Livermore General Plan prohibits intensification of existing residential land use within the APA, in order to ensure public safety and airport functionality. This policy severely limits the number of housing units that could be constructed in the station area in the future. Future residential development in the eastern portions of both the Isabel/I-580 and Greenville East Station areas is restricted. As shown in Figure 3.3-4, this is particularly true for the Greenville East Station area where the majority of the eastern portion of the station area is located outside the City of Livermore and Alameda County UGBs. City and County policies identified in Section 3.3, Land Use, restrict future development to within these boundaries. Additionally, the California Air Resources Board (CARB) has issued guidelines that recommend close evaluation of residential development within 500 feet of heavily trafficked roadways, because of exposure to diesel particulate matter from vehicle emissions. This evaluation may reduce some of the residential development potential for the remaining portion of this station area. Further, the eastern portion of the station area is dominated by land contracted under the Williamson Act (see Figure 3.3-3), which as detailed in Section 3.3, Land Use, is considered an agricultural resource to be conserved and also lies in a City-designated scenic corridor.

There are two general options to increase the residential development potential of Alternative 1 station areas and bring Alternative 1 into consistency with Resolution #3434. The first option would involve relaxing the development restrictions associated with the Livermore APA. However, loosening APA restrictions would be difficult because airport restrictions are established and enforced to protect public

health and safety. They are unlikely to be reduced as long as the airport remains operational. The second option is to amend either or both of the County and City UGB development policies to include more or all of the station areas within the UGB. However, both of these boundaries are the result of voter initiatives, and as such, altering the UGBs would demand further voter approval and passage of a local measure(s). If the UGB is amended, this option also involves negotiating with owners of Williamson Act contracted land in the Greenville East Station area in order to purchase contracted land. In order to develop the land, it would either need to be condemned or property owners would need to file for non-renewal on their own accord, a decision that would trigger a final, 10-year contract. Alternatively, owners of Williamson Act contracted land could petition to cancel their contract(s) and pay the required cancellation fee, which is equal to 12.5 percent of the unrestricted fair market value of the property. To approve tentative contract cancellations, the County of Alameda would have to present specific findings that are supported by substantial evidence. Cancellation of the contracts by the owners, however, would not necessarily mean that the land would be approved for urban development by the City. Each of these options, if successfully implemented, would ultimately result in new physical development whose subsequent environmental impacts would need to be examined.

Alternatives 1a and 1b. These alternatives, both of which include the Dublin/Pleasanton, Downtown Livermore, and Greenville East Stations, would have a housing deficit of an average of 824 units per station (for three stations) compared to the MTC threshold of 3,850 units. This is due to development restrictions in portions of the Greenville East Station area; as described under Alternative 1, above. As such, Alternatives 1a and 1b would not be consistent with MTC Resolution #3434. There are two options to bring these alternatives closer to the MTC target, both of which focus on increasing the development potential at Greenville East. In addition, amendments to the Livermore Downtown Specific Plan could be considered to introduce more residential development near the Downtown Livermore Station. Each of these different proposals, if successfully implemented, would ultimately result in new physical development whose subsequent environmental impacts would need to be examined.

Alternative 2. This alternative includes stations at Isabel/I-580 and Vasco Road. Alternative 2 would have a housing deficit of an average of 1,819 units per station (for three stations) compared to the MTC threshold of 3,850 units. This shortfall is the result of the low residential growth potential surrounding the proposed stations. Constraints associated with the Isabel/I-580 Station are identified under Alternative 1 above. Residential development surrounding the Vasco Road Station is primarily constrained by existing land use designations. As shown in Figure 3.3-5, the area is primarily designated for light industrial and public land uses (the latter associated with Lawrence Livermore National Laboratory and the neighboring public park). Thus, the area currently contains only 227 housing units. Although the great majority of the 729 housing units projected for the area are the result of residential development associated with Livermore's Brisa Neighborhood Plan, current land use designations in the station area prevent achieving more residential units around the Vasco Road Station.

There are two main options for increasing the residential development potential of Alternative 2 station areas and bringing Alternative 2 closer to the MTC target. The first is to change the Livermore APA

for the Isabel/I-580 Station area, as explained under Alternative 1 and to modify the UGB. As previously noted, the likelihood of either of these occurring and resulting in additional housing in this station area is unlikely. The second option is to increase the development potential around the Vasco Road Station via amendments to the City of Livermore General Plan land use map. This process, which would likely involve changing the primary industrial land use designations around the proposed station to various residential designations, would require evaluation of environmental impacts such as land use compatibility, transportation and traffic, air quality, and noise.

Alternative 2a. This alternative includes the Downtown Livermore and the Vasco Road Stations. Alternative 2a would have a housing deficit of an average of 505 units per station (for three stations) compared to the MTC threshold of 3,850 units. This alternative is nearly consistent with the MTC target ,because the two station areas—Dublin/Pleasanton and Downtown Livermore—have high residential development potential but the third station area—Vasco Road—has development constraints based on current land use designations (see Alternative 2, above).

As noted under Alternative 2 above, the development potential around the Vasco Road Station could be increased by amending the Livermore General Plan. It is also conceivable that additional units could be permitted in the Downtown Livermore Station area, which would require amending the Livermore Downtown Specific Plan and supplementing the environmental document prepared for that plan.

Alternative 3. This alternative includes stations at Isabel/I-580 and Downtown Livermore. Like Alternative 2a, the corridor-wide projected housing average for the three stations that would be served by this alternative nearly attains the MTC target, at only 438 units below the MTC threshold. Again, this is the result of two stations—Dublin/Pleasanton and Downtown Livermore—with high residential development potential and a third station—Isabel/1-580—with development constraints (see Alternative 1, above).

Options for increasing the development potential around the Isabel/I-580 Station are outlined under Alternative 1 and suggestions for the Downtown Livermore Station are identified under Alternative 2a.

Alternative 3a. This alternative proposes stations at Isabel/Stanley and Downtown Livermore. Alternative 3a would have a housing deficit of an average of 787 units per station (for three stations) compared to the MTC threshold of 3,850 units. This alternative's development potential reflects two stations—Dublin/Pleasanton and Downtown Livermore—with high residential development potential that are offset by a third station—Isabel/Stanley—with development constraints. There are three primary constraints to residential development around the Isabel/Stanley Station. First, the northern portion of the Isabel/Stanley Station area extends into the Livermore APA. Resulting restrictions to residential development are explained under Alternative 1 above, and are unlikely to allow further residential development potential in this station area. Second, the western portion of the station area is composed almost entirely of privately-owned and currently utilized quarry land, the owners of which have expressed no interest in selling. Third, the station footprint is bisected by the east-west running Livermore UGB, thus inhibiting development potential in the southern portion of the station area.

The constraints to TOD around the Isabel/Stanley Station are substantial. Strategies for promoting residential development in areas currently outside the UGB and within the APA have been discussed under Alternative 1, above. This notwithstanding, the large amount of privately-owned quarry land in the station area would demand negotiating with land owners. As indicated, the quarry is currently a profitable operation and there is no indication that the owners wish to sell quarry land. Moreover, the quarries are recognized by the state as a significant mineral resource area, making the area's conversion to transit uses unlikely until the mineral resources have been extracted. Thus, opportunities to make up the shortfall are likely limited to amending the Livermore Downtown Specific Plan, as described under Alternative 2a.

Alternative 4. This alternative proposes a single station at Isabel/I-580. Alternative 4 would have a housing deficit of an average of 1,282 units per station as compared to the MTC threshold of 3,850 units. Unlike the preceding BART extension alternatives, Alternative 4 would be a one-station extension beyond the existing Dublin/Pleasanton BART Station. As explained under Alternative 1 above, the station area would experience limited residential development potential due to its location within the Livermore APA, would need to be evaluated for potential diesel particulate matter exposure due to its proximity to heavy traffic on I-580, and would need voter approval and subsequent City approval of increased development potential in the area that is currently outside the UGB.

As noted under Alternative 2 above, the development potential around the Isabel/I-580 Station could be increased via changes to the Livermore APA and amendments to the UGB. However, reliance on a single station area to meet the MTC threshold, especially when the station development potential is unlikely to be increased, significantly decreases the overall TOD potential of Alternative 4.

Alternative 5. This alternative proposes a single station at Isabel/Stanley. Alternative 5 would have a housing deficit of an average of 1,806 units per station compared to the MTC threshold of 3,850 units. Like Alternative 4, Alternative 5 includes only one station beyond the existing Dublin/Pleasanton BART Station. As explained under Alternative 3a above, this station area is limited in terms of new development by numerous regulatory and physical constraints. As a result, the corridor-wide projected housing average represents the largest MTC threshold deficit and least amount of TOD potential of all nine proposed alternatives.

As noted under Alternative 3a above, the development potential around the Isabel/Stanley Station could be increased via several options. However, none of these options are particularly promising at this time, and, like Alternative 4, reliance on a single station area to meet the MTC threshold significantly decreases the overall TOD potential of Alternative 5.

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Section 6
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Summary

S.1 INTRODUCTION

The San Francisco Bay Area Rapid Transit District (BART) has prepared this Draft Program Environmental Impact Report (EIR), pursuant to the California Environmental Quality Act (CEQA), for enhanced rail service in eastern Alameda County. Service is proposed to follow an alignment originating in the Interstate 580 (I-580) median, at the existing Dublin/Pleasanton BART Station, traveling eastward, to Pleasanton and Livermore through an area known as the Tri-Valley (see Figure S-1). Nine different alignment, station, and maintenance facility combinations have been defined, all of which are either completely contained within the I-580 median, or diverge from the I-580 median and pass southeasterly through portions of the City of Livermore to the existing Altamont Commuter Express (ACE)/Union Pacific Railroad (UPRR) or the Southern Pacific Railroad (SPRR) corridors. The extension would serve to:

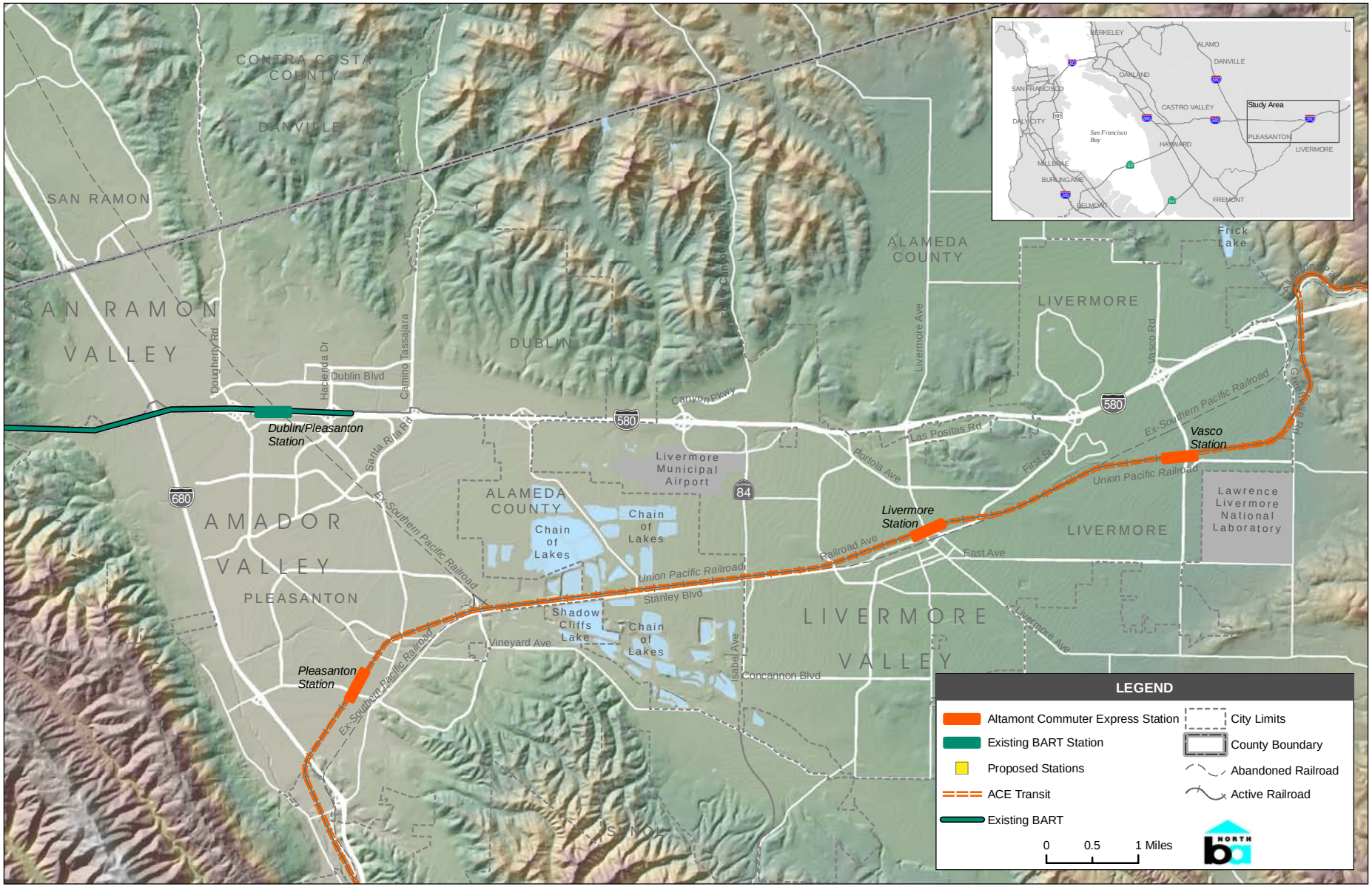
- alleviate congestion on I-580, especially during the heavy commute hours between the Central Valley and the San Francisco Bay Area across the Altamont Pass;
- provide intermodal connections to the ACE regional rail system that links Stockton with San Jose through the Tri-Valley area and the east side of San Francisco Bay; and
- improve air quality and reduce greenhouse gas and other emissions associated with automobile use.

The purpose of this Program EIR is to highlight the differences among the nine alternatives and to allow BART, after considering comments from local public agencies and the public, to select a preferred alignment alternative as a focus for more detailed engineering efforts, environmental review and right-of-way preservation. Differences in freeway congestion, local circulation, transit connections in the Tri-Valley, land use and visual compatibility, regional air emissions, and noise exposure are among the environmental comparisons that are presented in this Program EIR to assist with selection of a preferred alternative.

S.2 PROGRAM DESCRIPTION

What are the objectives of the Proposed Program?

The Tri-Valley study area has been one of the fastest growing subregions of the San Francisco Bay Area. As a result, travel demand in the region has continued to increase, even though gridlock occurs on a regular basis on I-580 through the study area. In 2007, the eastbound afternoon commute along I-580 (from I-680 in Dublin/Pleasanton to the Greenville Road interchange in Livermore) was rated as



Source: USGS DEM; Caltrans, 2009.

BART TO LIVERMORE EXTENSION PROGRAM STUDY AREA

FIGURE S-1

the second most congested freeway segment in the Bay Area. The westbound morning commute along I-580 (from I-205 in San Joaquin County, immediately east of Alameda County, to Hacienda Drive in Pleasanton) was listed as the fourth most congested freeway segment.

Given the transportation characteristics and future travel demand in east Alameda County in general and along the I-580 corridor in particular, the following objectives have been identified by BART for extension of transit service to Livermore:

- Increase BART ridership
- Provide congestion relief along the I-580 corridor through the Tri-Valley area
- Provide convenient intermodal connections between BART, the Altamont Commuter Express, and the Livermore Amador Valley Transit Authority
- Support local efforts, initiatives, and policies to promote transit-oriented development
- Enhance economic benefits, contributing to local investment and development opportunities
- Provide a cost effective transit system, recognizing budget constraints and available funding
- Conform with the BART System Expansion Policy and with the Metropolitan Transportation Commission's Resolution #3434 – Transit-Oriented Development Policy for Regional Transit Extension Projects
- Protect and enhance the environment
- Improve transit mobility between the Silicon Valley, the Tri-Valley area, the East Bay Area, and San Francisco in support of efforts to reduce greenhouse gas emissions, consistent with Senate Bill (SB) 375.

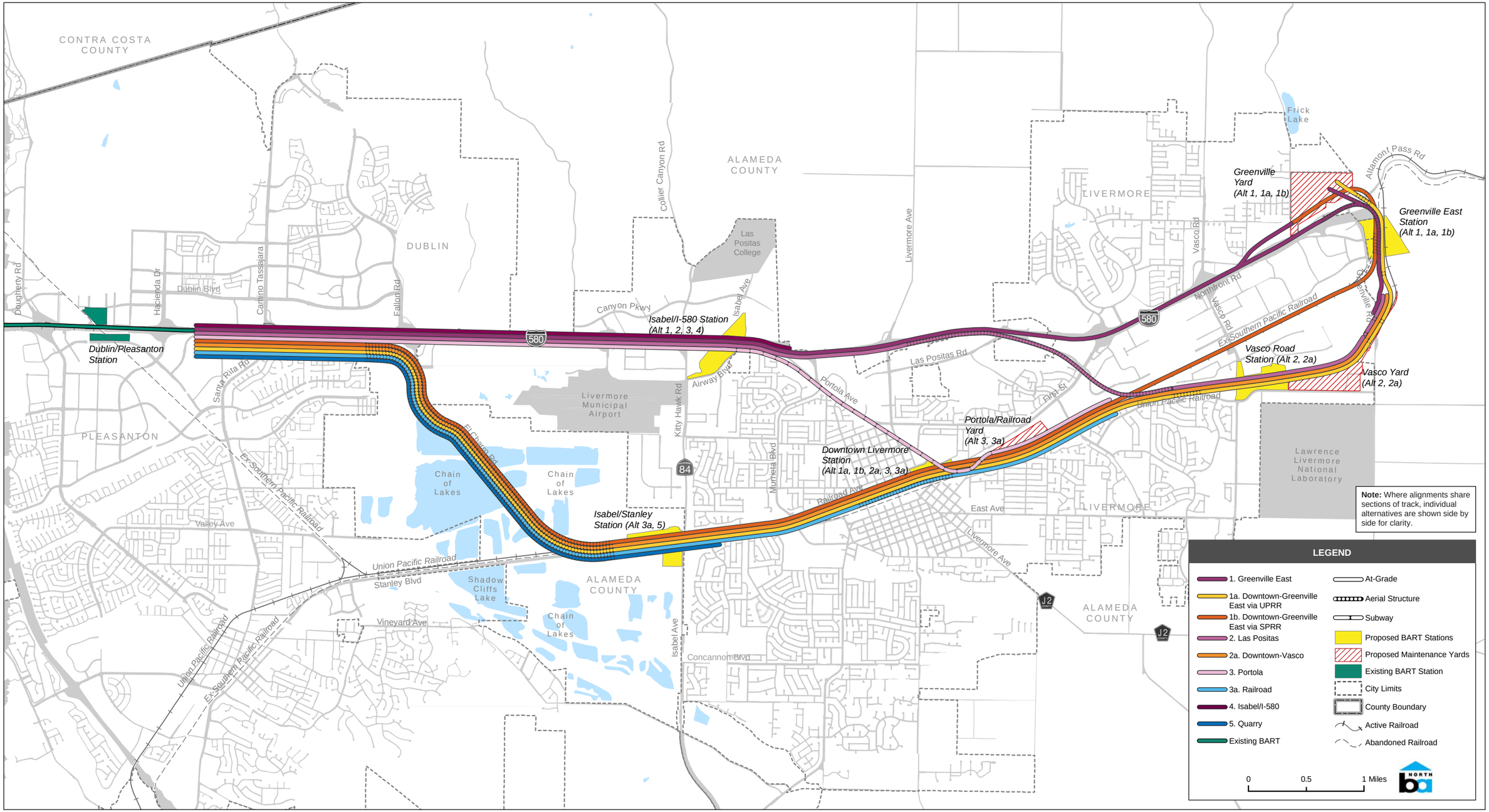
What proposals have been suggested to achieve the program objectives?

To accomplish the objectives defined for the study area, the following BART extension alternatives, ordered counterclockwise from the easternmost terminus station, have been identified and are illustrated in Figure S-2.

- Alternative 1, Greenville East — This alternative would originate at the existing Dublin/Pleasanton Station, follow the median of I-580, include an intermediate station at Isabel/I-580, and continue to a terminus at the proposed Greenville East Station at Greenville Road, just south of I-580.
- Alternative 1a, Downtown-Greenville East via UPRR — This alternative would originate at the existing Dublin/Pleasanton Station and follow the median of I-580, then diverge southeasterly along El Charro Road, parallel the existing UPRR tracks, and include an intermediate station at Downtown Livermore before heading northeast to a terminus at the proposed Greenville East Station.

- Alternative 1b, Downtown-Greenville East via SPRR – This alternative would share those elements described above for Alternative 1a, except that the segment between the proposed Downtown Livermore Station and a terminus at Greenville East would run parallel to an existing freight spur line previously operated by SPRR. The departure from the UPRR right-of-way east of downtown would occur near the intersection of Mines Road.
- Alternative 2, Las Positas – This alternative would originate at the existing Dublin/Pleasanton Station in the median of I-580, include an intermediate station at Isabel/I-580, then diverge southeasterly along Las Positas Road, toward central Livermore, to the UPRR right-of-way, at which point the alignment would run parallel to the existing UPRR tracks to a terminus station at Vasco Road.
- Alternative 2a, Downtown-Vasco – This alternative would be identical to Alternatives 1a and 1b between the existing end of track at the Dublin/Pleasanton Station and the proposed Downtown Livermore Station. Alternative 2a would include a Downtown Livermore Station and a terminus station at the Vasco Road Station.
- Alternative 3, Portola – This alternative would originate at the existing Dublin/Pleasanton Station in the median of I-580, include an intermediate station at Isabel/I-580, then diverge from the I-580 corridor at Airway Boulevard (just west of the existing Portola interchange), transition to Portola and Junction Avenues to a terminus station adjacent to the existing ACE station in Downtown Livermore.
- Alternative 3a, Railroad – This alternative would have an alignment identical to Alternatives 1a, 1b, and 2a in the median of I-580 and then along El Charro Road, then parallel to the UPRR tracks, include an intermediate station at the intersection of Isabel Avenue (SR-84) and Stanley Boulevard, and terminate adjacent to the existing Livermore ACE Station.
- Alternative 4, Isabel/I-580 – This single-station alternative would originate at the existing Dublin/Pleasanton Station and follow the median of I-580 to a terminus station immediately east of the planned Isabel Avenue overpass/interchange.
- Alternative 5, Quarry – This single-station alternative would originate at the existing Dublin/Pleasanton Station and follow the median of I-580, diverging from the I-580 corridor at El Charro Road, then proceed southeasterly to the UPRR, at which point the alternative would travel parallel to the UPRR tracks to a terminus station west of the Isabel Avenue (SR-84) and Stanley Boulevard intersection.

While the alignment, station, and maintenance facility locations differ among these nine BART alternatives, all alignments would be fully grade-separated. To accomplish this, the BART extension alternatives would run at grade (i.e., generally at the same elevation as the surrounding ground), on an aerial structure, in a retained trench, or in a subway (cut and cover), as necessitated by the surrounding terrain or existing conditions. The BART extension alternatives would make use of track, signal, and communications technology currently used by BART. Service would be provided using existing specifications for BART vehicles (or future vehicles superseding existing BART rolling stock) powered by an electrified third rail propulsion system.



Source: AECOM, May 4, 2009.

BART TO LIVERMORE EXTENSION ALTERNATIVES

FIGURE S-2

Besides the routes, how else do the alternatives differ?

The nine alternatives, as noted above, vary in length, ridership, and portions of the alignment that operate at grade, elevated, or below ground. The primary differences, aside from the route they follow, are the number and location of the stations – each alternative offers either one or two stations. The one-station alternatives, as expected, are generally shorter in length and have the potential to serve fewer riders. The two-station alternatives, in general, are longer, involve a correspondingly greater travel time, potentially carry more riders, and require an end-of-the-line maintenance facility. Figure S-3 summarizes some of these key features.

How much will it cost to build the BART to Livermore Extension?

Table S-1 summarizes the estimated capital cost for the BART extension alternatives, inclusive of the guideway, station(s), maintenance yard if included, I-580 modifications, right-of-way acquisition, systems (train control, power substations, communications, etc.), vehicles, contingencies, and soft costs (design, insurance, construction management, etc.).

Table S-1
Capital Cost Estimates for the BART Extension Alternatives ($2009)

Alternative	Capital Costs ($M)
1 – Greenville East	$2,870
1a – Downtown–Greenville East via UPRR	$3,720
1b – Downtown–Greenville East via SPRR	$3,760
2 – Las Positas	$3,280
2a – Downtown–Vasco	$3,890
3 – Portola	$3,560
3a – Railroad	$3,540
4 – Isabel/I–580	$1,120
5 – Quarry	$1,610

Source: BART and AECOM, 2009.

Note: Additional information on the components of the above capital cost estimates is available in Appendix B.

How will the BART extension affect I-580?

The BART extension alternatives would attract trans-Altamont commuters and assist in redistributing trips away from highways between Livermore and the inner Bay Area, which includes I-580. Each of the BART extension alternatives would proceed eastward from the existing system terminus at Dublin/Pleasanton, which is situated within the I-580 median; however, under improvement scenarios for I-580 through 2035, and as described in the regional transportation plan, the freeway median is not sufficiently wide east of the existing terminus to accommodate BART track and/or additional

freeway-median stations. BART construction requires a minimum 46-foot width between freeway lanes to allow operation of trains in each travel direction, including allowances for outboard retaining walls where necessary and continuous security fencing.

As a result, the alternatives each require some amount of freeway widening and modifications to overpass structures to permit BART track and/or stations to be constructed within the freeway median. Widening would begin near the end of existing tailtracks east of the Hacienda Drive overpass. The maximum length of freeway widening (10.1 miles) would occur under Alternative 1 - Greenville East where nearly the entire length of BART extension would occupy the I-580 median. Under the alternatives that would require the least amount of widening (Alternatives 1a, 1b, 2a, 3a, and 5), the length of freeway to be widened would be approximately 1.7 miles.

S.3 PURPOSE OF THE EIR

What is a Program EIR and what is its purpose?

An EIR is a document that analyzes the environmental impacts of a proposed project on the physical environment. Its main purposes are to inform governmental decision makers and the public about the potential significant environmental effects of proposed activities; identify ways that environmental impacts can be avoided or significantly reduced; require changes in projects through the use of alternatives or mitigation measures when feasible; and disclose to the public the reasons why a project was approved if significant environmental effects are involved.

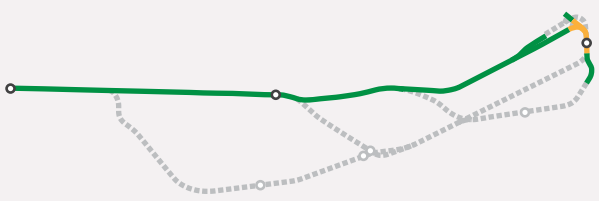
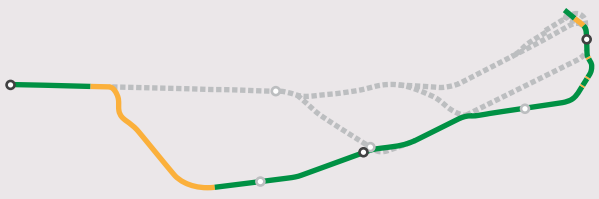
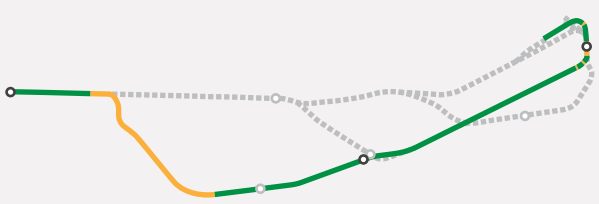
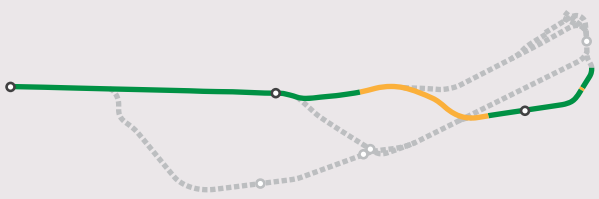
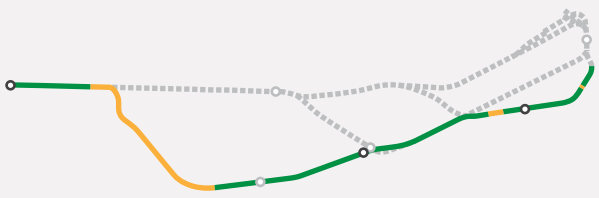
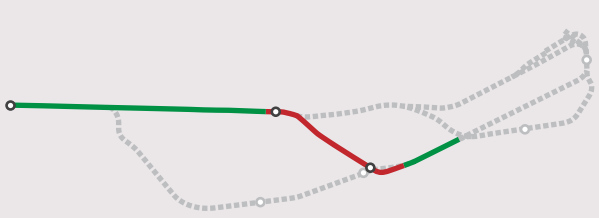
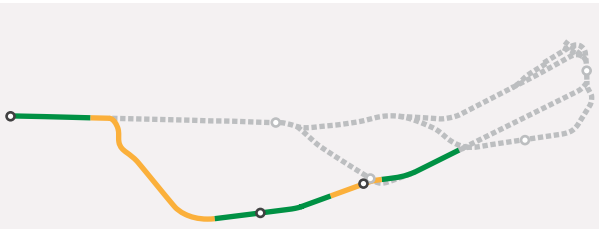
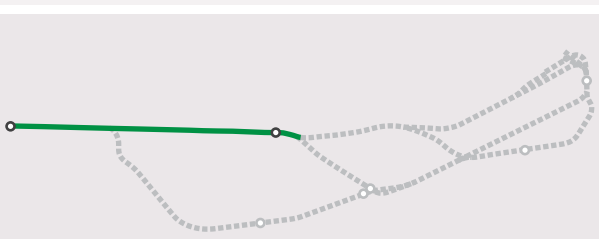
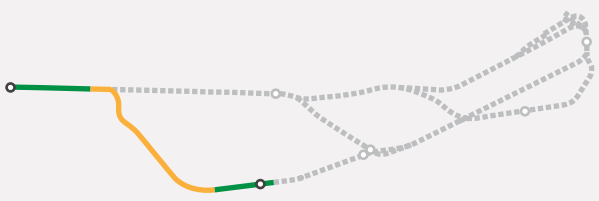
CEQA

The California Environmental Quality Act is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

Although the EIR does not control the ultimate decision on whether to approve a proposed project, the BART Board of Directors must consider the information in the EIR and public comments on significant impacts identified in the EIR. The BART Board of Directors will use the Final Program EIR (which will include the Draft Program EIR and responses to public comments) to select a preferred alignment alternative, and to specify any applicable mitigation measures as part of program approval.

For the BART to Livermore Extension Program, BART is preparing a Program EIR to evaluate alignment alternatives on a broad level. The Program EIR will be used to narrow the range of reasonable and feasible alignment alternatives by evaluating the potential environmental impacts and tradeoffs associated with the different routes, in order to identify alignment and station alternatives that may be considered in a future project-specific environmental document.

The Program EIR will provide an overview of potential environmental impacts associated with different alignments and station locations which will allow BART to refine station choices during subsequent, more detailed planning and to begin the process of protecting the right-of-way for future development of a transit system and releasing funds. At a later date, BART intends to prepare a project-level EIR before making the decision whether to construct a project. The subsequent

Alternative	Alignment Schematic and Guideway Structure Type At-Grade · Aerial Structure · Subway	Stations	Storage/ Maintenance Facility	Total BART System Riders[a]	New BART Riders[b]	Travel Time[c] (Minutes)	Total Length (Miles)
1. Greenville East		Isabel/I-580 Greenville East	Greenville Yard	690,100	31,700	10.9	11.5
1a. Downtown-Greenville East via UPRR		Downtown Livermore Greenville East	Greenville Yard	689,300	30,900	13.8	13.1
1b. Downtown-Greenville East via SPRR		Downtown Livermore Greenville East	Greenville Yard	689,300	30,900	13.5	13.2
2. Las Positas		Isabel/I-580 Vasco Road	Vasco Yard	688,200	29,800	9.7	10.0
2a. Downtown-Vasco		Downtown Livermore Vasco Road	Vasco Yard	690,000	31,600	11.8	12.0
3. Portola		Isabel/I-580 Downtown Livermore	Portola/ Railroad Yard	688,300	29,900	7.7	7.2
3a. Railroad		Isabel/ Stanley Downtown Livermore	Portola/ Railroad Yard	688,100	29,700	8.4	7.9
4. Isabel/ I-580		Isabel/I-580	No yard; tail tracks only	678,300	19,900	4.7	5.2
5. Quarry		Isabel/ Stanley	No yard; tail tracks only	679,200	20,800	5.6	5.5

NOTES
a. Total BART system ridership under the No Build Alternative is anticipated to be 658,400 daily weekday riders.
b. Denotes total daily riders beginning or ending at West Dublin/Pleasanton Station, East Dublin/Pleasanton Station, and the proposed station(s) for each alternative in the Year 2035. New BART riders are defined as persons who currently travel through the Tri-Valley area using another mode of transportation, but would shift to BART service were it to become available.
c. Denotes travel time from the East Dublin/Pleasanton Station to the alternative's terminus station and includes any stops at intermediate stations.

Source: WSA, 2009.

BART TO LIVERMORE EXTENSION ALTERNATIVES SUMMARY
FIGURE S-3

environmental documentation will also consider other technology choices for providing transit services to the City of Livermore.

For the purposes of this Program EIR, BART is the designated "lead agency," and is responsible for conducting the requisite environmental review, approving, and advancing the BART to Livermore Extension Program.

Lead Agency

A lead agency is the public agency that has the primary responsibility for carrying out or approving a project that is subject to CEQA.

S.4 IMPACTS OF THE BART TO LIVERMORE EXTENSION

What significant impacts might occur under the Proposed Program?

A summary of the major environmental differences among the BART to Livermore Extension Program alternatives is presented in Table S-2. In addition, the "significant" and "potentially significant" impacts associated with the BART extension alternatives that would occur during operation and construction are identified in Table S-3.

Significance

A significant environmental effect occurs when a project causes a substantial, or potentially substantial, adverse change in the physical conditions within the area affected by the project.

Can the impacts be reduced or eliminated?

For every significant impact identified in the Draft Program EIR, mitigation measures are proposed to reduce or eliminate the impact. A summary of these measures is contained in Table S-4. In some instances, the proposed mitigation would not reduce the impact to a less-than-significant level. In these cases, the potentially significant impact remains significant and is said to be "unavoidable." These significant and unavoidable impacts are identified in Table S-3.

Mitigation Measure

A mitigation measure is a requirement that is placed on a project to reduce or eliminate environmental impacts that will be caused by building the project. One example would be to build a sound wall between a housing development and a busy street to reduce the noise level.

For some impacts, information and analysis available at the Program EIR stage is insufficient to determine whether or how much a significant impact can be mitigated. Where it is uncertain whether an impact can be reduced to a less-than-significant level, the impact is conservatively identified as *potentially* significant and unavoidable. More detailed engineering and environmental review during the project-level effort may allow these potentially significant and unavoidable impacts to be mitigated to less than significant. In the future project-level EIR, BART will re-evaluate all impacts identified as significant and unavoidable in the Program EIR and will further consider the possibilities for feasible mitigation. For each significant and unavoidable impact, Table S-3 indicates whether the impact is so identified because insufficient information is currently available or because it is apparent, even at the Program EIR stage, that no feasible mitigation measures are available to reduce the impact to less than significant. However, for purposes of CEQA, both categories are considered significant and unavoidable.

What are the beneficial effects that might occur under the Proposed Program?

Beneficial effects of the BART to Livermore Extension Program include effects that enhance or improve upon the existing conditions. The BART extension program would have the following beneficial effects:

- improved freeway operations compared to the No Build conditions in 2035;
- net reduction in regional air emissions that would be consistent with and supportive of the goals of the Clean Air Plan and the Bay Area 2005 Ozone Strategy;
- net reductions to regional greenhouse gas emissions that would be supportive of the goals of Senate Bill 375; and
- net reduction in energy and petroleum consumption.

Are there any unresolved issues or areas of controversy?

During BART's public outreach activities, there were several areas of concern that surfaced. These concerns were expressed by residents, local communities, groups, and organizations. Also, given that this is a program-level document and cannot address site-specific and project-specific questions, there are a number of unresolved issues that will be addressed further when more detailed engineering and environmental analysis at the project level is performed.

The areas of concern below highlight critical environmental, social, and economic implications of the proposed extension as mentioned by the public during the public outreach efforts (see Section 1 for a more complete listing of areas of concern):

- Consider how a BART extension would affect regional air quality in the study area, as well as localized air quality around stations and yard facilities.
- Consider the effects of BART on existing traffic congestion on both local roadways and the State Highway System and evaluate ability of the alignment alternatives to alleviate future traffic congestion on I-580 within the study area and between the study area and San Joaquin County.
- Promote development that would reduce parking demand, and plan sufficient parking supply adjacent to station areas for BART passengers, local residents, and businesses.
- Evaluate and take into account bicycle and pedestrian safety, crime, impacts on local police services, and accessibility for Livermore residents.
- Evaluate operational noise impacts of the BART system in close proximity to sensitive receptors and effects on ambient noise levels.
- Ensure compliance with all applicable State agency regulations and code requirements, including the California Public Utilities Commission and the Department of Transportation.

Table S-2
Comparative Summary of Key Environmental Considerations

Issue	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/I-580	Alternative 5 Quarry
Transportation									
Increase in BART System Ridership (daily riders)	31,700	30,900	30,900	29,800	31,600	29,900	29,700	19,900	20,800
Reduction in Vehicle Miles Traveled (per day)	687,877	742,836	742,836	742,494	860,211	704,246	633,485	404,159	620,992
Changes to I-580 Congestion (# of affected segments)									
- Worsen	1	1	1	2	1	4	2	4	4
- Improve	7	7	7	6	7	5	6	5	5
Changes to Arterial Segments (# of affected segments)									
- Worsen	1	2	2	1	3	2	3	1	1
- Improve	2	2	2	2	1	2	2	2	2
Changes to Local Intersections (# of affected intersections)									
- Worsen	4	4	4	6	5	4	5	4	5
- Improve	8	8	8	7	8	8	7	8	7
Potential Station Connection with ACE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Land Use									
Land Use Conflicts (at station areas and yards)	Isabel/I-580: Airport Protection Area, proximity to freeway (noise and air quality concerns), partially outside Urban Growth Boundary Greenville East: agricultural lands, partially outside Urban Growth Boundary Greenville Yard: agricultural lands	Downtown Livermore: schools, churches, historic properties Greenville East: agricultural lands, partially outside Urban Growth Boundary Greenville Yard: agricultural lands	Downtown Livermore: schools, churches, historic properties Greenville East: agricultural lands, partially outside Urban Growth Boundary Greenville Yard: agricultural lands	Isabel/I-580: Airport Protection Area, proximity to freeway (noise and air quality concerns), partially outside Urban Growth Boundary Vasco Road: none Vasco Yard: none	Downtown Livermore: schools, churches, historic properties Vasco Road: none Vasco Yard: none	Isabel/I-580: Airport Protection Area, proximity to freeway (noise and air quality concerns), partially outside Urban Growth Boundary Downtown Livermore: schools, churches, historic properties Portola/Railroad Yard: proximity to historic residential district	Isabel/Stanley: Airport Protection Area, mining operations, partially outside Urban Growth Boundary Downtown Livermore: schools, churches, historic properties Portola/Railroad Yard: proximity to historic residential district	Isabel/I-580: Airport Protection Area, proximity to freeway (noise and air quality concerns), partially outside Urban Growth Boundary	Isabel/Stanley: Airport Protection Area, mining operations, partially outside Urban Growth Boundary
Loss of Agricultural Lands									
- Direct Impact (acres within footprint of station facilities)	55	25	25	55	25	0	25	0	25
- Indirect Impact (acres within one-half mile radius of station)	270	250	250	20	0	20	0	20	0

Table S-2
Comparative Summary of Key Environmental Considerations

Issue	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/I-580	Alternative 5 Quarry
Population and Housing									
Land Acquisition									
- Acres	126.7	161.6	157.5	185.4	210.2	120.8	177.4	28.2	82.2
- Parcels affected	128	185	179	143	206	189	179	64	63
- Residential units	29	79	81	10	81	84	83	7	8
Visual Quality/Aesthetics									
Visual Incompatibility (level of impact; description of incompatibility)	Moderate-to-high; aerial structure at foot of Altamont Pass.	Moderate; aerial structure at foot of Altamont Pass; possible sound walls	Moderate; aerial structure at foot of Altamont Pass; possible sound walls	Moderate; aerial structure incompatible with existing setting; possible sound walls	Moderate; aerial structures incompatible with existing setting; possible sound walls	Low; visually compatible	Moderate; aerial structure at approach to Downtown Livermore; possible sound walls	Low; visually compatible	Low; aerial structure along El Charro Road
Obstruction of Scenic Views (level of impact; source of obstruction)	Low; minimal and/or intermittent blockage at the Isabel/I-580 Station and the Greenville East Station.	Low; intermittent view blockage along El Charro Road	Low; intermittent view blockage along El Charro Road	Low; intermittent view blockage along Las Positas Road	Low; intermittent view blockage along El Charro Road	Low; no obstructions	Low; intermittent view blockage along El Charro Road	Low; aerial intermittent and/or minimal blockage at Isabel/I-580 Station.	Low; intermittent view blockage along El Charro Road
Cultural Resources									
Historic Resource Disturbance	Possible	Possible	Possible	Possible	Possible	Possible	Possible	No	Possible
Archaeological Disturbance	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
Geology, Soils, and Seismology									
Within Fault Zone or High Landslide Hazard Area	Yes	Yes	Yes	No	No	No	No	No	No
Potential Loss of Significant Mineral Resource Area	No	No	No	No	No	No	Yes	No	Yes
Hydrology and Water Quality									
Potential Disturbance to Water Resources									
- Streams (linear feet)	11,393	12,001	12,004	9,150	10,017	7,173	8,832	7,173	8,636
- Lakes/ponds (acres)	0	0	0	0	0	0	2.17	0	2.17
- Number of creek and stream crossings	9	12	13	8	11	5	10	5	8
100-year Floodplain Encroachment (acres)	44.9	61.9	61.3	30.0	47.5	25.3	52.0	25.3	51.1
Disturbance of Highly Erodible Soils (acres)	54.4	54.3	57.2	5.5	5.8	41.0	40.6	0	0
Increased Stormwater Runoff (new acres of impervious area)	309.5	211.3	211.3	253.9	177.1	178.9	155.0	95.5	71.6

Table S-2
Comparative Summary of Key Environmental Considerations

Issue	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/I-580	Alternative 5 Quarry
Potential Impact to Groundwater (acres)									
- Direct	328.0	312.4	308.3	302.0	292.6	214.4	202.7	132.2	128.3
- Indirect	516.8	546.7	536.4	473.5	507.4	382.6	366.4	238.2	236.5
Biological Resources									
Potential Disturbance to Wetlands/Waters of the U.S./State (acres)	24	20	15	19	18	5	12	5	11
Potential Disturbance/Removal of Special-status Plant Species Habitat (acres)	800	555	580	575	320	275	180	230	125
Potential Disturbance/Removal of Swainson's Hawk Foraging Habitat (acres)	276	276	276	0	0	0	0	0	0
Potential Disturbance to Special-status Amphibians/Reptiles Habitat (acres)									
- California Red Legged Frog	31	31	30	30	28	12	26	12	23
- California Tiger Salamander	12.5	5.5	1.5	1.5	5	0	0	0	0
- Western Pond Turtle	31	91	94	94	92	12	90	12	87
Potential Disturbance to Special-status Invertebrate Species Habitat (acres)	10 - 15	3 - 5	0.5 - 2	0.5 - 2	4 - 6	0.5 - 2	0.5 - 2	0.5 - 2	0.5 - 2
Noise and Vibration									
Potential for Noise Effects (linear feet)	0	28,000	24,500	6,500	28,000	0	16,000	0	1,000
Potential for Vibration Annoyance	No	Yes	Yes	No	Yes	Yes	Yes	No	No
Air Quality									
Reduction in Regional Emissions (lbs/day)									
- NOx	267	287	287	290	339	273	243	149	247
- ROG	46	50	50	49	57	47	42	27	41
Potential Carbon Monoxide Hotspots (# of worsened intersections in peak hours)	4	4	4	6	5	4	5	4	4
Reduction in Greenhouse Gas Emissions (lbs/day)	429,694	459,473	463,658	493,946	591,522	483,098	412,010	261,429	468,866

Table S-2
Comparative Summary of Key Environmental Considerations

Issue	Alternative 1 Greenville East	Alternative 1a Downtown-Greenville East via UPRR	Alternative 1b Downtown-Greenville East via SPRR	Alternative 2 Las Positas	Alternative 2a Downtown-Vasco	Alternative 3 Portola	Alternative 3a Railroad	Alternative 4 Isabel/I-580	Alternative 5 Quarry
Public Health and Safety									
Hazardous Materials Sites within 1/2-mile									
- Cortese List	32	57	57	30	57	33	47	18	19
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	0	3	2	1	3	0	2	0	0
- National Priority List (NPL)	0	2	2	2	2	1	1	0	0
Airport Compatibility									
- Facilities in Safety Zone	Isabel/I-580 Station	None	None	Isabel/I-580 Station	None	Isabel/I-580 Station	None	Isabel/I-580 Station	None
- Facilities in Height Referral Area	Isabel/I-580 Station	Downtown Livermore Station	Downtown Livermore Station	Isabel/I-580 Station	Downtown Livermore Station	Isabel/I-580 Station; Downtown Livermore Station; Portola/ Railroad Yard	Isabel/Stanley Station; Downtown Livermore Station; Portola/ Railroad Yard	Isabel/I-580 Station	Downtown Livermore Station
Energy									
Reduction in Regional Energy Consumption (Billion BTUs/year)	628	668	678	754	919	756	624	402	770

Table S-3
BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Transportation										
Freeway Segment Congestion (number of segments) - Improved - Worsened	 7 1 S/PSU	 7 1 S/PSU	 7 1 S/PSU	 6 2 S/PSU	 7 1 S/PSU	 5 4 S/PSU	 6 2 S/PSU	 5 4 S/PSU	 5 4 S/PSU	Project-level analysis necessary to confirm significance
Arterial Congestion (number of segments) - Improved - Worsened	 2 1 S/LTS	 2 2 S/LTS	 2 2 S/LTS	 2 1 S/LTS	 1 3 S/LTS	 2 2 S/LTS	 2 3 S/LTS	 2 1 S/LTS	 2 1 S/LTS	
Intersection Congestion (number of segments) - Improved - Worsened	 8 4 S/LTS	 8 4 S/LTS	 8 4 S/LTS	 6 7 S/LTS	 8 5 S/LTS	 8 4 S/SU	 7 5 S/SU	 8 4 S/SU	 7 5 S/LTS	
Spillover Parking	-	S/LTS	S/LTS	-	S/LTS	S/LTS	S/LTS	-	-	
Disruption to Pedestrian Circulation	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	
Disruption to Trails	PS/LTS	-	-	PS/LTS	-	PS/LTS	PS/LTS	PS/LTS	PS/LTS	
Disruption to Bicycle Facilities	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	-	PS/LTS	-	

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant SU=Significant and Unavoidable PSU=Potentially Significant and Unavoidable

Table S-3
BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Land Use										
Land Use Conflicts/ Incompatibilities	-	-	-	-	-	PS/PSU	PS/PSU	-	-	
Loss of Agricultural Resources	S/PSU	S/PSU	S/PSU	-	-	-	-	-	-	To be proposed as part of station area development; project-level analysis necessary to confirm
Population and Housing										
Property Acquisition/Potential Displacement	S/LTS	S/LTS	S/LTS	S/LTS	S/LTS	S/LTS	S/LTS	S/LTS	S/LTS	Comply with existing regulations and/or agency procedures
Visual Quality										
Visual Incompatibility - Aerial Structures - Sound Walls	PS/SU -	- PS/SU	- PS/SU	PS/SU PS/PSU	- PS/PSU	- -	S/SU PS/PSU	- -	- -	None feasible. Standard measures available, but effectiveness depends on specific project circumstances
Light and Glare	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	-	PS/LTS	

Significance Classification:

S = Significant PS = Potentially Significant LTS = Less than Significant SU=Significant and Unavoidable PSU=Potentially Significant and Unavoidable

Table S-3
BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Cultural Resources										
Disturbance to Historic Resources - Structures - Resource Setting	PS/LTS -	PS/PSU PS/PSU	PS/PSU PS/PSU	- PS/PSU	PS/PSU PS/PSU	PS/PSU -	PS/PSU PS/PSU	- -	- PS/PSU	Comply with existing regulations and/or agency procedures; standard measures available, but effectiveness depends on specific project circumstances
Disturbance to Archaeological Resources and Human Remains	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Geology, Soils, and Seismicity										
Disturbance to Significant Mineral Resource Areas	-	-	-	-	-	-	S/PSU	-	S/PSU	Project-level analysis necessary to confirm significance
Disturbance to Paleontological Resources	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Hydrology and Water Quality										
Alteration to Drainage Patterns	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Groundwater Impacts	-	-	-	-	-	PS/LTS	-	-	-	Comply with existing regulations and/or agency procedures

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BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Encroachment into Flood Hazard Areas	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Biological Resources										
Disturbance to Wetlands, Waters of the U.S. and/or Waters of the State	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Disturbance to Special-Status Plants and Habitats	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Disturbance to Swainson's Hawk Foraging Habitat	PS/LTS	PS/LTS	PS/LTS	-	-	-	-	-	-	Comply with existing regulations and/or agency procedures
Disturbance to Special-Status Amphibians and Reptiles	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Disturbance to Special-Status Vernal Pool Invertebrates	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Disturbance to Vernal Pool Fairy Shrimp Critical Habitat	PS/LTS	PS/LTS	PS/LTS	-	-	-	-	-	-	Comply with existing regulations and/or agency procedures
Disturbance to California Central Coast Steelhead	-	PS/LTS	PS/LTS	-	PS/LTS	-	PS/LTS	-	PS/LTS	Comply with existing regulations and/or agency procedures
Disturbance to Heritage Trees	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	

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Table S-3
BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Noise										
Noise from BART trains	-	PS/PSU	PS/PSU	PS/PSU	PS/PSU	-	PS/PSU	-	PS/PSU	Standard measures available, but effectiveness depends on specific project circumstances
Noise from BART Maintenance Facility	PS/LTS	PS/LTS	PS/LTS	-	-	PS/LTS	PS/LTS	-	-	
Noise from BART Ventilation Shafts	-	-	-	-	-	PS/LTS	-	-	-	
Noise from BART Substations	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	Standard measures available, but effectiveness depends on specific project circumstances
Noise from Local Traffic	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	Project-level analysis necessary to confirm significance
Vibration	-	PS/PSU	PS/PSU	-	PS/PSU	PS/PSU	PS/PSU	-	-	Project-level analysis necessary to confirm significance
Air Quality										
Localized CO Concentrations	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	
Public Health and Safety										
Accidental Release of Hazardous Materials	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures

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Table S-3
BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Accidental Release of Hazardous Materials Near Schools	-	-	-	-	-	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Energy										
Reliability of Transmission System to Deliver Peak Electricity Demand	PS/PSU	PS/PSU	PS/PSU	PS/SU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	Electricity transmission reliability under jurisdiction of others.
Construction										
Transportation – disruption to traffic, and interference with transit and freight operations, pedestrian, bicycles and trails systems	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	
Visual Quality – Views of construction sites and equipment and material storage areas, light and glare	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	
Hydrology and Water Quality – flooding, erosion, and siltation	-	PS/LTS	PS/LTS	-	PS/LTS	PS/LTS	PS/LTS	-	PS/LTS	

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BART Extension Alternatives – Significant and Potentially Significant Impacts Before/After Mitigation

Significant Impact	1 Greenville East	1a Downtown-Greenville East via UPRR	1b Downtown-Greenville East via SPRR	2 Las Positas	2a Downtown-Vasco	3 Portola	3a Railroad	4 Isabel/ I-580	5 Quarry	Comment regarding Mitigation
Biological Resources – disturbance to jurisdictional wetlands, special status species, special status habitats, nesting birds and bats	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Noise and Vibration – noise and vibration	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	PS/PSU	Standard measures available, but effectiveness depends on specific project circumstances
Air Quality – construction equipment exhaust, odor, and particulate matter	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Standard measures available
Public Health and Safety – accidental releases, interference with emergency response vehicles, and pipeline rupture	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Utilities – disruption of utility services	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	Comply with existing regulations and/or agency procedures
Energy – energy demand	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	PS/LTS	

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Table S-4
Mitigation Measure Summary for BART to Livermore Extension Program

Transportation	
Freeways	• Coordinate with Caltrans and local jurisdictions to implement freeway traffic management strategies.
Arterials	• Coordinate with the Alameda County Congestion Management Agency and local jurisdictions to implement lane configuration adjustments and explore signalization improvements.
Intersections	• Lane configuration adjustments and/or signalization improvements at the affected intersections.
Parking Spillover around Stations	• Construct parking facilities at non-downtown Livermore stations. • Implement a parking monitoring program and parking controls at Downtown Livermore Station as necessary.
Pedestrian Trails	• Maintain pedestrian facilities on roadways affected by the widening of I-580. • Maintain pedestrian crossings of BART alignment. • Maintain trail network along the BART alignment and around station sites and maintenance yards.
Trails	• Maintain trail crossings of the BART alignment.
Bicycle Facilities	• Maintain bicycle network on roadways affected by the widening of I-580. • Maintain bicycle network crossings of the BART alignment.
Land Use	
Incompatibility with Surrounding Land Uses	• Develop station area plans to enhance functional relationships and design characteristics between the station facilities and surrounding land uses. • Design the Portola/Railroad Maintenance Yard to reduce potential land use conflicts with surrounding uses.
Population and Housing	
Displacement of Businesses and Housing	• Acquire property and relocate affected residents and businesses in accordance with State law.
Visual Quality/Aesthetics	
Visual Compatibility	• Design sound walls with sensitivity to surroundings. • Confer with local jurisdictions about accepting noise exceedances to avoid visual impacts of sound walls.
Light and Glare	• Design lighting fixtures at all stations to reduce spillover and to prevent forming significant point sources of light.
Cultural Resources	
Historic and Archaeological Resources	• Conduct project-level historical resources investigation and mitigate as necessary. • Conduct project-level archaeological resources investigation and mitigate as necessary. • Follow State procedures to address the accidental discovery or recognition of any human remains.

Table S-4
Mitigation Measure Summary for BART to Livermore Extension Program

Geology, Soils and Seismicity	
Paleontological Resources	• Conduct project-level paleontological resources investigation and mitigate as necessary.
Hydrology and Water Quality	
Flooding	• Engineer storm drain system to accommodate design flows. • Limit permanent groundwater dewatering operations.
Flood Hazard Area Encroachment	• Design facilities to avoid/reduce flood hazards.
Biological Resources	
Wetlands	• Prepare a wetland delineation. • Obtain all applicable wetland permits. • Prepare and implement a Wetland Mitigation Plan.
Special Status Plant Species	• Conduct a floristic survey. • Consult with CDFG and USFWS if State or federally listed plants are found; obtain and comply with incidental take permits. • Develop and implement mitigation in consultation with CDFG if other special-status plants are found.
Swainson's Hawk Habitat	• Consult with CDFG and mitigate for loss of Swainson's hawk foraging habitat.
Special Status Amphibians and Reptiles	• Consult with USFWS and reduce impacts on California tiger salamander. • Consult with USFWS and reduce impacts on California red-legged frog. • Consult with CDFG and reduce impacts on Western Pond Turtle.
Special Status Vernal Pool Invertebrates	• Consult with USFWS and reduce impacts on vernal pool invertebrates and their habitat.
Steelhead	• Avoid in-water construction during the rainy season. • Consult with NOAA Fisheries and USACE and mitigate for the loss of riverine riparian vegetation.
Trees	• Conduct tree survey and replace trees at suitable ratios.
Noise and Vibration	
BART Trains	• Install noise attenuation measures that would reduce BART train noise.
Maintenance Facilities	• Install noise attenuation measures or other equivalent measures around the maintenance facilities.
Ventilation Shafts	• Design the ventilation shafts with adequate shielding.
Substations	• Design and locate substation buildings to reduce noise levels.
Local Traffic	• Install noise attenuation measures or other equivalent measures along roadways.
Vibration	• Conduct a site-specific detailed vibration study and employ vibration-reducing practices.

Table S-4
Mitigation Measure Summary for BART to Livermore Extension Program

Public Health And Safety	
Routine Transport, Use, or Disposal of Hazardous Materials	• Develop and implement a Spill Prevention Plan.
Construction Impacts	
Transportation	• Develop and implement a construction phasing and traffic management plan. • Plan, schedule, and coordinate construction activities to reduce effects on local transit bus lines and freight rail services. • Maintain pedestrian, bicycle, and trail access during construction.
Visual Quality	• Visually screen construction yards and staging areas. • Use vegetation to reduce impacts to land disturbed by construction of alignments.
Hydrology	• Reduce groundwater dewatering. • Reduce the potential for on-site flooding during undercrossing of Arroyo Las Positas. • Limit discharge from dewatering.
Biological Resources	• Protect burrowing owl burrows. • Protect tricolored blackbird and yellow-headed blackbird nests. • Protect birds covered by the Migratory Bird Treaty Act (including white-tailed kite, loggerhead shrike, and other special species). • Conduct bat and bat roosting site surveys. • Perform monitoring and implement exclusion measures if bat roosts are identified.
Noise and Vibration	• Employ noise-reduction construction practices. • Designate a noise-disturbance coordinator, disseminate information to residences and businesses, and implement a response/tracking program. • Employ vibration reducing construction practices.
Air Quality	• Implement construction mitigation measures recommended by the Bay Area Air Quality Management District. • Implement a construction emissions reduction plan for heavy equipment exhaust. • Implement a construction emissions reduction plan for diesel particulate matter.
Public Health and Safety	• Conduct a file review and a Phase I Environmental Site Assessment prior to construction. • Conduct further soil and groundwater investigations and mitigate as necessary prior to any construction activities. • Remediate the contaminated sites prior to construction as recommended by the soil and groundwater investigations and mitigate as necessary. • Conduct an asbestos-containing materials survey prior to demolition work, or upgrading, or reconstruction of existing structures • Confirm the location of underground utilities prior to ground-disturbing activities associated with project construction.
Utilities	• Restrict service interruptions to off-peak periods. • Arrange temporary backup service to reduce effects of utility interruption. • Notify customers of service interruptions.
Energy	• Develop and implement a construction energy conservation plan.

Issues and comments related to the alignment and design of different project alternatives include:

- Plan for potential multi-modal connections with other forms of existing transit, such as the ACE and local and regional bus services, and possible future connections with a High-Speed Rail system.
- Consider alternatives that encourage higher residential densities, mixed-use development and pedestrian-friendly environments, and benefit the regional economy.
- Consider alternatives that will most effectively reduce vehicle miles traveled thereby reducing existing and future congestion on I-580.
- Ensure efficient access from Livermore to the BART system.
- Considers other station locations close to the North Livermore Avenue exit, at Vasco Road, East Livermore, West Livermore, and North Flynn Road.
- Locate the alignment within the I-580 median and facilitate BART extension to Mountain House, Tracy Lathrop and Manteca in the future.
- Evaluate the short- and long -term cost of selecting an alignment which does not utilize the I-580 median.

Issues to be resolved include:

- Selection of a preferred alternative alignment.
- Selection and more detailed planning of station areas.
- Design and planning improvements for an expanded or new maintenance facility.
- Use of the UPRR right-of-way.
- Future ACE connections and service with a BART extension.
- Funding availability.

S.5 NEXT STEPS

Where can others review the Draft EIR?

The Draft EIR can be reviewed at the following locations:

Metropolitan Transportation Commission – Association of Bay Area Governments Library
101 8th Street
Oakland, CA 94607-4700

Livermore Library – Civic Center Branch
1188 South Livermore Avenue
Livermore, CA 94550-9315

Pleasanton Library
400 Old Bernal Avenue
Pleasanton, CA 94566

Dublin Public Library
200 Civic Plaza
Dublin, CA 94568

The Draft EIR and related documents can be reviewed at the following location:

San Francisco Bay Area Rapid Transit District
Contact: Malcolm Quint
300 Lakeside Drive, 16th Floor
Oakland, CA 94612
(888) 441-0434

Check it out

For additional information about the entire BART to Livermore Extension Program, please visit www.barttolivermore.org.

The Draft Program EIR can also be reviewed online at www.bart.gov or www.barttolivermore.org. To obtain a copy of the Draft Program EIR on CD-ROM, email info@barttolivermore.org or call (888) 441-0434.

How do I comment on the Draft Program EIR?

When Writing Comments…

Don't forget it's best to focus on the environmental issues associated with the alignment alternatives.

Readers are invited to submit written comments on the adequacy of the document; i.e., does this Draft EIR identify and analyze the possible environmental impacts and recommend appropriate mitigation measures? Comments are most helpful when they are specific and targeted to the environmental assessment; for example, by identifying specific impacts that need further evaluation and what additional information is desired, or by describing alternatives or measures that would better mitigate significant environmental effects. Comments may be submitted anytime during the public review period, which extends from November 5, 2009, through 5 p.m. on December 21, 2009.

Written comments should be submitted to: Mr. Malcolm Quint
San Francisco Bay Area Rapid Transit District
300 Lakeside Drive, 16th Floor
Oakland, CA 94612

Other ways to comment:

- website – www.barttolivermore.org
- email – info@barttolivermore.org
- fax – (510) 464-7673

Written comments can also be submitted by email to info@barttolivermore.org. For more information, please call (888) 441-0434. However, comments cannot be accepted by phone.

A public meeting to accept comments on the Draft Program EIR will be held. The purpose of the hearing will be to afford the public agencies and members of the public an opportunity to comment on the Draft Program EIR orally or to submit written comments. Hearing notices will be mailed to responsible agencies. Additionally, all hearings will be noticed and advertised in the following ways:

- Published in the advertising section of the Tri-Valley Herald and the Independent;
- Mailed to the owners and occupants of contiguous property shown on the latest equalized assessment roll; and
- Mailed to all individuals who have submitted a written request for notification concerning the proposed program.

What will happen at the public hearing?

At the public hearing, BART staff will describe the BART to Livermore Extension Program, including alignment alternatives and potential impacts and mitigation measures, and will solicit comments from the public. Following the close of the public review and comment period, written responses will be prepared that address all substantive written and oral comments on the Draft Program EIR. The Final Program EIR will consist of the Draft Program EIR, the comments received during the public review period, responses to the comments, and any revisions to the Draft EIR as a result of public agency and public comments.

How and when will a preferred alignment be selected?

Prior to the preparation of the Final Program EIR, BART will consult with the Tri-Valley Regional Rail Policy Working Group (PWG) to solicit its views regarding a preferred alignment alternative. The PWG is a group of regional stakeholders currently consisting of the following members: the Alameda County Supervisor for District 1, the Mayor of Livermore, the Mayor of Dublin, the Mayor of Tracy, one Councilmember from Livermore, one Councilmember from Danville, one Councilmember from San Ramon, one Councilmember from Pleasanton, one member from the ACE Board of Directors, and BART directors from BART Districts 1 and 5.

This consultation process is separate from the preparation of the Program EIR document and is not required under CEQA. To facilitate this consultation, following publication of the Draft Program EIR and the 45-day review period, BART staff will review the public comments and prepare a Preferred Alternative Memo that will propose a preferred alignment. The Preferred Alternative Memo will be distributed to a variety of stakeholders, including the PWG; the Livermore City Council, other public agencies and elected officials, and will be available for review by members of the public. PWG members will review the Preferred Alternative Memo and may provide a recommendation on the preferred alignment to the BART Board of Directors. The BART Board will consider the PWG's recommendation when making the decision to select a preferred alignment alternative.

How will a decision be made to advance a Preferred Alignment Alternative?

The BART Board of Directors must certify that it has reviewed and considered the information in the EIR and that the EIR has been completed in conformity with the requirements of CEQA before any decision can be made regarding the BART to Livermore Extension Program. Public agencies cannot approve or carry out a project if it would result in a significant or unavoidable effect, unless the public agency makes one or more of the following findings, which would need to be supported by substantial evidence in the record:

- Changes or alterations have been required in, or incorporated into, the action which avoid or substantially lessen the significant environmental effect.
- Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

- Specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or program alternatives identified in the Final EIR.

If the BART Board decides to select a Preferred Alternative with significant effects that are identified in the Final Program EIR, but which are not avoided or substantially lessened, the BART Board must indicate that such unavoidable significant effects are acceptable due to overriding considerations. This is known as a "Statement of Overriding Considerations." In preparing this statement, CEQA requires the BART Board to balance the specific benefits of the proposed action against its unavoidable environmental risks. If the benefits of the Preferred Alternative outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered acceptable.

Appendices

Appendix A
Notice of Preparation

NOTICE OF PREPARATION

To: Responsible/Trustee Agency
From: San Francisco Bay Area Rapid Transit District (BART)
300 Lakeside Drive
Oakland, CA, 94612

Subject: **Notice of Preparation of an Environmental Impact Report**

Project Title	**File Number**
BART to Livermore Extension Program EIR	
Project Proponent	
The San Francisco Bay Area Rapid Transit District (BART)	
Project Location	
Alameda County, California – from the existing BART terminus station in Dublin/Pleasanton eastward to Livermore.	
Project Description	
Alternative alignments are being considered to extend BART services eastward from the current terminus at the Dublin/Pleasanton BART Station. Three alignments are proposed to be studied at a programmatic level, although others, or variations, may arise as a result of further analysis as well as responses to this NOP and the public scoping meetings that BART will be hosting. One route follows an alignment within the I-580 right-of-way to a terminus station at Greenville Road, and would include a station at Isabel Avenue. A second route would follow the I-580 alignment from the Dublin/Pleasanton BART Station, and then turn south at Isabel Avenue and terminate at a station at Isabel Avenue/Stanley Boulevard in the City of Livermore. A third possible route, which is a variant of the second alignment, would start at the Dublin/Pleasanton BART Station, follow I-580 to the east, and turn south at El Charro Road, which is the western city limit for Livermore. The alignment would follow El Charro Road, continue southeasterly along Quarry Road, and then proceed eastward along Stanley Boulevard until terminating at a station at Isabel Avenue/Stanley Boulevard in the City of Livermore. The terminus station, whether at Greenville or at Isabel Avenue/Stanley Boulevard would provide a convenient connection to the Altamont Commuter Express (ACE) commuter rail service between Stockton and the San Francisco Bay Area. A maintenance yard near the terminus station is being considered as part of each of these alternatives. The programmatic analysis will be used to help identify alignment and station alternatives that may be considered in future project-specific environmental documents.	
The San Francisco Bay Area Rapid Transit District (BART) will be the Lead Agency for the Program Environmental Impact Report (EIR) identified above. In connection with the Program EIR, we need to know the views of your agency as to the scope and content of the environmental information that is germane to your agency's statutory responsibilities. Please provide any comments you may have no later than thirty (30) calendar days after your receipt of this notice to Mr. Malcolm Quint, The San Francisco Bay Area Rapid Transit District, 300 Lakeside Drive, 16th floor, Oakland, CA, 94612, together with the name and phone number of a contact person in your agency.	
Prepared by: PBS&J on behalf of BART	Signature: Rodney Young Date: 6/9/08

BART to Livermore Extension

BART intends to prepare a Program EIR pursuant to the California Environmental Quality Act (CEQA) for transit service to Livermore. A number of options for providing service between the existing terminus along the I-580 corridor at Dublin/Pleasanton and Livermore are under discussion. At this conceptual stage, specific alignments, station locations, and transit technology have not been determined. However, BART and the jurisdictions along the corridor are interested in advancing the planning for future transit extensions and preserving right-of-way from future encroachment and development that could preclude later development of a transit system. The Program EIR will help determine the potential environmental impacts and tradeoffs associated with the different routes and enable BART, in consultation with its local partner agencies, to narrow the range of reasonable and feasible alignment alternatives and help identify alignment and station alternatives that may be considered in future project-specific environmental documents. The Program EIR will provide an overview to potential environmental impacts associated with different station locations which have been proposed, and allow BART and its local partners to refine station choices during subsequent more detailed planning, and to begin the process of protecting the right-of-way for future development of a transit system.

Currently, three alignments are being considered. The first alignment extends eastward along the I-580 between the Dublin/Pleasanton BART Station to a terminus station in the vicinity of Greenville Road, an approximately 10-mile-long corridor that would include a potential station at Isabel Avenue. The second alignment would follow the I-580 alignment from the Dublin/Pleasanton BART Station, but would turn south at Isabel Avenue and terminate at a station at Isabel Avenue/Stanley Boulevard in the City of Livermore. This alignment would be approximately 6 miles long from the Dublin/Pleasanton BART Station and include only the one terminus station. The third alignment, which is a variant of the second route, would start at the Dublin/Pleasanton BART Station and follow I-580 to the east, but turn south at El Charro Road. From there, the route would follow El Charro Road, continue southeast along Quarry Road, and then proceed east along Stanley Boulevard until the alignment terminates at a station at Isabel Avenue/Stanley Boulevard in the City of Livermore. Similar to the second alternative, this variant would include only one station at the terminus. This potential corridor would be approximately 5 miles long.

Each alignment emphasizes interregional rail connectivity in that the planned BART stations would provide convenient transfers to the Altamont Commuter Express (ACE) commuter rail service between Stockton and the San Francisco Bay Area. In the future, these stations may also provide for connections to High Speed Rail (HSR), depending on its final alignment between the Central Valley and the San Francisco Bay Area.

Each alignment includes an option for a maintenance yard near the terminus station. The facility would serve two general purposes: 1) cleaning, maintenance, and storage of BART train cars; and 2) major repair and overhaul functions, involving body damage, wheel and truck assemblies, electromagnetic systems (e.g., door mechanisms, brakes), and electronics (e.g., train control and communication equipment).

Probable Effects

The Program EIR will explore the extent to which the alternative alignments and station locations result in potentially significant environmental effects. This document will support key decisions relative to identifying the range of reasonable and feasible alignment alternatives. Some of these key decisions include:

- A determination of whether BART would be in the I-580 median to Greenville Road or would depart the median to link to a Isabel/Stanley ACE Station. This decision is critical as the Alameda County Congestion Management Agency (ACCMA) is proceeding with Advanced Right-of-Way Protection efforts along the I-580 freeway.

- Identification of the feasibility of transit supportive land uses at the proposed station sites.

- A determination of whether viable connections to ACE and Livermore Amador Valley Transit Authority (LAVTA) services can be accomplished at the proposed station sites. The potential for future high-speed rail (HSR) or high-speed train (HST) connections and alignments also needs to be understood.

Environmental issues that will be investigated in the comprehensive Program EIR include transportation, traffic, and circulation effects; land use compatibility and consistency with locally adopted plans; potential effects on population, housing, and employment; disturbance to sensitive visual and cultural resources; effects of noise and vibration; geologic and hydrology effects; potential disturbance to sensitive wildlife and vegetation species and habitats; air emissions from transit system construction and operation; public health and safety concerns related to exposure to hazardous materials; and community service and utility demand. More specifically, some of the areas of the Program EIR will consider:

- Land Use Compatibility – What conflicts might be expected with respect to existing land uses in the station areas? What are the implications of developing transit-related infrastructure outside city and county urban growth boundaries?

- Mineral Resources – What effects, if any, would the different alignments have on quarry operations south of I-580 and west of Isabel Avenue (SR 84)?

- Transportation/Traffic Impacts – What effects would potential alignments and station locations have for local circulation, access, transit system connectivity and parking?

- Wetlands/Biological Impacts – Would there be direct and indirect disturbance to the sensitive areas like the alkali sinks and meadows, wetlands, and riparian woodlands?

- Safety Considerations – What implications would the alignments have considering the proposed changes to the Livermore Airport safety zones?

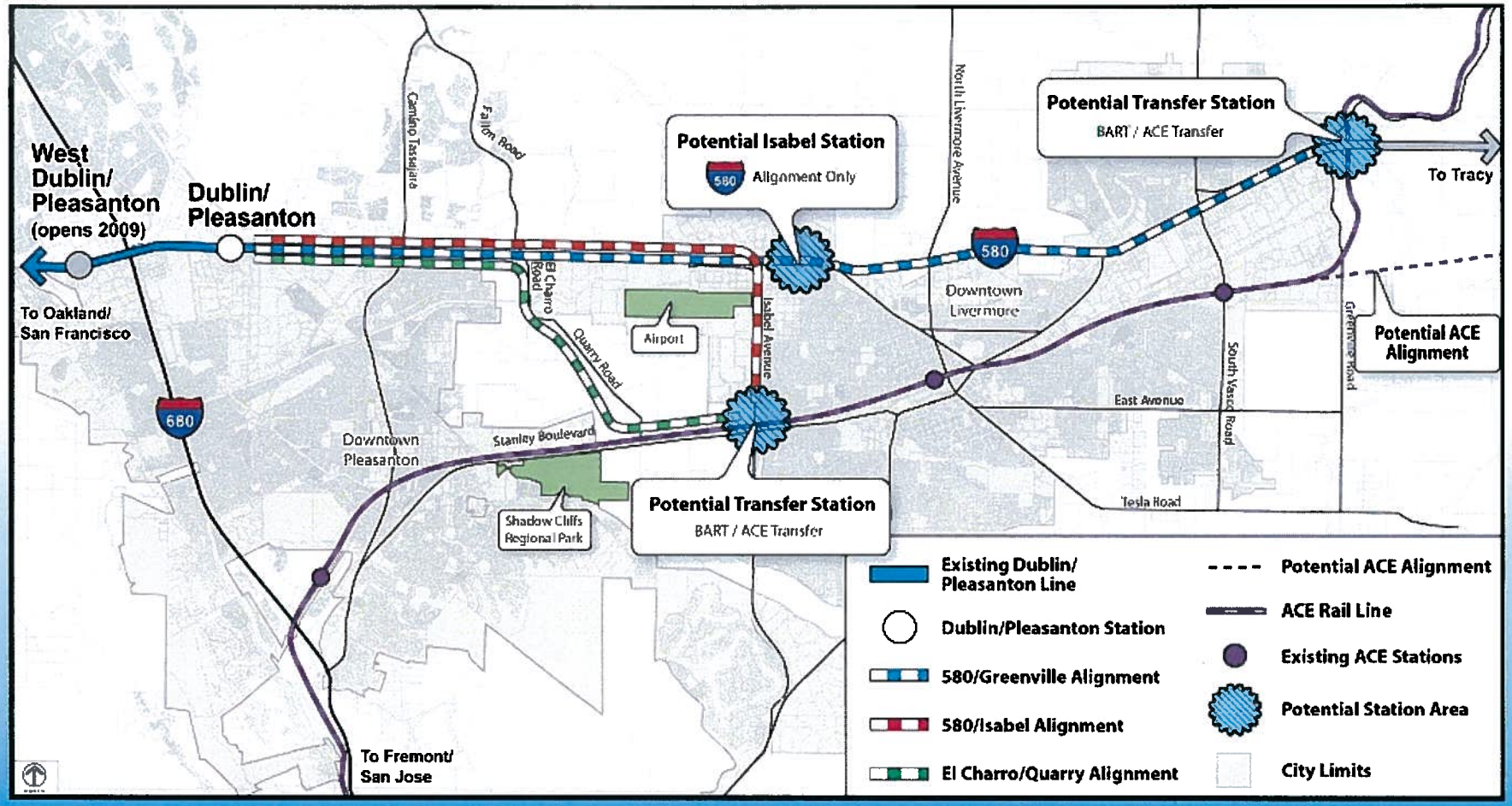
- Geologic/Seismic Safety – Are there special design implications to address the proximity of the Greenville Fault?

- Air Quality Impacts – What are the effects of air emissions from transit system construction and operation, and benefits from providing a transit alternative to the automobile, for air quality on the local, regional and global (climate change) levels?

- Noise and Vibration Impacts – What are the local effects on sensitive receptors along the alignments and station areas?

- Visual Impacts – Would the transit improvements affect adjacent visual resources, including the City of Livermore's Scenic Corridor? Are there height and/or scale compatibility concerns between the improvements and both existing and planned adjoining development patterns?

Project Corridor Location



Appendix B
Estimated Capital Costs for the BART to Livermore Extension Alternatives

NOVEMBER 2, 2009

BART TO LIVERMORE STUDY

COST COMPARISON OF ALTERNATIVES
(ALL COSTS 2009$M)

COST ELEMENTS	ALT 1 Greenville East	ALT 1a Downtown (via UPRR)	ALT 1b Downtown (via SPRR)	ALT 2 Las Positas	ALT 2a Downtown Vasco	ALT 3 Portola	ALT 3a Railroad	ALT 4 Isabel/I-580	ALT 5 Quarry
1. GUIDEWAY	$490	$1,010	$990	$690	$940	$730	$850	$170	$590
2. STATIONS	$360	$360	$360	$360	$360	$760	$350	$300 (See Note 6)	$180
3. YARD / SHOPS	$450	$450	$450	$490	$490	$470	$470	$0	$0
4A. FREEWAY REBUILD	$220	$20	$20	$90	$20	$50	$20	$40	$20
4B. OTHER SITEWORK	$60	$150	$250	$60	$160	$50	$60	$30	$20
5 . SYSTEMS (TRAIN CONTROL, POWER, COMMUNICATION, ETC.)	$400	$460	$460	$390	$420	$300	$330	$180	$200
6. CONSTRUCTION	**$1,980**	**$2,450**	**$2,530**	**$2,080**	**$2,390**	**$2,360**	**$2,080**	**$720**	**$1,010**
7. RIGHT-OF-WAY	**$290**	**$490**	**$450**	**$570**	**$730**	**$460**	**$680**	**$70**	**$210**
GUIDEWAY	$110	$230	$190	$100	$200	$70	$130	$40	$100
STATIONS	$160	$240	$240	$230	$290	$120	$280	$30	$110
MAINTENANCE FACILITY	$20	$20	$20	$240	$240	$270	$270	$0	$0
BART OWNED PROPERTY (See Note 5)	*$231*	*$170*	*$170*	*$61*	*$0*	*$61*	*$0*	*$61*	*$0*
8. VEHICLES	**$380**	**$340**	**$340**	**$330**	**$330**	**$330**	**$310**	**$230**	**$240**
9. CONSTRUCTION , ROW, & VEHICLES	**$2,650**	**$3,280**	**$3,320**	**$2,980**	**$3,450**	**$3,150**	**$3,070**	**$1,020**	**$1,460**
10. PROGRAM RESERVE AT 10% (See Note 3)	$270	$330	$330	$300	$350	$320	$310	$100	$150
11. TOTAL	**$2,920**	**$3,610**	**$3,650**	**$3,280**	**$3,800**	**$3,470**	**$3,380**	**$1,120**	**$1,610**
Length in Miles	***11.5***	***13.1***	***13.2***	***11.0***	***12.0***	***8.4***	***9.1***	***5.2***	***5.7***

NOTES

1. Contingency = Construction at 30%, Right-of -Way at 10%, & Vehicles at 10% (Included in Items 1-9 & 11)
2. Soft Costs = Construction at 45%, Right-of-Way at 10%, & Vehicles at 10% (Included in Items 1-9 & 11)
3. Program Reserve Applied at 10% (To Item 9 - Construction, ROW & Vehicles).
4. All Costs are in 2009 Dollars.
5. The $'s Represent the Value of Property Owned by BART at the Potential Isabel / I-580 Station Site and / or the Potential Greenville Yard Site. These $'s are not included in the Alternatives' Right-of-Way Costs in this Table.
6. The Isabel / I-580 Station in Alternative 3 is Underground and costs $180M more than the At-Grade Isabel / I-580 Station in Alternative 4.

Appendix C
Potential Land Acquisition for the BART to Livermore Extension Alternatives (Preliminary List of Affected Parcels)

Potential Land Acquisition -- Alternative 1

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0015-002-07	3.0	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0015-007-03	11.8	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
099 -0015-016-03	103.5	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099 -0015-035-02	1.3	5.1% to 10.0%	Vacant Commercial	0	ROW
099 -0015-036-00	4.6	10.1% to 25.0%	Vacant Commercial	0	ROW
099 -0015-059-00	14.2	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0021-001-00	8.8	Less than 1%	Shopping Center	0	ROW
099 -0026-006-00	16.6	1.0% to 5.0%	Mobile Home Parks, Trailer Parks	19	ROW
099 -0040-009-05	5.6	Less than 1%	Light Industrial	0	ROW
099 -0040-010-39	41.1	Less than 1%	Warehouse, Storage	0	ROW
099 -0040-010-45	64.9	Less than 1%	Vacant Industrial	0	ROW
099 -0100-003-05	22.5	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099 -0100-018-18	10.7	Less than 1%	Residential Miscellaneous	0	ROW
099 -0100-031-00	11.9	Less than 1%	Governmental, Public	0	ROW
099 -0100-032-00	12.3	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
099 -1315-053-00	0.7	10.1% to 25.0%	Governmental, Public	0	ROW
099 -1315-054-00	1.5	25.1% to 50.0%	Governmental, Public	0	ROW
099B-5371-014-00	0.2	25.1% to 50.0%	Vacant Commercial	0	ROW
099B-5371-018-00	0.1	1.0% to 5.0%	Single Family Residence	1	ROW
099B-5371-019-00	0.1	More than 75%	Vacant Commercial	0	ROW
099B-5376-007-01	0.5	25.1% to 50.0%	Vacant Commercial	0	ROW
099B-5376-008-00	1.1	1.0% to 5.0%	Vacant Commercial	0	ROW
099B-5376-009-00	1.7	5.1% to 10.0%	Vacant Commercial	0	ROW
099B-5376-010-00	2.3	5.1% to 10.0%	Vacant Industrial	0	ROW
099B-5500-001-02	1.0	1.0% to 5.0%	Residential Miscellaneous	0	ROW
099B-5500-001-11	18.0	1.0% to 5.0%	Residential Miscellaneous	0	ROW
099B-5500-001-11	18.0	5.1% to 10.0%	Residential Miscellaneous	0	Yard
099B-5500-002-03	1.3	5.1% to 10.0%	Residential Miscellaneous	0	ROW
099B-5500-002-06	9.1	10.1% to 25.0%	Residential Miscellaneous	0	Yard
099B-5500-004-00	1.6	10.1% to 25.0%	Vacant Commercial	0	ROW
099B-5500-005-00	0.3	More than 75%	Residential Miscellaneous	0	ROW
099B-5600-006-04	5.1	10.1% to 25.0%	Utilities	0	ROW
099B-5600-009-03	17.6	Less than 1%	Vacant Industrial	0	ROW
099B-5685-006-00	73.8	25.1% to 50.0%	Agricultural Miscellaneous	0	Station
099B-5685-007-00	24.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099B-5685-007-00	24.0	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5685-008-00	13.6	1.0% to 5.0%	Utilities	0	ROW
099B-5685-008-00	13.6	25.1% to 50.0%	Utilities	0	Station
099B-5685-009-00	13.9	5.1% to 10.0%	Governmental, Public	0	ROW
099B-5685-009-00	13.9	51.1% to 75.0%	Governmental, Public	0	Station
099B-5700-001-19	13.2	More than 75%	Vacant Industrial	0	Station
099B-5700-001-33	3.0	More than 75%	Industrial Miscellaneous	0	Station
099B-5700-001-35	1.9	More than 75%	Warehouse, Storage	0	Station
099B-5700-001-38	11.9	10.1% to 25.0%	Agricultural Miscellaneous	0	ROW
099B-5700-002-09	14.4	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5700-003-02	2.2	More than 75%	Governmental, Public	0	Station
099B-5875-020-18	0.7	25.1% to 50.0%	Light Industrial	0	ROW
099B-5875-025-00	0.2	10.1% to 25.0%	Vacant Industrial	0	ROW
099B-5900-001-01	2.5	50.1% to 75.0%	Governmental, Public	0	ROW
099B-5900-002-09	2.6	1.0% to 5.0%	Vacant Industrial	0	ROW
099B-5900-004-02	2.1	Less than 1%	Industrial Miscellaneous	0	ROW

Potential Land Acquisition -- Alternative 1

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099B-5900-028-00	2.5	10.1% to 25.0%	Warehouse, Storage	0	ROW
099B-8110-024-00	1.3	Less than 1%	Vacant Commercial	0	ROW
099B-8124-011-00	1.1	Less than 1%	Vacant Commercial	0	ROW
099B-8124-013-00	0.7	5.1% to 10.0%	Vacant Commercial	0	ROW
902 -0008-002-02	34.0	Less than 1%	Vacant Commercial	0	ROW
902 -0008-005-05	4.0	5.1% to 10.0%	Vacant Residential	0	ROW
902 -0008-005-08	0.6	10.1% to 25.0%	Single Family Residence	1	ROW
902 -0008-005-09	8.8	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
902 -0008-007-02	1.9	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
902 -0008-008-02	3.9	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
902 -0008-009-04	4.1	1.0% to 5.0%	Single Family Residence	1	ROW
902 -0008-010-04	3.8	1.0% to 5.0%	Vacant Commercial	0	ROW
902 -0008-011-06	1.8	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
903 -0010-036-00	36.4	1.0% to 5.0%	Governmental, Public	0	Station
903 -0010-037-00	71.6	1.0% to 5.0%	Vacant Residential	0	Station
904 -0001-001-10	35.4	1.0% to 5.0%	Vacant Commercial	0	ROW
904 -0001-003-18	3.2	Less than 1%	Vacant Industrial	0	ROW
904 -0001-008-00	11.8	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0002-006-00	257.7	Less than 1%	Governmental, Public	0	ROW
904 -0004-010-01	5.5	1.0% to 5.0%	Office Building	0	ROW
904 -0004-010-02	4.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
904 -0004-054-00	5.5	Less than 1%	Recreational	0	ROW
904 -0004-057-00	2.5	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0004-067-00	4.9	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0005-004-05	2.9	More than 75%	Vacant rural-res homesites	0	Station
904 -0011-003-00	1.2	Less than 1%	Governmental, Public	0	ROW
904-1-11-2	25.3	1.0% to 5.0%	Vacant	0	ROW
904-1-3-14	20.3	1.0% to 5.0%	Government/Institutional	0	ROW
904-1-9-7	17.0	1.0% to 5.0%	Vacant	0	ROW
904-1-9-8	24.7	1.0% to 5.0%	Vacant	0	ROW
905 -0001-005-02	49.5	1.0% to 5.0%	Vacant Industrial	0	ROW
905 -0001-006-03	51.5	1.0% to 5.0%	Residential Miscellaneous	0	ROW
905 -0009-012-01	3.9	5.1% to 10.0%	Vacant Industrial	0	ROW
905 -0009-013-03	11.3	Less than 1%	Vacant Industrial	0	ROW
905-1-1-2	110.0	Less than 1%	Agricultural	0	ROW
905-1-2-2	1.1	10.1% to 25.0%	Government/Institutional	0	ROW
905-1-3-2	76.6	Less than 1%	Agricultural	0	ROW
905-1-4-3	8.8	1.0% to 5.0%	Residential	0	ROW
905-1-4-4	39.9	Less than 1%	Residential	0	ROW
905-15-17	2.8	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-15-18	2.9	Less than 1%	Vacant	0	ROW
905-9-27-1	15.3	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-9-43	2.4	5.1% to 10.0%	Commercial/Retail/Office	0	ROW
905-9-60	1.8	Less than 1%	Commercial/Retail/Office	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 1

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
985 -0027-002-00	136.0	Less than 1%	Vacant Commercial	0	ROW
985 -0027-003-00	1.2	10.1% to 25.0%	Vacant Commercial	0	ROW
985 -0027-004-00	0.8	1.0% to 5.0%	Vacant Industrial	0	ROW
985 -0027-005-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0249-001-04	0.4	1.0% to 5.0%	Vacant Residential	0	ROW
098 -0250-005-00	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0251-009-00	1.0	10.1% to 25.0%	Utilities	0	ROW
098 -0252-007-02	0.3	25.1% to 50.0%	Vacant rural-res homesites	0	ROW
098 -0253-003-01	0.3	10.1% to 25.0%	Multi-Family Dwelling (2-4 Unit)	4	ROW
098 -0253-004-00	0.0	25.1% to 50.0%	Vacant Residential	0	ROW
098 -0253-005-00	0.1	25.1% to 50.0%	Single Family Residence	1	ROW
098 -0253-006-00	0.2	25.1% to 50.0%	Single Family Residence	1	ROW
098 -0254-002-01	0.1	More than 75%	Quadruplex	4	Station
098 -0254-002-02	0.1	More than 75%	Quadruplex	4	Station
098 -0254-005-00	0.1	More than 75%	Mobile Home	1	Station
098 -0254-006-00	0.2	More than 75%	Triplex	3	Station
098 -0254-007-00	0.2	More than 75%	Duplex	2	Station
098 -0254-008-00	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0254-011-01	0.0	More than 75%	Governmental, Public	0	Station
098 -0254-013-00	0.6	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-001-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-002-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-02	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-04	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-06	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-08	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-12	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-13	1.5	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-004-00	0.8	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-005-01	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-03	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-05	0.7	More than 75%	Office Building	0	Station
098 -0260-006-03	0.0	More than 75%	Utilities	0	Station
098 -0260-006-04	0.8	More than 75%	Service Station, Gas Station	0	Station
098 -0260-007-02	0.3	More than 75%	Governmental, Public	0	Station
098 -0260-008-03	0.0	More than 75%	Service Station, Gas Station	0	Station
098 -0260-008-04	0.5	More than 75%	Service Station, Gas Station	0	Station
098 -0260-009-06	0.3	More than 75%	Store/Office Combo	0	Station
098 -0260-009-08	0.2	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-010-02	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-013-02	0.1	More than 75%	Utilities	0	Station
098 -0260-013-03	2.1	More than 75%	Governmental, Public	0	Station
098 -0260-014-01	0.2	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-015-01	0.6	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-016-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0260-016-02	0.3	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-017-01	0.0	More than 75%	Utilities	0	Station
098 -0260-017-02	1.3	More than 75%	Governmental, Public	0	Station
098 -0260-018-03	0.8	More than 75%	Governmental, Public	0	Station
098 -0260-018-04	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-018-05	0.0	More than 75%	Utilities	0	Station
098 -0260-019-01	0.9	More than 75%	Light Industrial	0	Station
098 -0260-019-02	0.8	More than 75%	Commercial Miscellaneous	0	Station
098 -0260-021-01	0.3	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-02	0.2	More than 75%	Quadruplex	4	Station

Potential Land Acquisition -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0260-021-03	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-04	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-05	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-06	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-07	0.2	More than 75%	Quadruplex	4	Station
098 -0260-022-03	0.6	More than 75%	Utilities	0	Station
098 -0260-022-04	1.4	More than 75%	Utilities	0	Station
098 -0260-022-05	0.1	More than 75%	Governmental, Public	0	Station
098 -0260-022-06	0.0	More than 75%	Governmental, Public	0	Station
098 -0264-001-01	0.3	More than 75%	Service Station, Gas Station	0	Station
098 -0264-001-05	1.7	More than 75%	Governmental, Public	0	Station
098 -0264-024-02	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0264-024-02	0.7	More than 75%	Utilities	0	Station
098 -0264-028-01	0.8	1.0% to 5.0%	Warehouse, Storage	0	ROW
098 -0275-015-04	0.3	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0275-016-04	0.9	25.1% to 50.0%	Utilities	0	ROW
098 -0280-001-01	0.0	More than 75%	Utilities	0	Station
098 -0280-001-02	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-002-01	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-002-02	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-003-01	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0280-004-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0280-007-07	0.3	More than 75%	Vacant Commercial	0	Station
098 -0280-008-03	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-008-07	0.0	More than 75%	Utilities	0	Station
098 -0280-008-08	0.0	More than 75%	Governmental, Public	0	Station
098 -0290-006-07	2.1	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0290-007-02	1.1	50.1% to 75.0%	Utilities	0	ROW
098 -0290-008-02	1.4	25.1% to 50.0%	Utilities	0	ROW
098 -0290-009-02	1.2	50.1% to 75.0%	Utilities	0	ROW
098 -0290-017-02	0.2	10.1% to 25.0%	Stores, Retail Outlet	0	ROW
098 -0290-018-05	0.2	5.1% to 10.0%	Restaurant, Bar, Food Service	0	ROW
098 -0290-026-00	0.9	5.1% to 10.0%	Stores, Retail Outlet	0	ROW
098 -0291-001-00	1.0	Less than 1%	Commercial Miscellaneous	0	ROW
098 -0291-009-00	0.2	1.0% to 5.0%	Duplex	2	ROW
099 -0040-016-00	8.7	5.1% to 10.0%	Utilities	0	ROW
099 -0040-017-04	7.9	25.1% to 50.0%	Utilities	0	ROW
099 -0040-020-00	13.1	25.1% to 50.0%	Utilities	0	ROW
099 -0040-022-00	0.5	10.1% to 25.0%	Utilities	0	ROW
099 -0051-017-01	0.3	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0051-017-03	1.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
099 -0051-018-00	0.7	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-019-05	0.1	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-020-05	0.3	50.1% to 75.0%	Utilities	0	ROW
099 -0051-020-06	1.1	50.1% to 75.0%	Utilities	0	ROW
099 -0056-007-02	5.6	5.1% to 10.0%	Utilities	0	ROW
099 -0056-008-00	3.8	25.1% to 50.0%	Utilities	0	ROW
099 -0175-014-02	4.5	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-01	0.7	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-02	6.1	10.1% to 25.0%	Utilities	0	ROW
099 -0176-007-02	18.4	5.1% to 10.0%	Governmental, Public	0	ROW

Potential Land Acquisition -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0176-007-03	0.5	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-04	0.2	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0185-003-00	4.0	10.1% to 25.0%	Utilities	0	ROW
099A-1400-013-01	2.2	25.1% to 50.0%	Utilities	0	ROW
099A-1475-008-02	14.8	10.1% to 25.0%	Utilities	0	ROW
099A-1475-008-03	4.4	10.1% to 25.0%	Utilities	0	ROW
099A-1475-008-05	0.2	25.1% to 50.0%	Utilities	0	ROW
099A-1475-008-06	0.9	25.1% to 50.0%	Utilities	0	ROW
099A-1475-008-08	2.2	25.1% to 50.0%	Utilities	0	ROW
099A-2909-015-01	1.3	25.1% to 50.0%	Governmental, Public	0	ROW
099B-5500-001-10	65.4	Less than 1%	Governmental, Public	0	ROW
099B-5500-001-11	18.0	1.0% to 5.0%	Residential Miscellaneous	0	ROW
099B-5500-001-11	18.0	5.1% to 10.0%	Residential Miscellaneous	0	Yard
099B-5500-002-06	9.1	10.1% to 25.0%	Residential Miscellaneous	0	Yard
099B-5600-006-03	0.1	10.1% to 25.0%	Utilities	0	ROW
099B-5600-006-04	5.1	25.1% to 50.0%	Utilities	0	ROW
099B-5600-009-03	17.6	5.1% to 10.0%	Vacant Industrial	0	ROW
099B-5685-006-00	73.8	25.1% to 50.0%	Agricultural Miscellaneous	0	Station
099B-5685-007-00	24.0	10.1% to 25.0%	Agricultural Miscellaneous	0	ROW
099B-5685-007-00	24.0	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5685-008-00	13.6	10.1% to 25.0%	Utilities	0	ROW
099B-5685-008-00	13.6	25.1% to 50.0%	Utilities	0	Station
099B-5685-009-00	13.9	1.0% to 5.0%	Governmental, Public	0	ROW
099B-5685-009-00	13.9	51.1% to 75.0%	Governmental, Public	0	Station
099B-5700-001-19	13.2	More than 75%	Vacant Industrial	0	Station
099B-5700-001-33	3.0	More than 75%	Industrial Miscellaneous	0	Station
099B-5700-001-35	1.9	More than 75%	Warehouse, Storage	0	Station
099B-5700-001-38	11.9	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099B-5700-002-09	14.4	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5700-003-02	2.2	More than 75%	Governmental, Public	0	Station
904 -0001-002-12	5.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0001-003-23	15.0	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-004-02	4.3	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-006-01	1.3	5.1% to 10.0%	Governmental, Public	0	ROW
904 -0001-006-03	1.4	25.1% to 50.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-06	4.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-08	56.9	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-18	45.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-21	3.4	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
904 -0001-007-24	25.1	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-009-05	0.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-009-06	11.9	Less than 1%	Vacant Industrial	0	ROW
904 -0001-010-00	35.2	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-013-00	0.1	10.1% to 25.0%	Governmental, Public	0	ROW
904 -0009-001-00	214.7	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0009-003-00	4.9	5.1% to 10.0%	Utilities	0	ROW
904 -0010-002-02	70.8	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0010-002-06	6.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0010-005-00	5.7	25.1% to 50.0%	Utilities	0	ROW
904 -0010-007-00	1.1	1.0% to 5.0%	Vacant Industrial	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW

Potential Land Acquisition -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
946 -1350-003-05	239.5	Less than 1%	Governmental, Public	0	ROW
946 -1350-004-00	1.7	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1350-005-03	148.4	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
946 -1350-006-02	64.0	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0249-001-04	0.4	1.0% to 5.0%	Vacant Residential	0	ROW
098 -0250-005-00	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0251-009-00	1.0	10.1% to 25.0%	Utilities	0	ROW
098 -0252-007-02	0.3	25.1% to 50.0%	Vacant rural-res homesites	0	ROW
098 -0253-003-01	0.3	10.1% to 25.0%	Multi-Family Dwelling (2-4 Unit)	4	ROW
098 -0253-004-00	0.0	25.1% to 50.0%	Vacant Residential	0	ROW
098 -0253-005-00	0.1	25.1% to 50.0%	Single Family Residence	3	ROW
098 -0253-006-00	0.2	25.1% to 50.0%	Single Family Residence	1	ROW
098 -0254-002-01	0.1	More than 75%	Quadruplex	4	Station
098 -0254-002-02	0.1	More than 75%	Quadruplex	4	Station
098 -0254-005-00	0.1	More than 75%	Mobile Home	1	Station
098 -0254-006-00	0.2	More than 75%	Triplex	3	Station
098 -0254-007-00	0.2	More than 75%	Duplex	2	Station
098 -0254-008-00	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0254-011-01	0.0	More than 75%	Governmental, Public	0	Station
098 -0254-013-00	0.6	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-001-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-002-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-02	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-04	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-06	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-08	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-12	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-13	1.5	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-004-00	0.8	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-005-01	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-03	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-05	0.7	More than 75%	Office Building	0	Station
098 -0260-006-03	0.0	More than 75%	Utilities	0	Station
098 -0260-006-04	0.8	More than 75%	Service Station, Gas Station	0	Station
098 -0260-007-02	0.3	More than 75%	Governmental, Public	0	Station
098 -0260-008-03	0.0	More than 75%	Service Station, Gas Station	0	Station
098 -0260-008-04	0.5	More than 75%	Service Station, Gas Station	0	Station
098 -0260-009-06	0.3	More than 75%	Store/Office Combo	0	Station
098 -0260-009-08	0.2	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-010-02	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-013-02	0.1	More than 75%	Utilities	0	Station
098 -0260-013-03	2.1	More than 75%	Governmental, Public	0	Station
098 -0260-014-01	0.2	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-015-01	0.6	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-016-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0260-016-02	0.3	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-017-01	0.0	More than 75%	Utilities	0	Station
098 -0260-017-02	1.3	More than 75%	Governmental, Public	0	Station
098 -0260-018-03	0.8	More than 75%	Governmental, Public	0	Station
098 -0260-018-04	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-018-05	0.0	More than 75%	Utilities	0	Station
098 -0260-019-01	0.9	More than 75%	Light Industrial	0	Station
098 -0260-019-02	0.8	More than 75%	Commercial Miscellaneous	0	Station
098 -0260-021-01	0.3	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-02	0.2	More than 75%	Quadruplex	4	Station

Potential Land Acquisition -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0260-021-03	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-04	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-05	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-06	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-07	0.2	More than 75%	Quadruplex	4	Station
098 -0260-022-03	0.6	More than 75%	Utilities	0	Station
098 -0260-022-04	1.4	More than 75%	Utilities	0	Station
098 -0260-022-05	0.1	More than 75%	Governmental, Public	0	Station
098 -0260-022-06	0.0	More than 75%	Governmental, Public	0	Station
098 -0264-001-01	0.3	More than 75%	Service Station, Gas Station	0	Station
098 -0264-001-05	1.7	More than 75%	Governmental, Public	0	Station
098 -0264-024-02	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0264-024-02	0.7	More than 75%	Utilities	0	Station
098 -0264-028-01	0.8	1.0% to 5.0%	Warehouse, Storage	0	ROW
098 -0275-015-04	0.3	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0275-016-04	0.9	25.1% to 50.0%	Utilities	0	ROW
098 -0280-001-01	0.0	More than 75%	Utilities	0	Station
098 -0280-001-02	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-002-01	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-002-02	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-003-01	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0280-004-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0280-007-07	0.3	More than 75%	Vacant Commercial	0	Station
098 -0280-008-03	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-008-07	0.0	More than 75%	Utilities	0	Station
098 -0280-008-08	0.0	More than 75%	Governmental, Public	0	Station
098 -0290-006-07	2.1	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0290-007-02	1.1	50.1% to 75.0%	Utilities	0	ROW
098 -0290-008-02	1.4	25.1% to 50.0%	Utilities	0	ROW
098 -0290-009-02	1.2	50.1% to 75.0%	Utilities	0	ROW
098 -0290-017-02	0.2	10.1% to 25.0%	Stores, Retail Outlet	0	ROW
098 -0290-018-05	0.2	5.1% to 10.0%	Restaurant, Bar, Food Service	0	ROW
098 -0290-026-00	0.9	5.1% to 10.0%	Stores, Retail Outlet	0	ROW
098 -0291-001-00	1.0	Less than 1%	Commercial Miscellaneous	0	ROW
098 -0291-009-00	0.2	1.0% to 5.0%	Duplex	2	ROW
099 -0040-018-00	7.6	25.1% to 50.0%	Utilities	0	ROW
099 -0040-020-00	13.1	25.1% to 50.0%	Utilities	0	ROW
099 -0051-017-01	0.3	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0051-017-03	1.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
099 -0051-018-00	0.7	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-019-05	0.1	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-020-05	0.3	50.1% to 75.0%	Utilities	0	ROW
099 -0051-020-06	1.1	50.1% to 75.0%	Utilities	0	ROW
099 -0056-007-02	5.6	5.1% to 10.0%	Utilities	0	ROW
099 -0056-008-00	3.8	25.1% to 50.0%	Utilities	0	ROW
099 -0175-014-02	4.5	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-01	0.7	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-02	6.1	10.1% to 25.0%	Utilities	0	ROW
099 -0176-007-02	18.4	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-03	0.5	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-04	0.2	5.1% to 10.0%	Governmental, Public	0	ROW

Potential Land Acquisition -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0185-003-00	4.0	10.1% to 25.0%	Utilities	0	ROW
099B-5500-001-10	65.4	1.0% to 5.0%	Governmental, Public	0	ROW
099B-5500-001-11	18.0	5.1% to 10.0%	Residential Miscellaneous	0	Yard
099B-5500-002-06	9.1	10.1% to 25.0%	Residential Miscellaneous	0	Yard
099B-5680-007-00	7.4	5.1% to 10.0%	Governmental, Public	0	ROW
099B-5685-006-00	73.8	25.1% to 50.0%	Agricultural Miscellaneous	0	Station
099B-5685-007-00	24.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099B-5685-007-00	24.0	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5685-008-00	13.6	1.0% to 5.0%	Utilities	0	ROW
099B-5685-008-00	13.6	25.1% to 50.0%	Utilities	0	Station
099B-5685-009-00	13.9	5.1% to 10.0%	Governmental, Public	0	ROW
099B-5685-009-00	13.9	51.1% to 75.0%	Governmental, Public	0	Station
099B-5700-001-19	13.2	More than 75%	Vacant Industrial	0	Station
099B-5700-001-33	3.0	More than 75%	Industrial Miscellaneous	0	Station
099B-5700-001-35	1.9	More than 75%	Warehouse, Storage	0	Station
099B-5700-001-38	11.9	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099B-5700-002-07	4.7	10.1% to 25.0%	Vacant Industrial	0	ROW
099B-5700-002-09	14.4	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099B-5700-002-09	14.4	10.1% to 25.0%	Agricultural Miscellaneous	0	Station
099B-5700-003-01	4.0	1.0% to 5.0%	Utilities	0	ROW
099B-5700-003-02	2.2	More than 75%	Governmental, Public	0	Station
099B-5700-999-99	2.0	1.0% to 5.0%	Vacant Industrial	0	ROW
099B-5875-027-00	13.1	25.1% to 50.0%	Utilities	0	ROW
099B-8121-001-00	2.9	25.1% to 50.0%	Utilities	0	ROW
904 -0001-002-12	5.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0001-003-23	15.0	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-004-02	4.3	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-006-01	1.3	5.1% to 10.0%	Governmental, Public	0	ROW
904 -0001-006-03	1.4	25.1% to 50.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-06	4.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-08	56.9	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-18	45.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-21	3.4	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
904 -0001-007-24	25.1	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-009-05	0.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-009-06	11.9	Less than 1%	Vacant Industrial	0	ROW
904 -0001-010-00	35.2	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-013-00	0.1	10.1% to 25.0%	Governmental, Public	0	ROW
904 -0009-001-00	214.7	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0009-003-00	4.9	5.1% to 10.0%	Utilities	0	ROW
904 -0010-002-02	70.8	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0010-002-06	6.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0010-005-00	5.7	25.1% to 50.0%	Utilities	0	ROW
904 -0010-007-00	1.1	1.0% to 5.0%	Vacant Industrial	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
946 -1350-003-05	239.5	Less than 1%	Governmental, Public	0	ROW
946 -1350-004-00	1.7	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1350-005-03	148.4	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
946 -1350-006-02	64.0	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 2

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0015-007-03	11.8	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
099 -0015-016-03	103.5	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099 -0015-059-00	14.2	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0021-001-00	8.8	Less than 1%	Shopping Center	0	ROW
099 -0040-016-00	8.7	5.1% to 10.0%	Utilities	0	ROW
099 -0040-017-01	0.4	50.1% to 75.0%	Utilities	0	ROW
099 -0040-017-03	1.3	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0040-017-04	7.9	10.1% to 25.0%	Utilities	0	ROW
099 -0040-020-00	13.1	1.0% to 5.0%	Utilities	0	ROW
099 -0040-022-00	0.5	10.1% to 25.0%	Utilities	0	ROW
099 -0100-003-05	22.5	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
099 -0100-018-18	10.7	Less than 1%	Residential Miscellaneous	0	ROW
099 -0100-031-00	11.9	Less than 1%	Governmental, Public	0	ROW
099 -0100-032-00	12.3	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
099 -1325-005-02	0.4	10.1% to 25.0%	Governmental, Public	0	ROW
099 -1325-005-03	3.5	1.0% to 5.0%	Warehouse, Storage	0	ROW
099 -1325-020-07	6.8	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
099 -1325-022-02	2.9	1.0% to 5.0%	Single Family Residence	1	ROW
099 -1325-023-00	4.7	1.0% to 5.0%	Vacant Industrial	0	ROW
099 -1325-029-02	3.2	5.1% to 10.0%	Vacant Industrial	0	ROW
099 -1325-030-04	4.9	1.0% to 5.0%	Vacant Industrial	0	ROW
099 -1326-039-00	8.4	Less than 1%	Light Industrial	0	Station
099 -1349-005-00	2.5	1.0% to 5.0%	Vacant Industrial	0	ROW
099 -1349-014-01	4.0	10.1% to 25.0%	Warehouse, Storage	0	ROW
099 -1376-013-00	1.4	10.1% to 25.0%	Commercial Miscellaneous	0	ROW
099A-1400-013-01	2.2	25.1% to 50.0%	Utilities	0	ROW
099A-1400-015-10	4.5	1.0% to 5.0%	Governmental, Public	0	ROW
099A-1400-030-00	3.3	10.1% to 25.0%	Governmental, Public	0	ROW
099A-1475-001-06	0.3	More than 75%	Governmental, Public	0	Station
099A-1475-001-12	1.9	More than 75%	Governmental, Public	0	Station
099A-1475-001-13	0.1	More than 75%	Governmental, Public	0	Station
099A-1475-001-14	8.8	More than 75%	Warehouse, Storage	0	Station
099A-1475-004-08	3.1	10.1% to 25.0%	Industrial Miscellaneous	0	Yard
099A-1475-004-10	2.9	10.1% to 25.0%	Warehouse, Storage	0	Yard
099A-1475-004-12	2.0	10.1% to 25.0%	Light Industrial	0	Yard
099A-1475-004-13	0.2	More than 75%	Utilities	0	Yard
099A-1475-004-14	1.8	10.1% to 25.0%	Light Industrial	0	Yard
099A-1475-005-06	0.6	Less than 1%	Governmental, Public	0	ROW
099A-1475-005-06	0.6	More than 75%	Governmental, Public	0	Station
099A-1475-008-02	14.8	51.1% to 75.0%	Utilities	0	Station
099A-1475-008-03	4.4	25.1% to 50.0%	Utilities	0	Yard
099A-1475-008-05	0.2	10.1% to 25.0%	Utilities	0	Yard
099A-1475-008-06	0.9	25.1% to 50.0%	Utilities	0	Yard
099A-1475-008-08	2.2	More than 75%	Utilities	0	Station
099A-1475-013-00	0.2	More than 75%	Governmental, Public	0	Station
099A-1475-014-00	4.1	More than 75%	Warehouse, Storage	0	Station
099A-1475-015-00	4.9	More than 75%	Warehouse, Storage	0	Station
099A-1475-017-00	2.3	More than 75%	Warehouse, Storage	0	Station
099A-1475-018-00	2.8	More than 75%	Warehouse, Storage	0	Yard
099A-1475-019-00	2.9	More than 75%	Warehouse, Storage	0	Yard
099A-1475-020-00	13.4	More than 75%	Warehouse, Storage	0	Yard

Potential Land Acquisition -- Alternative 2

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099A-1475-021-00	14.8	More than 75%	Warehouse, Storage	0	Yard
099A-1475-022-00	17.7	More than 75%	Warehouse, Storage	0	Yard
099A-1475-031-00	7.1	More than 75%	Warehouse, Storage	0	Yard
099A-1475-034-00	1.7	More than 75%	Warehouse, Storage	0	Station
099A-1475-035-00	1.3	More than 75%	Warehouse, Storage	0	Station
099A-1475-036-00	4.6	More than 75%	Vacant Industrial	0	Yard
099A-1475-041-00	5.3	More than 75%	Vacant Industrial	0	Yard
099A-2909-015-01	1.3	10.1% to 25.0%	Governmental, Public	0	ROW
099B-5600-004-22	0.0	More than 75%	Governmental, Public	0	Yard
099B-5600-004-23	1.6	51.1% to 75.0%	Utilities	0	Yard
099B-5600-004-24	145.1	Less than 1%	Residential Miscellaneous	0	Yard
099B-5600-006-03	0.1	51.1% to 75.0%	Utilities	0	Yard
099B-5600-006-04	5.1	10.1% to 25.0%	Utilities	0	Yard
099B-5751-003-00	5.0	More than 75%	Warehouse, Storage	0	Station
099B-5751-006-00	3.6	More than 75%	Warehouse, Storage	0	Station
099B-5751-007-00	3.0	More than 75%	Vacant Industrial	0	Station
099B-5760-002-22	2.1	More than 75%	Governmental, Public	0	Station
099B-5760-007-00	8.4	Less than 1%	Vacant Industrial	0	Station
099B-5760-010-00	1.4	More than 75%	Governmental, Public	0	Station
902 -0008-005-05	4.0	5.1% to 10.0%	Vacant Residential	0	ROW
902 -0008-005-08	0.6	10.1% to 25.0%	Single Family Residence	1	ROW
902 -0008-005-09	8.8	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
902 -0008-007-02	1.9	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
902 -0008-008-02	3.9	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
902 -0008-009-04	4.1	1.0% to 5.0%	Single Family Residence	1	ROW
902 -0008-010-04	3.8	1.0% to 5.0%	Vacant Commercial	0	ROW
902 -0008-011-06	1.8	10.1% to 25.0%	Vacant Miscellaneous	0	ROW
902 -0008-027-00	15.4	Less than 1%	Governmental, Public	0	ROW
903 -0010-036-00	36.4	1.0% to 5.0%	Governmental, Public	0	Station
903 -0010-037-00	71.6	1.0% to 5.0%	Vacant Residential	0	Station
904 -0001-001-10	35.4	1.0% to 5.0%	Vacant Commercial	0	ROW
904 -0001-003-18	3.2	Less than 1%	Vacant Industrial	0	ROW
904 -0001-008-00	11.8	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0002-006-00	257.7	Less than 1%	Governmental, Public	0	ROW
904 -0004-010-01	5.5	1.0% to 5.0%	Office Building	0	ROW
904 -0004-010-02	4.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
904 -0004-054-00	5.5	Less than 1%	Recreational	0	ROW
904 -0004-057-00	2.5	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0004-067-00	4.9	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0005-004-05	2.9	More than 75%	Vacant rural-res homesites	0	Station
904 -0011-003-00	1.2	Less than 1%	Governmental, Public	0	ROW
904-1-11-2	25.3	1.0% to 5.0%	Vacant	0	ROW
904-1-3-14	20.3	1.0% to 5.0%	Government/Institutional	0	ROW
904-1-9-7	17.0	1.0% to 5.0%	Vacant	0	ROW
904-1-9-8	24.7	1.0% to 5.0%	Vacant	0	ROW
905 -0001-005-02	49.5	1.0% to 5.0%	Vacant Industrial	0	ROW
905 -0001-006-03	51.5	1.0% to 5.0%	Residential Miscellaneous	0	ROW
905 -0009-012-01	3.9	5.1% to 10.0%	Vacant Industrial	0	ROW
905 -0009-013-03	11.3	Less than 1%	Vacant Industrial	0	ROW
905-1-1-2	110.0	Less than 1%	Agricultural	0	ROW
905-1-2-2	1.1	10.1% to 25.0%	Government/Institutional	0	ROW

Potential Land Acquisition -- Alternative 2					
APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
905-1-3-2	76.6	Less than 1%	Agricultural	0	ROW
905-1-4-3	8.8	1.0% to 5.0%	Residential	0	ROW
905-1-4-4	39.9	Less than 1%	Residential	0	ROW
905-15-17	2.8	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-15-18	2.9	Less than 1%	Vacant	0	ROW
905-9-27-1	15.3	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-9-43	2.4	5.1% to 10.0%	Commercial/Retail/Office	0	ROW
905-9-60	1.8	Less than 1%	Commercial/Retail/Office	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
985 -0027-002-00	136.0	Less than 1%	Vacant Commercial	0	ROW
985 -0027-003-00	1.2	10.1% to 25.0%	Vacant Commercial	0	ROW
985 -0027-004-00	0.8	1.0% to 5.0%	Vacant Industrial	0	ROW
985 -0027-005-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0249-001-04	0.4	1.0% to 5.0%	Vacant Residential	0	ROW
098 -0250-005-00	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0251-009-00	1.0	10.1% to 25.0%	Utilities	0	ROW
098 -0252-007-02	0.3	25.1% to 50.0%	Vacant rural-res homesites	0	ROW
098 -0253-003-01	0.3	10.1% to 25.0%	Multi-Family Dwelling (2-4 Unit)	4	ROW
098 -0253-004-00	0.0	25.1% to 50.0%	Vacant Residential	0	ROW
098 -0253-005-00	0.1	25.1% to 50.0%	Single Family Residence	3	ROW
098 -0253-006-00	0.2	25.1% to 50.0%	Single Family Residence	1	ROW
098 -0254-002-01	0.1	More than 75%	Quadruplex	4	Station
098 -0254-002-02	0.1	More than 75%	Quadruplex	4	Station
098 -0254-005-00	0.1	More than 75%	Mobile Home	1	Station
098 -0254-006-00	0.2	More than 75%	Triplex	3	Station
098 -0254-007-00	0.2	More than 75%	Duplex	2	Station
098 -0254-008-00	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0254-011-01	0.0	More than 75%	Governmental, Public	0	Station
098 -0254-013-00	0.6	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-001-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-002-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-02	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-04	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-06	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-08	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-12	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-13	1.5	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-004-00	0.8	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-005-01	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-03	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-05	0.7	More than 75%	Office Building	0	Station
098 -0260-006-03	0.0	More than 75%	Utilities	0	Station
098 -0260-006-04	0.8	More than 75%	Service Station, Gas Station	0	Station
098 -0260-007-02	0.3	More than 75%	Governmental, Public	0	Station
098 -0260-008-03	0.0	More than 75%	Service Station, Gas Station	0	Station
098 -0260-008-04	0.5	More than 75%	Service Station, Gas Station	0	Station
098 -0260-009-06	0.3	More than 75%	Store/Office Combo	0	Station
098 -0260-009-08	0.2	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-010-02	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-013-02	0.1	More than 75%	Utilities	0	Station
098 -0260-013-03	2.1	More than 75%	Governmental, Public	0	Station
098 -0260-014-01	0.2	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-015-01	0.6	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-016-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0260-016-02	0.3	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-017-01	0.0	More than 75%	Utilities	0	Station
098 -0260-017-02	1.3	More than 75%	Governmental, Public	0	Station
098 -0260-018-03	0.8	More than 75%	Governmental, Public	0	Station
098 -0260-018-04	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-018-05	0.0	More than 75%	Utilities	0	Station
098 -0260-019-01	0.9	More than 75%	Light Industrial	0	Station
098 -0260-019-02	0.8	More than 75%	Commercial Miscellaneous	0	Station
098 -0260-021-01	0.3	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-02	0.2	More than 75%	Quadruplex	4	Station

Potential Land Acquisition -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0260-021-03	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-04	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-05	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-06	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-07	0.2	More than 75%	Quadruplex	4	Station
098 -0260-022-03	0.6	More than 75%	Utilities	0	Station
098 -0260-022-04	1.4	More than 75%	Utilities	0	Station
098 -0260-022-05	0.1	More than 75%	Governmental, Public	0	Station
098 -0260-022-06	0.0	More than 75%	Governmental, Public	0	Station
098 -0264-001-01	0.3	More than 75%	Service Station, Gas Station	0	Station
098 -0264-001-05	1.7	More than 75%	Governmental, Public	0	Station
098 -0264-024-02	0.7	10.1% to 25.0%	Utilities	0	ROW
098 -0264-024-02	0.7	More than 75%	Utilities	0	Station
098 -0264-028-01	0.8	1.0% to 5.0%	Warehouse, Storage	0	ROW
098 -0275-015-04	0.3	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0275-016-04	0.9	25.1% to 50.0%	Utilities	0	ROW
098 -0280-001-01	0.0	More than 75%	Utilities	0	Station
098 -0280-001-02	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-002-01	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-002-02	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-003-01	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0280-004-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0280-007-07	0.3	More than 75%	Vacant Commercial	0	Station
098 -0280-008-03	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-008-07	0.0	More than 75%	Utilities	0	Station
098 -0280-008-08	0.0	More than 75%	Governmental, Public	0	Station
098 -0290-006-07	2.1	1.0% to 5.0%	Stores, Retail Outlet	0	ROW
098 -0290-007-02	1.1	50.1% to 75.0%	Utilities	0	ROW
098 -0290-008-02	1.4	25.1% to 50.0%	Utilities	0	ROW
098 -0290-009-02	1.2	50.1% to 75.0%	Utilities	0	ROW
098 -0290-017-02	0.2	10.1% to 25.0%	Stores, Retail Outlet	0	ROW
098 -0290-018-05	0.2	5.1% to 10.0%	Restaurant, Bar, Food Service	0	ROW
098 -0290-026-00	0.9	5.1% to 10.0%	Stores, Retail Outlet	0	ROW
098 -0291-001-00	1.0	Less than 1%	Commercial Miscellaneous	0	ROW
098 -0291-009-00	0.2	1.0% to 5.0%	Duplex	2	ROW
099 -0040-016-00	8.7	5.1% to 10.0%	Utilities	0	ROW
099 -0040-017-01	0.4	50.1% to 75.0%	Utilities	0	ROW
099 -0040-017-03	1.3	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0040-017-04	7.9	10.1% to 25.0%	Utilities	0	ROW
099 -0040-020-00	13.1	25.1% to 50.0%	Utilities	0	ROW
099 -0040-022-00	0.5	10.1% to 25.0%	Utilities	0	ROW
099 -0051-017-01	0.3	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0051-017-03	1.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
099 -0051-018-00	0.7	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-019-05	0.1	1.0% to 5.0%	Vacant Commercial	0	ROW
099 -0051-020-05	0.3	50.1% to 75.0%	Utilities	0	ROW
099 -0051-020-06	1.1	50.1% to 75.0%	Utilities	0	ROW
099 -0056-007-02	5.6	5.1% to 10.0%	Utilities	0	ROW
099 -0056-008-00	3.8	25.1% to 50.0%	Utilities	0	ROW
099 -0175-014-02	4.5	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-01	0.7	25.1% to 50.0%	Utilities	0	ROW

Potential Land Acquisition -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0175-019-02	6.1	10.1% to 25.0%	Utilities	0	ROW
099 -0176-007-02	18.4	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-03	0.5	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-04	0.2	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0185-003-00	4.0	10.1% to 25.0%	Utilities	0	ROW
099 -1326-039-00	8.4	Less than 1%	Light Industrial	0	Station
099A-1400-013-01	2.2	25.1% to 50.0%	Utilities	0	ROW
099A-1400-030-00	3.3	10.1% to 25.0%	Governmental, Public	0	ROW
099A-1475-001-06	0.3	More than 75%	Governmental, Public	0	Station
099A-1475-001-12	1.9	More than 75%	Governmental, Public	0	Station
099A-1475-001-13	0.1	More than 75%	Governmental, Public	0	Station
099A-1475-001-14	8.8	More than 75%	Warehouse, Storage	0	Station
099A-1475-004-08	3.1	10.1% to 25.0%	Industrial Miscellaneous	0	Yard
099A-1475-004-10	2.9	10.1% to 25.0%	Warehouse, Storage	0	Yard
099A-1475-004-12	2.0	10.1% to 25.0%	Light Industrial	0	Yard
099A-1475-004-13	0.2	More than 75%	Utilities	0	Yard
099A-1475-004-14	1.8	10.1% to 25.0%	Light Industrial	0	Yard
099A-1475-005-06	0.6	Less than 1%	Governmental, Public	0	ROW
099A-1475-005-06	0.6	More than 75%	Governmental, Public	0	Station
099A-1475-008-02	14.8	51.1% to 75.0%	Utilities	0	Station
099A-1475-008-03	4.4	Less than 1%	Utilities	0	ROW
099A-1475-008-03	4.4	25.1% to 50.0%	Utilities	0	Yard
099A-1475-008-05	0.2	10.1% to 25.0%	Utilities	0	Yard
099A-1475-008-06	0.9	25.1% to 50.0%	Utilities	0	Yard
099A-1475-008-08	2.2	More than 75%	Utilities	0	Station
099A-1475-013-00	0.2	More than 75%	Governmental, Public	0	Station
099A-1475-014-00	4.1	More than 75%	Warehouse, Storage	0	Station
099A-1475-015-00	4.9	More than 75%	Warehouse, Storage	0	Station
099A-1475-017-00	2.3	More than 75%	Warehouse, Storage	0	Station
099A-1475-018-00	2.8	More than 75%	Warehouse, Storage	0	Yard
099A-1475-019-00	2.9	More than 75%	Warehouse, Storage	0	Yard
099A-1475-020-00	13.4	More than 75%	Warehouse, Storage	0	Yard
099A-1475-021-00	14.8	More than 75%	Warehouse, Storage	0	Yard
099A-1475-022-00	17.7	More than 75%	Warehouse, Storage	0	Yard
099A-1475-031-00	7.1	More than 75%	Warehouse, Storage	0	Yard
099A-1475-034-00	1.7	More than 75%	Warehouse, Storage	0	Station
099A-1475-035-00	1.3	More than 75%	Warehouse, Storage	0	Station
099A-1475-036-00	4.6	More than 75%	Vacant Industrial	0	Yard
099A-1475-041-00	5.3	More than 75%	Vacant Industrial	0	Yard
099A-2909-015-01	1.3	25.1% to 50.0%	Governmental, Public	0	ROW
099B-5600-004-22	0.0	More than 75%	Governmental, Public	0	Yard
099B-5600-004-23	1.6	51.1% to 75.0%	Utilities	0	Yard
099B-5600-004-24	145.1	Less than 1%	Residential Miscellaneous	0	Yard
099B-5600-006-03	0.1	51.1% to 75.0%	Utilities	0	Yard
099B-5600-006-04	5.1	10.1% to 25.0%	Utilities	0	Yard
099B-5751-003-00	5.0	More than 75%	Warehouse, Storage	0	Station
099B-5751-006-00	3.6	More than 75%	Warehouse, Storage	0	Station
099B-5751-007-00	3.0	More than 75%	Vacant Industrial	0	Station
099B-5760-002-22	2.1	More than 75%	Governmental, Public	0	Station
099B-5760-007-00	8.4	Less than 1%	Vacant Industrial	0	Station
099B-5760-010-00	1.4	More than 75%	Governmental, Public	0	Station

Potential Land Acquisition -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
904 -0001-002-12	5.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0001-003-23	15.0	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-004-02	4.3	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-006-01	1.3	5.1% to 10.0%	Governmental, Public	0	ROW
904 -0001-006-03	1.4	25.1% to 50.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-06	4.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-08	56.9	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-18	45.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-21	3.4	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
904 -0001-007-24	25.1	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-009-05	0.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-009-06	11.9	Less than 1%	Vacant Industrial	0	ROW
904 -0001-010-00	35.2	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-013-00	0.1	10.1% to 25.0%	Governmental, Public	0	ROW
904 -0009-001-00	214.7	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0009-003-00	4.9	5.1% to 10.0%	Utilities	0	ROW
904 -0010-002-02	70.8	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0010-002-06	6.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0010-005-00	5.7	25.1% to 50.0%	Utilities	0	ROW
904 -0010-007-00	1.1	1.0% to 5.0%	Vacant Industrial	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
946 -1350-003-05	239.5	Less than 1%	Governmental, Public	0	ROW
946 -1350-004-00	1.7	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1350-005-03	148.4	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
946 -1350-006-02	64.0	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW

Potential Land Acquisition -- Alternative 2a					
APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 3

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
097 -0136-005-00	2.6	10.1% to 25.0%	Governmental, Public	0	ROW
098 -0210-002-02	1.2	1.0% to 5.0%	Multi-Family Dwelling (2-4 Unit)	**0**	ROW
098 -0210-002-03	9.4	Less than 1%	Governmental, Public	0	ROW
098 -0210-004-11	0.5	Less than 1%	Multi-Family Dwelling (2-4 Unit)	**0**	ROW
098 -0210-007-02	0.8	5.1% to 10.0%	Multi-Family Dwelling (2-4 Unit)	**0**	ROW
098 -0210-008-03	0.2	1.0% to 5.0%	Multi-Family Dwelling (2-4 Unit)	**0**	ROW
098 -0254-008-00	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0254-011-01	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-005-05	0.7	More than 75%	Office Building	0	Station
098 -0260-006-03	0.0	More than 75%	Utilities	0	Station
098 -0260-006-04	0.8	More than 75%	Service Station, Gas Station	0	Station
098 -0260-007-02	0.3	More than 75%	Governmental, Public	0	Station
098 -0260-008-03	0.0	More than 75%	Service Station, Gas Station	0	Station
098 -0260-008-04	0.5	More than 75%	Service Station, Gas Station	0	Station
098 -0260-009-06	0.3	More than 75%	Store/Office Combo	0	Station
098 -0260-009-08	0.2	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-010-02	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-013-02	0.1	More than 75%	Utilities	0	Station
098 -0260-013-03	2.1	More than 75%	Governmental, Public	0	Station
098 -0260-014-01	0.2	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-015-01	0.6	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-016-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0260-016-02	0.3	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-017-01	0.0	More than 75%	Utilities	0	Station
098 -0260-017-02	1.3	More than 75%	Governmental, Public	0	Station
098 -0260-018-03	0.8	More than 75%	Governmental, Public	0	Station
098 -0260-018-04	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-018-05	0.0	More than 75%	Utilities	0	Station
098 -0260-019-01	0.9	More than 75%	Light Industrial	0	Station
098 -0260-019-02	0.8	More than 75%	Commercial Miscellaneous	0	Station
098 -0260-022-03	0.6	More than 75%	Utilities	0	Station
098 -0260-022-04	1.4	More than 75%	Utilities	0	Station
098 -0260-022-05	0.1	More than 75%	Governmental, Public	0	Station
098 -0260-022-06	0.0	More than 75%	Governmental, Public	0	Station
098 -0264-001-01	0.3	More than 75%	Service Station, Gas Station	0	Station
098 -0264-001-05	1.7	More than 75%	Governmental, Public	0	Station
098 -0264-001-09	0.8	1.0% to 5.0%	Religious	0	ROW
098 -0264-001-10	1.1	1.0% to 5.0%	Multi-Family Dwelling (2-4 Unit)	**0**	ROW
098 -0264-001-17	27.4	Less than 1%	Governmental, Public	0	ROW
098 -0264-004-01	1.2	Less than 1%	Hospitals,Convalescent,Homes	0	Yard
098 -0264-024-02	0.7	More than 75%	Utilities	0	Station
098 -0264-028-01	0.8	25.1% to 50.0%	Warehouse, Storage	0	Yard
098 -0275-009-06	5.1	10.1% to 25.0%	Service Station, Gas Station	0	ROW
098 -0275-012-00	0.5	10.1% to 25.0%	Commercial Miscellaneous	0	ROW
098 -0275-015-04	0.3	More than 75%	Stores, Retail Outlet	0	Yard
098 -0275-016-04	0.9	51.1% to 75.0%	Utilities	0	Yard
098 -0280-001-01	0.0	More than 75%	Utilities	0	Station
098 -0280-001-02	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-002-01	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-002-02	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-003-01	0.3	More than 75%	Stores, Retail Outlet	0	Station

Potential Land Acquisition -- Alternative 3

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0280-004-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0280-007-07	0.3	More than 75%	Vacant Commercial	0	Station
098 -0280-008-03	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-008-07	0.0	More than 75%	Utilities	0	Station
098 -0280-008-08	0.0	More than 75%	Governmental, Public	0	Station
099 -0040-014-22	5.1	More than 75%	Service Station, Gas Station	0	Yard
099 -0040-015-01	0.2	10.1% to 25.0%	Governmental, Public	0	Yard
099 -0040-015-05	1.6	More than 75%	Warehouse, Storage	0	Yard
099 -0040-019-10	8.8	More than 75%	Utilities	0	Yard
099 -0040-020-00	13.1	25.1% to 50.0%	Utilities	0	Yard
099 -0040-048-00	1.7	51.1% to 75.0%	Warehouse, Storage	0	Yard
099 -0040-055-00	1.7	More than 75%	Warehouse, Storage	0	Yard
099 -0040-056-00	1.9	More than 75%	Warehouse, Storage	0	Yard
099 -0040-057-00	1.6	More than 75%	Vacant Commercial	0	Yard
099 -0040-058-01	1.7	More than 75%	Warehouse, Storage	0	Yard
099 -0051-014-00	2.1	More than 75%	Warehouse, Storage	0	Yard
099 -0051-015-01	1.5	1.0% to 5.0%	Governmental, Public	0	Yard
099 -0051-015-02	2.2	25.1% to 50.0%	Light Industrial	0	Yard
099 -0051-016-01	0.4	25.1% to 50.0%	Governmental, Public	0	Yard
099 -0051-017-01	0.3	51.1% to 75.0%	Governmental, Public	0	Yard
099 -0051-017-03	1.4	25.1% to 50.0%	Warehouse, Storage	0	Yard
099 -0051-018-00	0.7	25.1% to 50.0%	Vacant Commercial	0	Yard
099 -0051-019-03	0.1	More than 75%	Utilities	0	Yard
099 -0051-019-04	1.5	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0051-019-04	1.5	5.1% to 10.0%	Governmental, Public	0	Yard
099 -0051-019-05	0.1	25.1% to 50.0%	Vacant Commercial	0	Yard
099 -0051-020-04	0.5	25.1% to 50.0%	Utilities	0	Yard
099 -0051-020-05	0.3	51.1% to 75.0%	Utilities	0	Yard
099 -0051-020-06	1.1	More than 75%	Utilities	0	Yard
099 -0051-021-01	2.4	25.1% to 50.0%	Governmental, Public	0	ROW
099 -0056-002-00	3.7	51.1% to 75.0%	Hotel/Motel	0	Yard
099 -0056-003-02	7.5	More than 75%	Utilities	0	Yard
099 -0056-003-09	0.9	1.0% to 5.0%	Hotel/Motel	0	Yard
099 -0056-003-11	0.3	5.1% to 10.0%	Stores, Retail Outlet	0	Yard
099 -0056-003-13	0.7	1.0% to 5.0%	Stores, Retail Outlet	0	Yard
099 -0056-004-10	2.3	51.1% to 75.0%	Miscallaneous Industrial	0	Yard
099 -0056-007-01	0.1	More than 75%	Utilities	0	Yard
099 -0056-007-02	5.6	More than 75%	Utilities	0	Yard
099 -0056-008-00	3.8	25.1% to 50.0%	Utilities	0	Yard
099 -0056-009-01	1.9	51.1% to 75.0%	Auto Sales, Services	0	Yard
099 -0056-010-02	4.6	51.1% to 75.0%	Auto Sales, Services	0	Yard
099 -0100-009-04	1.0	1.0% to 5.0%	Mobile Home Parks, Trailer Parks	0	ROW
099 -0130-002-02	15.1	Less than 1%	Mobile Home Parks, Trailer Parks	0	ROW
099 -1374-001-00	0.5	10.1% to 25.0%	Governmental, Public	0	Yard
099 -1374-002-00	1.3	Less than 1%	Vacant Industrial	0	Yard
903 -0010-036-00	36.4	1.0% to 5.0%	Governmental, Public	0	Station
903 -0010-037-00	71.6	1.0% to 5.0%	Vacant Residential	0	Station
904 -0001-001-10	35.4	1.0% to 5.0%	Vacant Commercial	0	ROW
904 -0001-003-18	3.2	Less than 1%	Vacant Industrial	0	ROW
904 -0001-008-00	11.8	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0002-006-00	257.7	Less than 1%	Governmental, Public	0	ROW

Potential Land Acquisition -- Alternative 3

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
904 -0004-010-01	5.5	1.0% to 5.0%	Office Building	0	ROW
904 -0004-010-02	4.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
904 -0004-054-00	5.5	Less than 1%	Recreational	0	ROW
904 -0004-057-00	2.5	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0004-067-00	4.9	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0005-004-05	2.9	More than 75%	Vacant rural-res homesites	0	Station
904 -0011-003-00	1.2	Less than 1%	Governmental, Public	0	ROW
904-1-11-2	25.3	1.0% to 5.0%	Vacant	0	ROW
904-1-3-14	20.3	1.0% to 5.0%	Government/Institutional	0	ROW
904-1-9-7	17.0	1.0% to 5.0%	Vacant	0	ROW
904-1-9-8	24.7	1.0% to 5.0%	Vacant	0	ROW
905 -0001-005-02	49.5	1.0% to 5.0%	Vacant Industrial	0	ROW
905 -0001-006-03	51.5	1.0% to 5.0%	Residential Miscellaneous	0	ROW
905 -0009-012-01	3.9	5.1% to 10.0%	Vacant Industrial	0	ROW
905 -0009-013-03	11.3	Less than 1%	Vacant Industrial	0	ROW
905-1-1-2	110.0	Less than 1%	Agricultural	0	ROW
905-1-2-2	1.1	10.1% to 25.0%	Government/Institutional	0	ROW
905-1-3-2	76.6	Less than 1%	Agricultural	0	ROW
905-1-4-3	8.8	1.0% to 5.0%	Residential	0	ROW
905-1-4-4	39.9	Less than 1%	Residential	0	ROW
905-15-17	2.8	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-15-18	2.9	Less than 1%	Vacant	0	ROW
905-9-27-1	15.3	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-9-43	2.4	5.1% to 10.0%	Commercial/Retail/Office	0	ROW
905-9-60	1.8	Less than 1%	Commercial/Retail/Office	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
985 -0027-002-00	136.0	Less than 1%	Vacant Commercial	0	ROW
985 -0027-003-00	1.2	10.1% to 25.0%	Vacant Commercial	0	ROW
985 -0027-004-00	0.8	1.0% to 5.0%	Vacant Industrial	0	ROW
985 -0027-005-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 3					
APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0210-005-04	0.2	5.1% to 10.0%	Single Family Residence	1	ROW
098 -0254-005-00	0.1	More than 75%	Mobile Home	1	Station
098 -0260-001-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-002-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-02	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-04	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-06	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-08	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-12	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-005-01	0.2	More than 75%	Single Family Residence	1	Station
098 -0260-005-03	0.2	More than 75%	Single Family Residence	1	Station
098 -0275-011-00	0.3	25.1% to 50.0%	Single Family Residence	1	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
098 -0254-007-00	0.2	More than 75%	Duplex	2	Station
098 -0254-006-00	0.2	More than 75%	Triplex	3	Station
098 -0254-002-01	0.1	More than 75%	Quadruplex	4	Station
098 -0254-002-02	0.1	More than 75%	Quadruplex	4	Station
098 -0254-013-00	0.6	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-003-13	1.5	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-004-00	0.8	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-01	0.3	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-02	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-03	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-04	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-05	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-06	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-07	0.2	More than 75%	Quadruplex	4	Station
098 -0264-003-00	0.8	5.1% to 10.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard
098 -0264-023-00	0.3	25.1% to 50.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard
099 -0056-006-02	2.4	51.1% to 75.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard

Potential Land Acquisition -- Alternative 3a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0254-008-00	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0254-011-01	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-005-05	0.7	More than 75%	Office Building	0	Station
098 -0260-006-03	0.0	More than 75%	Utilities	0	Station
098 -0260-006-04	0.8	More than 75%	Service Station, Gas Station	0	Station
098 -0260-007-02	0.3	More than 75%	Governmental, Public	0	Station
098 -0260-008-03	0.0	More than 75%	Service Station, Gas Station	0	Station
098 -0260-008-04	0.5	More than 75%	Service Station, Gas Station	0	Station
098 -0260-009-06	0.3	More than 75%	Store/Office Combo	0	Station
098 -0260-009-08	0.2	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-010-02	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-013-02	0.1	More than 75%	Utilities	0	Station
098 -0260-013-03	2.1	More than 75%	Governmental, Public	0	Station
098 -0260-014-01	0.2	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-015-01	0.6	More than 75%	Stores, Retail Outlet	0	Station
098 -0260-016-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0260-016-02	0.3	More than 75%	Medical/Dental/Professional Bldg	0	Station
098 -0260-017-01	0.0	More than 75%	Utilities	0	Station
098 -0260-017-02	1.3	More than 75%	Governmental, Public	0	Station
098 -0260-018-03	0.8	More than 75%	Governmental, Public	0	Station
098 -0260-018-04	0.0	More than 75%	Governmental, Public	0	Station
098 -0260-018-05	0.0	More than 75%	Utilities	0	Station
098 -0260-019-01	0.9	More than 75%	Light Industrial	0	Station
098 -0260-019-02	0.8	More than 75%	Commercial Miscellaneous	0	Station
098 -0260-022-03	0.6	More than 75%	Utilities	0	Station
098 -0260-022-04	1.4	More than 75%	Utilities	0	Station
098 -0260-022-05	0.1	More than 75%	Governmental, Public	0	Station
098 -0260-022-06	0.0	More than 75%	Governmental, Public	0	Station
098 -0264-001-01	0.3	More than 75%	Service Station, Gas Station	0	Station
098 -0264-001-05	1.7	More than 75%	Governmental, Public	0	Station
098 -0264-004-01	1.2	Less than 1%	Hospitals,Convalescent,Homes	0	Yard
098 -0264-024-02	0.7	More than 75%	Utilities	0	Station
098 -0264-028-01	0.8	25.1% to 50.0%	Warehouse, Storage	0	Yard
098 -0275-015-04	0.3	More than 75%	Stores, Retail Outlet	0	Yard
098 -0275-016-04	0.9	51.1% to 75.0%	Utilities	0	Yard
098 -0280-001-01	0.0	More than 75%	Utilities	0	Station
098 -0280-001-02	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-002-01	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-002-02	0.2	More than 75%	Governmental, Public	0	Station
098 -0280-003-01	0.3	More than 75%	Stores, Retail Outlet	0	Station
098 -0280-004-01	0.2	More than 75%	Service Station, Gas Station	0	Station
098 -0280-007-07	0.3	More than 75%	Vacant Commercial	0	Station
098 -0280-008-03	0.1	More than 75%	Governmental, Public	0	Station
098 -0280-008-07	0.0	More than 75%	Utilities	0	Station
098 -0280-008-08	0.0	More than 75%	Governmental, Public	0	Station
098 -0290-007-01	0.6	25.1% to 50.0%	Utilities	0	ROW
098 -0290-007-02	1.1	25.1% to 50.0%	Utilities	0	ROW
098 -0290-008-01	0.8	25.1% to 50.0%	Utilities	0	ROW
098 -0290-008-02	1.4	25.1% to 50.0%	Utilities	0	ROW
098 -0290-009-02	1.2	25.1% to 50.0%	Utilities	0	ROW
098 -0290-009-05	0.6	10.1% to 25.0%	Utilities	0	ROW

Potential Land Acquisition -- Alternative 3a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0040-014-22	5.1	More than 75%	Service Station, Gas Station	0	Yard
099 -0040-015-01	0.2	10.1% to 25.0%	Governmental, Public	0	Yard
099 -0040-015-05	1.6	More than 75%	Warehouse, Storage	0	Yard
099 -0040-019-10	8.8	More than 75%	Utilities	0	Yard
099 -0040-020-00	13.1	25.1% to 50.0%	Utilities	0	Yard
099 -0040-048-00	1.7	51.1% to 75.0%	Warehouse, Storage	0	Yard
099 -0040-055-00	1.7	More than 75%	Warehouse, Storage	0	Yard
099 -0040-056-00	1.9	More than 75%	Warehouse, Storage	0	Yard
099 -0040-057-00	1.6	More than 75%	Vacant Commercial	0	Yard
099 -0040-058-01	1.7	More than 75%	Warehouse, Storage	0	Yard
099 -0051-014-00	2.1	More than 75%	Warehouse, Storage	0	Yard
099 -0051-015-01	1.5	1.0% to 5.0%	Governmental, Public	0	Yard
099 -0051-015-02	2.2	25.1% to 50.0%	Light Industrial	0	Yard
099 -0051-016-01	0.4	25.1% to 50.0%	Governmental, Public	0	Yard
099 -0051-017-01	0.3	51.1% to 75.0%	Governmental, Public	0	Yard
099 -0051-017-03	1.4	25.1% to 50.0%	Warehouse, Storage	0	Yard
099 -0051-018-00	0.7	25.1% to 50.0%	Vacant Commercial	0	Yard
099 -0051-019-03	0.1	More than 75%	Utilities	0	Yard
099 -0051-019-04	1.5	5.1% to 10.0%	Governmental, Public	0	Yard
099 -0051-019-05	0.1	25.1% to 50.0%	Vacant Commercial	0	Yard
099 -0051-020-04	0.5	25.1% to 50.0%	Utilities	0	Yard
099 -0051-020-05	0.3	51.1% to 75.0%	Utilities	0	Yard
099 -0051-020-06	1.1	More than 75%	Utilities	0	Yard
099 -0056-002-00	3.7	51.1% to 75.0%	Hotel/Motel	0	Yard
099 -0056-003-02	7.5	More than 75%	Utilities	0	Yard
099 -0056-003-09	0.9	1.0% to 5.0%	Hotel/Motel	0	Yard
099 -0056-003-11	0.3	5.1% to 10.0%	Stores, Retail Outlet	0	Yard
099 -0056-003-13	0.7	1.0% to 5.0%	Stores, Retail Outlet	0	Yard
099 -0056-004-10	2.3	51.1% to 75.0%	Miscallaneous Industrial	0	Yard
099 -0056-007-01	0.1	More than 75%	Utilities	0	Yard
099 -0056-007-02	5.6	More than 75%	Utilities	0	Yard
099 -0056-008-00	3.8	25.1% to 50.0%	Utilities	0	Yard
099 -0056-009-01	1.9	51.1% to 75.0%	Auto Sales, Services	0	Yard
099 -0056-010-02	4.6	51.1% to 75.0%	Auto Sales, Services	0	Yard
099 -0175-014-02	4.5	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-01	0.7	25.1% to 50.0%	Utilities	0	ROW
099 -0175-019-02	6.1	10.1% to 25.0%	Utilities	0	ROW
099 -0176-007-02	18.4	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-03	0.5	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0176-007-04	0.2	5.1% to 10.0%	Governmental, Public	0	ROW
099 -0185-003-00	4.0	10.1% to 25.0%	Utilities	0	ROW
099 -1374-001-00	0.5	10.1% to 25.0%	Governmental, Public	0	Yard
099 -1374-002-00	1.3	Less than 1%	Vacant Industrial	0	Yard
904 -0001-002-12	5.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0001-003-23	15.0	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-004-02	4.3	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-006-01	1.3	5.1% to 10.0%	Governmental, Public	0	ROW
904 -0001-006-03	1.4	25.1% to 50.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-06	4.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-08	56.9	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-18	45.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW

Potential Land Acquisition -- Alternative 3a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
904 -0001-007-21	3.4	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
904 -0001-007-24	25.1	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-009-05	0.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-009-06	11.9	Less than 1%	Vacant Industrial	0	ROW
904 -0001-010-00	35.2	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-013-00	0.1	10.1% to 25.0%	Governmental, Public	0	ROW
904 -0007-003-02	49.0	25.1% to 50.0%	Mineral, Quarries, Mining	0	Station
904 -0009-001-00	214.7	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0009-003-00	4.9	5.1% to 10.0%	Utilities	0	ROW
904 -0010-002-02	70.8	25.1% to 50.0%	Agricultural Miscellaneous	0	Station
904 -0010-002-03	0.2	More than 75%	Utilities	0	Station
904 -0010-002-06	6.9	Less than 1%	Governmental, Public	0	ROW
904 -0010-002-06	6.9	5.1% to 10.0%	Governmental, Public	0	Station
904 -0010-005-00	5.7	Less than 1%	Utilities	0	ROW
904 -0010-005-00	5.7	More than 75%	Utilities	0	Station
904 -0010-006-00	6.1	More than 75%	Utilities	0	Station
904 -0010-007-00	1.1	1.0% to 5.0%	Vacant Industrial	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
946 -1350-003-05	239.5	Less than 1%	Governmental, Public	0	ROW
946 -1350-005-03	148.4	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
946 -1350-006-02	64.0	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW
098 -0254-005-00	0.1	More than 75%	Mobile Home	1	Station
098 -0260-001-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-002-00	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-02	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-04	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-06	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-08	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-003-12	0.1	More than 75%	Single Family Residence	1	Station
098 -0260-005-01	0.2	More than 75%	Single Family Residence	1	Station

Potential Land Acquisition -- Alternative 3a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 -0260-005-03	0.2	More than 75%	Single Family Residence	1	Station
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1350-004-00	1.7	10.1% to 25.0%	Single Family Residence	1	ROW
098 -0254-007-00	0.2	More than 75%	Duplex	2	Station
098 -0254-006-00	0.2	More than 75%	Triplex	3	Station
098 -0254-002-01	0.1	More than 75%	Quadruplex	4	Station
098 -0254-002-02	0.1	More than 75%	Quadruplex	4	Station
098 -0254-013-00	0.6	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-003-13	1.5	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-004-00	0.8	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-01	0.3	More than 75%	Multi-Family Dwelling (2-4 Unit)	4	Station
098 -0260-021-02	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-03	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-04	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-05	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-06	0.2	More than 75%	Quadruplex	4	Station
098 -0260-021-07	0.2	More than 75%	Quadruplex	4	Station
098 -0264-003-00	0.8	5.1% to 10.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard
098 -0264-023-00	0.3	25.1% to 50.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard
099 -0056-006-02	2.4	51.1% to 75.0%	Multi-Family Dwelling (2-4 Unit)	4	Yard

Potential Land Acquisition -- Alternative 4

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
903 -0010-036-00	36.4	1.0% to 5.0%	Governmental, Public	0	Station
903 -0010-037-00	71.6	1.0% to 5.0%	Vacant Residential	0	Station
904 -0001-001-10	35.4	1.0% to 5.0%	Vacant Commercial	0	ROW
904 -0001-003-18	3.2	Less than 1%	Vacant Industrial	0	ROW
904 -0001-008-00	11.8	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0002-006-00	257.7	Less than 1%	Governmental, Public	0	ROW
904 -0004-010-01	5.5	1.0% to 5.0%	Office Building	0	ROW
904 -0004-010-02	4.4	1.0% to 5.0%	Warehouse, Storage	0	ROW
904 -0004-054-00	5.5	Less than 1%	Recreational	0	ROW
904 -0004-057-00	2.5	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0004-067-00	4.9	1.0% to 5.0%	Vacant Industrial	0	ROW
904 -0005-004-05	2.9	More than 75%	Vacant rural-res homesites	0	Station
904 -0011-003-00	1.2	Less than 1%	Governmental, Public	0	ROW
904-1-11-2	25.3	1.0% to 5.0%	Vacant	0	ROW
904-1-3-14	20.3	1.0% to 5.0%	Government/Institutional	0	ROW
904-1-9-7	17.0	1.0% to 5.0%	Vacant	0	ROW
904-1-9-8	24.7	1.0% to 5.0%	Vacant	0	ROW
905 -0001-005-02	49.5	1.0% to 5.0%	Vacant Industrial	0	ROW
905 -0001-006-03	51.5	1.0% to 5.0%	Residential Miscellaneous	0	ROW
905 -0009-012-01	3.9	5.1% to 10.0%	Vacant Industrial	0	ROW
905 -0009-013-03	11.3	Less than 1%	Vacant Industrial	0	ROW
905-1-1-2	110.0	Less than 1%	Agricultural	0	ROW
905-1-2-2	1.1	10.1% to 25.0%	Government/Institutional	0	ROW
905-1-3-2	76.6	Less than 1%	Agricultural	0	ROW
905-1-4-3	8.8	1.0% to 5.0%	Residential	0	ROW
905-1-4-4	39.9	Less than 1%	Residential	0	ROW
905-15-17	2.8	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-15-18	2.9	Less than 1%	Vacant	0	ROW
905-9-27-1	15.3	1.0% to 5.0%	Commercial/Retail/Office	0	ROW
905-9-43	2.4	5.1% to 10.0%	Commercial/Retail/Office	0	ROW
905-9-60	1.8	Less than 1%	Commercial/Retail/Office	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
985 -0027-002-00	136.0	Less than 1%	Vacant Commercial	0	ROW
985 -0027-003-00	1.2	10.1% to 25.0%	Vacant Commercial	0	ROW
985 -0027-004-00	0.8	1.0% to 5.0%	Vacant Industrial	0	ROW

Potential Land Acquisition -- Alternative 4

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
985 -0027-005-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Potential Land Acquisition -- Alternative 5

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 -0175-019-02	6.1	5.1% to 10.0%	Utilities	0	ROW
099 -0176-007-02	18.4	1.0% to 5.0%	Governmental, Public	0	ROW
099 -0176-007-03	0.5	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0176-007-04	0.2	10.1% to 25.0%	Governmental, Public	0	ROW
099 -0185-003-00	4.0	25.1% to 50.0%	Utilities	0	ROW
904 -0001-002-12	5.0	1.0% to 5.0%	Agricultural Miscellaneous	0	ROW
904 -0001-003-23	15.0	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-004-02	4.3	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-006-01	1.3	5.1% to 10.0%	Governmental, Public	0	ROW
904 -0001-006-03	1.4	25.1% to 50.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-06	4.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-08	56.9	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-18	45.6	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-007-21	3.4	5.1% to 10.0%	Agricultural Miscellaneous	0	ROW
904 -0001-007-24	25.1	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0001-009-05	0.9	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-009-06	11.9	Less than 1%	Vacant Industrial	0	ROW
904 -0001-010-00	35.2	1.0% to 5.0%	Governmental, Public	0	ROW
904 -0001-013-00	0.1	10.1% to 25.0%	Governmental, Public	0	ROW
904 -0007-003-02	49.0	25.1% to 50.0%	Mineral, Quarries, Mining	0	Station
904 -0009-001-00	214.7	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
904 -0009-003-00	4.9	5.1% to 10.0%	Utilities	0	ROW
904 -0010-002-02	70.8	25.1% to 50.0%	Agricultural Miscellaneous	0	Station
904 -0010-002-03	0.2	More than 75%	Utilities	0	Station
904 -0010-002-06	6.9	Less than 1%	Governmental, Public	0	ROW
904 -0010-002-06	6.9	5.1% to 10.0%	Governmental, Public	0	Station
904 -0010-005-00	5.7	1.0% to 5.0%	Utilities	0	ROW
904 -0010-005-00	5.7	More than 75%	Utilities	0	Station
904 -0010-006-00	6.1	More than 75%	Utilities	0	Station
904 -0010-007-00	1.1	1.0% to 5.0%	Vacant Industrial	0	ROW
941 -2779-009-00	15.5	Less than 1%	Shopping Center	0	ROW
941 -2780-013-00	0.2	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-014-00	0.1	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-015-00	0.0	50.1% to 75.0%	Vacant Commercial	0	ROW
941 -2780-024-00	10.7	Less than 1%	Governmental, Public	0	ROW
946 -1100-021-03	1.0	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1100-022-02	2.2	10.1% to 25.0%	Auto Sales, Services	0	ROW
946 -1100-023-02	5.7	Less than 1%	Auto Sales, Services	0	ROW
946 -1122-040-00	0.3	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-035-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-036-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-043-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-044-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-051-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1125-052-00	0.4	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1126-124-00	0.8	25.1% to 50.0%	Governmental, Public	0	ROW
946 -1128-003-09	124.3	1.0% to 5.0%	Governmental, Public	0	ROW
946 -1350-003-05	239.5	Less than 1%	Governmental, Public	0	ROW
946 -1350-004-00	1.7	10.1% to 25.0%	Single Family Residence	1	ROW
946 -1350-005-03	148.4	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
946 -1350-006-02	64.0	1.0% to 5.0%	Mineral, Quarries, Mining	0	ROW
985 -0027-009-02	38.8	1.0% to 5.0%	Vacant Commercial	0	ROW

Potential Land Acquisition -- Alternative 5

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
985 -0027-009-03	33.9	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-001-00	0.0	More than 75%	Vacant Residential	0	ROW
985 -0061-004-00	10.7	1.0% to 5.0%	Vacant Residential	0	ROW
985 -0061-005-00	16.0	1.0% to 5.0%	Vacant Commercial	0	ROW
985 -0061-007-00	12.3	Less than 1%	Stores, Retail Outlet	0	ROW
985 -0061-009-00	2.8	Less than 1%	Vacant Commercial	0	ROW
986 -0016-004-00	7.6	5.1% to 10.0%	Vacant Commercial	0	ROW
986 -0016-013-00	6.7	1.0% to 5.0%	Office Building	0	ROW
986 -0016-018-00	7.1	1.0% to 5.0%	Governmental, Public	0	ROW
986 -0016-023-00	3.3	Less than 1%	Vacant Commercial	0	ROW
986 -0016-024-00	15.8	Less than 1%	Auto Sales, Services	0	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 132602600	6.8	5.1% to 10%	Industrial	0	ROW
099B560000801	2.0	10.1% to 25.0%	Industrial	0	ROW
099B575304500	6.5	5.1% to 10%	Industrial	0	ROW
099B575302300	3.6	1.0% to 5.0%	Industrial	0	ROW
099B575300700	4.8	10.1% to 25.0%	Industrial	0	ROW
099B560000903	17.6	1.0% to 5.0%	Industrial	0	ROW
099 132601300	2.5	10.1% to 25.0%	Industrial	0	ROW
099 132601400	2.5	10.1% to 25.0%	Industrial	0	ROW
099 132602500	1.3	10.1% to 25.0%	Industrial	0	ROW
099 132603100	1.9	5.1% to 10%	Industrial	0	ROW
099 132603900	5.7	5.1% to 10%	Industrial	0	ROW
099 134901401	4.0	Less than 1%	Industrial	0	ROW
099 132602700	3.0	10.1% to 25.0%	Industrial	0	ROW
099B568500700	24.0	5.1% to 10%	Agricultural	0	ROW
099 134900500	2.5	5.1% to 10%	Industrial	0	ROW
099B812500201	44.2	1.0% to 5.0%	Industrial	0	ROW
099B575306500	5.7	1.0% to 5.0%	Industrial	0	ROW
099B570000138	11.9	1.0% to 5.0%	Agricultural	0	ROW
098 035608700	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 035608600	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 029000413	0.2	25.1% to 50.0%	Residential	TBD	ROW
098 029000416	0.6	10.1% to 25.0%	Vacant	0	ROW
098 035608900	0.1	Less than 1%	Residential	TBD	ROW
098 035608500	0.2	10.1% to 25.0%	Residential	TBD	ROW
098 029000411	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 035609000	0.1	Less than 1%	Residential	TBD	ROW
098 035608800	0.1	Less than 1%	Residential	TBD	ROW
098 029000412	0.2	10.1% to 25.0%	Residential	TBD	ROW
098 035610301	0.1	5.1% to 10%	Residential	TBD	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 029100900	0.2	25.1% to 50.0%	Residential	TBD	ROW
098 025000500	0.7	25.1% to 50.0%	Vacant	0	ROW
098 029100100	1.0	5.1% to 10%	Mixed Use	0	ROW
098 029000607	2.1	10.1% to 25.0%	Mixed Use	0	ROW
098 025300500	0.1	50.1% to 75%	Residential	TBD	ROW
098 029000413	0.2	Less than 1%	Residential	TBD	ROW
098 025100900	1.0	10.1% to 25.0%	Vacant	0	ROW
098 025300301	0.3	25.1% to 50.0%	Residential	TBD	ROW
098 025300600	0.2	50.1% to 75%	Residential	TBD	ROW
098 029001805	0.2	10.1% to 25.0%	Mixed Use	0	ROW
098 029002600	0.9	10.1% to 25.0%	Mixed Use	0	ROW
098 024900104	0.4	5.1% to 10%	Mixed Use	0	ROW
098 029001702	0.2	25.1% to 50.0%	Mixed Use	0	ROW
098 025300400	0.0	More than 75%	Residential	TBD	ROW
098 025200702	0.3	50.1% to 75%	Commercial	0	ROW
099 005101701	0.3	25.1% to 50.0%	Commercial	0	Rail Yard
098 026402300	0.3	5.1% to 10%	Residential	TBD	Rail Yard
099 005101800	0.7	10.1% to 25.0%	Commercial	0	Rail Yard
098 026402801	0.8	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101703	1.4	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101905	0.1	10.1% to 25.0%	Commercial	0	Rail Yard
098 026400300	0.8	Less than 1%	Residential	TBD	ROW
098 027501504	0.3	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101601	0.4	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101501	1.5	Less than 1%	Commercial	0	Rail Yard
099 005101502	2.2	5.1% to 10%	Commercial	0	Rail Yard
099 137403100	2.4	Less than 1%	Industrial	0	ROW
099 004001501	0.2	25.1% to 50.0%	Industrial	0	ROW
099 004005801	1.7	10.1% to 25.0%	Industrial	0	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 1a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
Parcels below do not appear to be within the ROW; however, due to differences in the scale of the data, these parcels have been included to be conservative in the estimate of potential land acquisition.					
098 035609300	0.1		Residential	0	ROW
098 038501600	0.1		Residential	0	ROW
098 038505600	0.1		Residential	0	ROW
098 035609200	0.1		Residential	0	ROW
098 035609700	0.1		Residential	0	ROW
098 029000410	0.1		Residential	0	ROW
098 035609100	0.1		Residential	0	ROW
098 035609600	0.1		Residential	0	ROW
098 035609900	0.1		Residential	0	ROW
098 035610000	0.1		Residential	0	ROW
098 038505900	0.1		Residential	0	ROW
098 038506000	0.1		Residential	0	ROW
098 038505700	0.1		Residential	0	ROW
098 035609400	0.1		Residential	0	ROW
098 038505500	0.1		Residential	0	ROW
098 038501700	0.1		Residential	0	ROW
098 035610200	0.1		Residential	0	ROW
098 038505800	0.1		Residential	0	ROW
098 035609500	0.1		Residential	0	ROW
098 035609800	0.1		Residential	0	ROW
098 035610100	0.1		Residential	0	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 024900104	0.4	5.1% to 10%	Mixed Use	0	ROW
098 025000500	0.7	25.1% to 50.0%	Vacant	0	ROW
098 025100900	1.0	10.1% to 25.0%	Vacant	0	ROW
098 025200702	0.3	50.1% to 75%	Commercial	0	ROW
098 025300301	0.3	25.1% to 50.0%	Residential	TBD	ROW
098 025300400	0.0	More than 75%	Residential	TBD	ROW
098 025300500	0.1	50.1% to 75%	Residential	TBD	ROW
098 025300600	0.2	50.1% to 75%	Residential	TBD	ROW
098 026400300	1.7	Less than 1%	Residential	TBD	Rail Yard
098 026402300	0.5	5.1% to 10%	Residential	TBD	Rail Yard
098 026402801	1.6	10.1% to 25.0%	Commercial	0	Rail Yard
098 027501504	0.5	50.1% to 75%	Commercial	0	Rail Yard
098 029000411	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 029000412	0.2	10.1% to 25.0%	Residential	TBD	ROW
098 029000413	0.4	10.1% to 25.0%	Residential	TBD	ROW
098 029000416	0.6	10.1% to 25.0%	Vacant	0	ROW
098 029000607	2.1	10.1% to 25.0%	Mixed Use	0	ROW
098 029001702	0.2	25.1% to 50.0%	Mixed Use	0	ROW
098 029001805	0.2	10.1% to 25.0%	Mixed Use	0	ROW
098 029002600	0.9	10.1% to 25.0%	Mixed Use	0	ROW
098 029100100	1.0	5.1% to 10%	Mixed Use	0	ROW
098 029100900	0.2	25.1% to 50.0%	Residential	TBD	ROW
098 035608500	0.2	10.1% to 25.0%	Residential	TBD	ROW
098 035608600	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 035608700	0.1	1.0% to 5.0%	Residential	TBD	ROW
098 035608800	0.1	Less than 1%	Residential	TBD	ROW
098 035608900	0.1	Less than 1%	Residential	TBD	ROW
098 035609000	0.1	Less than 1%	Residential	TBD	ROW
098 035610301	0.1	5.1% to 10%	Residential	TBD	ROW
099 004001501	0.4	25.1% to 50.0%	Industrial	0	ROW
099 004005801	3.5	10.1% to 25.0%	Industrial	0	Rail Yard
099 005101501	3.0	Less than 1%	Commercial	0	Rail Yard
099 005101502	4.3	5.1% to 10%	Commercial	0	Rail Yard
099 005101601	0.8	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101701	0.6	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101703	2.7	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101800	1.5	10.1% to 25.0%	Commercial	0	Rail Yard
099 005101905	0.2	10.1% to 25.0%	Commercial	0	Rail Yard
099 134900500	2.5	5.1% to 10%	Industrial	0	ROW
099 134901401	4.0	5.1% to 10%	Industrial	0	ROW
099 137403100	4.9	Less than 1%	Industrial	0	ROW
099B568500700	24.0	1.0% to 5.0%	Agricultural	0	ROW
099B570000138	11.9	1.0% to 5.0%	Agricultural	0	ROW
099B570000207	4.7	10.1% to 25.0%	Vacant Industrial	0	ROW
099B570000209	14.4	1.0% to 5.0%	Agricultural	0	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 1b

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
Parcels below do not appear to be within the ROW; however, due to differences in the scale of the data, these parcels have been included to be conservative in the estimate of potential land acquisition.					
098 035609300	0.1		Residential	0	ROW
098 038501600	0.1		Residential	0	ROW
098 038505600	0.1		Residential	0	ROW
098 035609200	0.1		Residential	0	ROW
098 035609700	0.1		Residential	0	ROW
098 029000410	0.1		Residential	0	ROW
098 035609100	0.1		Residential	0	ROW
098 035609600	0.1		Residential	0	ROW
098 035609900	0.1		Residential	0	ROW
098 035610000	0.1		Residential	0	ROW
098 038505900	0.1		Residential	0	ROW
098 038506000	0.1		Residential	0	ROW
098 038505700	0.1		Residential	0	ROW
098 035609400	0.1		Residential	0	ROW
098 038505500	0.1		Residential	0	ROW
098 038501700	0.1		Residential	0	ROW
098 035610200	0.1		Residential	0	ROW
098 038505800	0.1		Residential	0	ROW
098 035609500	0.1		Residential	0	ROW
098 035609800	0.1		Residential	0	ROW
098 035610100	0.1		Residential	0	ROW

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 2

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
99004001703	1.3	25.1% to 50.0%	Open Space	0	ROW
099A140003000	3.3	25.1% to 50.0%	Open Space	0	ROW
099A140001510	4.5	1.0% to 5.0%	Open Space	0	ROW
99134900500	2.5	1.0% to 5.0%	Industrial	0	ROW
99134901401	4.0	5.1% to 10%	Industrial	0	ROW
099B560000424	145.1	1.0% to 5.0%	Agriculture	0	Rail Yard
099A147500412	2.0	1.0% to 5.0%	Industrial	0	Rail Yard
099A147500414	1.8	25.1% to 50.0%	Industrial	0	Rail Yard
099A147500410	2.9	25.1% to 50.0%	Warehouse	0	Rail Yard
099A147500408	3.1	10.1% to 25.0%	Industrial	0	Rail Yard

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project		Existing Use	Number of Residential Units	Proposed Use	Acres In	Percent In
098 035609000	0.12	Less than 1%	5	Residential	TBD	ROW	0.0850	49.4%
098 026400300	0.83	Less than 1%	4	Residential	TBD	Rail Yard	0.5010	100.0%
098 035608900	0.12	Less than 1%	5	Residential	TBD	ROW	0.0420	15.2%
099 005101501	1.50	Less than 1%	4	Commercial	0	Rail Yard	0.2520	100.0%
099 137403100	2.44	Less than 1%	4	Industrial	0	ROW	0.2570	100.0%
099 134901401	4.02	Less than 1%	1	Industrial	0	ROW	2.1160	100.0%
098 035608800	0.12	Less than 1%	5	Residential	TBD	ROW	0.1360	100.0%
098 035608700	0.12	1.0% to 5.0%	6	Residential	TBD	ROW	0.0070	1.6%
098 035608600	0.14	1.0% to 5.0%	2	Residential	TBD	ROW	0.1020	14.8%
099 004005801	1.75	1.0% to 5.0%	1	Industrial	0	ROW	1.2730	100.0%
098 029000411	0.11	1.0% to 5.0%	5	Residential	TBD	ROW	0.0270	30.0%
099 005101502	2.15	5.1% to 10%	2	Commercial	0	Rail Yard	0.1200	100.0%
098 029100100	1.03	5.1% to 10%	4	Mixed Use	0	ROW	0.3440	100.0%
099 134900500	2.46	5.1% to 10%	4	Industrial	0	ROW	0.2290	100.0%
098 024900104	0.44	5.1% to 10%	5	Mixed Use	0	ROW	0.1150	100.0%
098 026402300	0.26	5.1% to 10%	4	Residential	0	Rail Yard	0.6660	100.0%
098 035610301	0.13	5.1% to 10%	5	Residential	0	ROW	0.0970	100.0%
098 029000607	2.10	10.1% to 25.0%	1	Mixed Use	0	ROW	0.0050	100.0%
099 005101703	1.35	10.1% to 25.0%	1	Commercial	0	Rail Yard	0.3440	100.0%
098 029002600	0.89	10.1% to 25.0%	5	Mixed Use	0	ROW	0.1350	100.0%
099 005101601	0.41	10.1% to 25.0%	4	Commercial	0	Rail Yard	0.2480	100.0%
098 035608500	0.21	10.1% to 25.0%	6	Residential	0	ROW	0.0170	47.2%
099 005101800	0.73	10.1% to 25.0%	2	Commercial	0	Rail Yard	0.0460	100.0%
098 025100900	1.03	10.1% to 25.0%	5	Vacant	0	ROW	0.1380	100.0%
098 029000412	0.17	10.1% to 25.0%	5	Residential	0	ROW	0.1310	100.0%
098 029000416	0.57	10.1% to 25.0%	6	Vacant	0	ROW	0.1680	48.8%
098 029001805	0.20	10.1% to 25.0%	5	Mixed Use	0	ROW	0.1150	100.0%
098 026402801	0.78	10.1% to 25.0%	4	Commercial	0	Rail Yard	0.8290	99.9%
099 005101905	0.10	10.1% to 25.0%	4	Commercial	0	Rail Yard	0.0040	100.0%
098 025000500	0.69	25.1% to 50.0%	5	Vacant	0	ROW	0.1710	100.0%
098 029100900	0.15	25.1% to 50.0%	5	Residential	0	ROW	0.1530	100.0%
099 005101701	0.28	25.1% to 50.0%	5	Commercial	0	Rail Yard	0.1590	100.0%
099A140003000	3.29	25.1% to 50.0%	4	Open Space	0	ROW	0.2070	100.0%
098 025300301	0.28	25.1% to 50.0%	5	Residential	0	ROW	0.1150	100.0%
099 004001703	1.32	25.1% to 50.0%	4	Open Space	0	ROW	0.6430	100.0%
098 029001702	0.22	25.1% to 50.0%	5	Mixed Use	0	ROW	1.5060	100.0%
098 027501504	0.26	25.1% to 50.0%	4	Commercial	0	Rail Yard	0.2520	100.0%
098 029000413	0.18	25.1% to 50.0%	2	Residential	TBD	ROW	0.1500	14.5%
099 004001501	0.22	25.1% to 50.0%	2	Industrial	0	ROW	0.0460	100.0%
098 025300500	0.09	50.1% to 75%	5	Residential	TBD	ROW	0.5790	100.0%
098 025200702	0.34	50.1% to 75%	5	Commercial	0	ROW	0.1610	100.0%
098 025300600	0.17	50.1% to 75%	5	Residential	TBD	ROW	0.1150	100.0%
098 025300400	0.04	More than 75%	5	Residential	TBD	ROW	0.8310	100.0%
099B560000424	145.1	1.0% to 5.0%		Agriculture	0	Rail Yard		
099A147500412	2.0	1.0% to 5.0%		Industrial	0	Rail Yard		
099A147500414	1.8	25.1% to 50.0%		Industrial	0	Rail Yard		
099A147500410	2.9	25.1% to 50.0%		Warehouse	0	Rail Yard		
099A147500408	3.1	10.1% to 25.0%		Industrial	0	Rail Yard		

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 2a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use	Acres In	Percent In
Parcels below do not appear to be within the ROW; however, due to differences in the scale of the data, these parcels have been included to be conservative in the estimate of potential land acquisition.							
098 035609300	0.1		Residential	0	ROW		
098 038501600	0.1		Residential	0	ROW		
098 038505600	0.1		Residential	0	ROW		
098 035609200	0.1		Residential	0	ROW		
098 035609700	0.1		Residential	0	ROW		
098 029000410	0.1		Residential	0	ROW		
098 035609100	0.1		Residential	0	ROW		
098 035609600	0.1		Residential	0	ROW		
098 035609900	0.1		Residential	0	ROW		
098 035610000	0.1		Residential	0	ROW		
098 038505900	0.1		Residential	0	ROW		
098 038506000	0.1		Residential	0	ROW		
098 038505700	0.1		Residential	0	ROW		
098 035609400	0.1		Residential	0	ROW		
098 038505500	0.1		Residential	0	ROW		
098 038501700	0.1		Residential	0	ROW		
098 035610200	0.1		Residential	0	ROW		
098 038505800	0.1		Residential	0	ROW		
098 035609500	0.1		Residential	0	ROW		
098 035609800	0.1		Residential	0	ROW		
098 035610100	0.1		Residential	0	ROW		

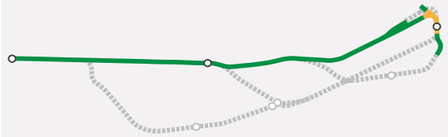
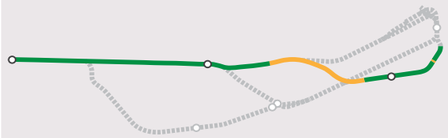
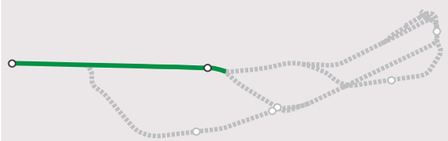
Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 3

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
098 027501200	0.47	10.1% to 25.0%	Mixed Use	0	ROW
098 027501100	0.35	25.1% to 50.0%	Residential	TBD	ROW
098 027500906	5.07	10.1% to 25.0%	Mixed Use	0	ROW
098 027501403	0.77	Less than 1%	Commercial	0	ROW
099 137403100	2.44	1.0% to 5.0%	Industrial	0	Rail Yard
099 004001501	0.22	1.0% to 5.0%	Industrial	0	Rail Yard
099 004005801	1.75	25.1% to 50.0%	Industrial	0	Rail Yard
099 005101701	0.28	50.1% to 75%	Commercial	0	Rail Yard
098 026402300	0.26	25.1% to 50.0%	Residential	TBD	Rail Yard
099 005101800	0.73	25.1% to 50.0%	Commercial	0	Rail Yard
098 026402801	0.78	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101703	1.35	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101905	0.10	25.1% to 50.0%	Commercial	0	Rail Yard
098 026400300	0.83	10.1% to 25.0%	Residential	TBD	Rail Yard
098 027501504	0.26	More than 75%	Commercial	0	Rail Yard
099 005101601	0.41	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101501	1.50	1.0% to 5.0%	Commercial	0	Rail Yard
098 026400401	1.17	Less than 1%	Residential	TBD	Rail Yard
099 005101502	2.15	10.1% to 25.0%	Commercial	0	Rail Yard

Additional Potential Land Acquisition with UP Commuter Access Principles Compliance -- Alternative 3a

APN	Parcel Size (acres)	Percent of Parcel Needed for Project	Existing Use	Number of Residential Units	Proposed Use
099 137403100	2.44	Less than 1%	Industrial	0	Rail Yard
099 004001501	0.22	25.1% to 50.0%	Industrial	0	Rail Yard
099 004005801	1.75	25.1% to 50.0%	Industrial	0	Rail Yard
099 005101701	0.28	25.1% to 50.0%	Commercial	0	Rail Yard
098 026402300	0.26	25.1% to 50.0%	Residential	TBD	Rail Yard
099 005101800	0.73	25.1% to 50.0%	Commercial	0	Rail Yard
098 026402801	0.78	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101703	1.35	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101905	0.10	25.1% to 50.0%	Commercial	0	Rail Yard
098 026400300	0.83	10.1% to 25.0%	Residential	TBD	Rail Yard
098 027501504	0.26	More than 75%	Commercial	0	Rail Yard
099 005101601	0.41	25.1% to 50.0%	Commercial	0	Rail Yard
099 005101501	1.50	1.0% to 5.0%	Commercial	0	Rail Yard
098 026400401	1.17	1.0% to 5.0%	Residential	TBD	Rail Yard
099 005101502	2.15	10.1% to 25.0%	Commercial	0	Rail Yard
Parcels below do not appear to be within the ROW; however, due to differences in the scale of the data, these parcels have been included to be conservative in the estimate of potential land acquisition.					
098 035609300	0.1		Residential	0	ROW
098 038501600	0.1		Residential	0	ROW
098 038505600	0.1		Residential	0	ROW
098 035609200	0.1		Residential	0	ROW
098 035609700	0.1		Residential	0	ROW
098 029000410	0.1		Residential	0	ROW
098 035609100	0.1		Residential	0	ROW
098 035609600	0.1		Residential	0	ROW
098 035609900	0.1		Residential	0	ROW
098 035610000	0.1		Residential	0	ROW
098 038505900	0.1		Residential	0	ROW
098 038506000	0.1		Residential	0	ROW
098 038505700	0.1		Residential	0	ROW
098 035609400	0.1		Residential	0	ROW
098 038505500	0.1		Residential	0	ROW
098 038501700	0.1		Residential	0	ROW
098 035610200	0.1		Residential	0	ROW
098 038505800	0.1		Residential	0	ROW
098 035609500	0.1		Residential	0	ROW
098 035609800	0.1		Residential	0	ROW
098 035610100	0.1		Residential	0	ROW

BART TO LIVERMORE EXTENSION ALTERNATIVES SUMMARY

Alternative	Alignment Schematic and Guideway Structure Type (At-Grade, Aerial Structure, Subway)	Stations	Storage/ Maintenance Facility
1. Greenville East		Isabel/I-580 Greenville East	Greenville Yard
1a. Downtown-Greenville East via UPRR		Downtown Livermore Greenville East	Greenville Yard
1b. Downtown-Greenville East via SPRR		Downtown Livermore Greenville East	Greenville Yard
2. Las Positas		Isabel/I-580 Vasco Road	Vasco Yard
2a. Downtown-Vasco		Downtown Livermore Vasco Road	Vasco Yard
3. Portola		Isabel/I-580 Downtown Livermore	Portola/ Railroad Yard
3a. Railroad		Isabel/ Stanley Downtown Livermore	Portola/ Railroad Yard
4. Isabel/ I-580		Isabel/I-580	No yard; tail tracks only
5. Quarry		Isabel/ Stanley	No yard; tail tracks only