# BART TO LIVERMORE EXTENSION PROJECT
# DRAFT ENVIRONMENTAL IMPACT REPORT

## Volume 1 of 3
Summary through Section 3.H Hydrology and Water Quality

## State Clearinghouse No. 2012082104


BART

San Francisco Bay Area Rapid Transit District

July 2017

# SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

July 31, 2017

**Subject: Notice of Availability of Draft Environmental Impact Report for the BART to Livermore Extension Project (SCH 2012082104)**

Dear Sir/Madam,

A copy of the Draft Environmental Impact Report (DEIR) for the proposed BART to Livermore Extension Project is enclosed. The enclosed CD-ROM contains the entire DEIR document and appendices. The Lead Agency for the project is the San Francisco Bay Area Rapid Transit (BART) District.

The Proposed Project, which would extend BART transit service into Livermore, is being developed in partnership with the City of Livermore and consists of a 5.5-mile BART extension along Interstate 580 from the Dublin/Pleasanton Station to a new station near the Isabel Avenue/I-580 interchange. The Proposed Project also includes new and modified bus services linking BART to the Altamont Corridor Express (ACE) stations and activity centers in Livermore, such as downtown Livermore, Las Positas College, and Lawrence Livermore National Laboratory (LLNL).

The Draft EIR evaluates several alternatives to the Proposed Project, including a No Project alternative, a Diesel Multiple Unit (DMU) alternative, an Express Bus/Bus Rapid Transit alternative, and an Enhanced Bus alternative. The Proposed Project as well as the DMU alternative include storage and maintenance facilities for effective operations.

Areas of potential impacts to the environment include transportation, land use and agricultural resources, population and housing, visual quality, cultural resources, geology and paleontological resources, hydrology and water quality, biological resources, noise and vibration, air quality, greenhouse gas emissions, energy, public health and safety, community services and utilities.

**Comment Period.** The public comment period for the DEIR begins on July 31, 2017. The deadline for receipt of comments is 5:00 pm, September 14, 2017.

**How to Comment.** Comments on the DEIR may be sent to the BART to Livermore Extension Project, 21st Floor, 300 Lakeside Drive, Oakland, CA 94612. You may also comment by email at barttolivermore@bart.gov or via the project website at www.bart.gov/livermore.

**Public Meetings.** Comments may also be made at two public hearings on the DEIR to be held in August:

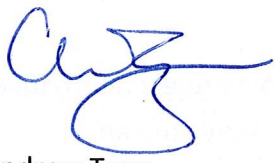
- Tuesday, August 22, 2017, Robert Livermore Community Center, 4448 Loyola Way, Livermore, CA 94550. 6:00 pm Open House/7:00 pm Meeting
- Tuesday, August 29, 2017, Shannon Community Center, 11600 Shannon Avenue, Dublin, CA 94568. 6:00 pm Open House/7:00 pm Meeting

**Additional Review Copies.** The DEIR is also available via download from the BART website: www.bart.gov/about/projects/liv/environment. Additional copies of the CD-ROM may be obtained by emailing a request to the email address below or by calling the information request number below. The DEIR also is available at the Livermore, Dublin and Pleasanton Libraries. The DEIR and all related documents are available for public review at 300 Lakeside Drive, 21th Floor, Oakland, CA 94612. Email or call the information request number to arrange an appointment.

**Information Line.** For more information, please email barttolivermore@bart.gov or call the information request line at (888) 441-0434 or (510) 464-6401 and leave a message. However, comments cannot be accepted by phone.

Thank you for your participation in the environmental process.

Sincerely,



Andrew Tang
Project Manager

# BART TO LIVERMORE EXTENSION PROJECT
# DRAFT ENVIRONMENTAL IMPACT REPORT

Volume 1 of 3
Summary through Section 3.H Hydrology and Water Quality

State Clearinghouse No. 2012082104

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July 2017

# VOLUME 1

Summary through Section 3.H Hydrology and Water Quality

# TABLE OF CONTENTS

## VOLUME 1

## VOLUME 2

# VOLUME 3

## APPENDICES

# List of Figures

## VOLUME 1

## VOLUME 2

# List of Tables

## VOLUME 1

## VOLUME 2

# Acronym List

| | |
|---|---|
| AB | Assembly Bill |
| ABAG | Association of Bay Area Governments |
| AC | alternating current |
| ACDEH | Alameda County Department of Environmental Health |
| ACE | Altamont Corridor Express |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| ACWD | Alameda County Water District |
| AERMOD | American Meteorological Society/Environmental Protection Agency Regulatory Model |
| af | acre-feet |
| afy | acre-feet per year |
| AIA | Airport Influence Area |
| ALUC | Airport Land Use Commissions |
| ALUCP | Airport Land Use Compatibility Plan |
| APA | Airport Protection Area |
| APCO | Air Pollution Control Officer |
| APN | Assessor's Parcel Number |
| APSA | Aboveground Petroleum Storage Act |
| ASR | Archeological Survey Report |
| ASTM | American Society for Testing and Materials |
| ATCM | Airborne Toxic Control Measure |
| B | beneficial impact |
| BAAQMD | Bay Area Air Quality Management District |
| BART | San Francisco Bay Area Rapid Transit District |
| BART Police | BART Police Department |
| Basin Plan | San Francisco Bay Basin Water Quality Control Plan |
| Bay Area | San Francisco Bay Area |
| bgs | below ground surface |
| BMP | best management practice |
| BRT | bus rapid transit |
| BTU | British thermal units |
| BTU/gal | British thermal units per gallon |
| BUOW | burrowing owl |
| CAA | Clean Air Act (federal) |
| CAAQS | California Ambient Air Quality Standards |
| CAFE | Corporate Average Fuel Economy (standards) |
| CAL FIRE | California Department of Forestry and Fire Protection |

| | |
|---|---|
| CalARP | California Accidental Release Prevention Program |
| CalEEMod® | California Emission Estimator Model, version 2013.2.2 |
| CalEPA | California Environmental Protection Agency |
| Cal/OSHA | California Division of Occupational Safety and Health |
| California CAA | State of California Clean Air Act |
| California Register | California Register of Historical Resources |
| Caltrans | California Department of Transportation |
| CalWater | California Water Service Company |
| CARB | California Air Resources Board |
| CARE | Community Air Risk Evaluation |
| CBC | California Building Code |
| CBIA | California Building Industry Association |
| CCR | California Code of Regulations |
| CDFW | California Department of Fish and Wildlife |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CESA | California Endangered Species Act |
| CFR | Code of Federal Regulations |
| CGP | Construction General Permit |
| CGS | California Geological Survey |
| CHMIRS | California Hazardous Material Incident Reporting System |
| CHRIS | California Historical Resources Information System |
| CaHSR | California High Speed Rail |
| CIA | Community Impact Assessment |
| CNDDB | California Natural Diversity Database |
| CNEL | community noise equivalent level |
| CNPS | California Native Plant Society |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| CPUC | California Public Utilities Commission |
| CRLF | California red-legged frog |
| CRPR | California Rare Plant Rank |
| CSS | Caltrans' Context Sensitive Solutions |
| CTS | California tiger salamander |
| CUPA | Certified Unified Program Agency |

| | |
|---|---|
| CWA | Clean Water Act |
| dB | decibel |
| dBA | A-weight decibel |
| DC | direct current |
| DHS | California Department of Health Services |
| DMU | diesel multiple unit |
| DPM | diesel particulate matter |
| DTSC | Department of Toxic Substances Control |
| DWR | Department of Water Resources |
| EACCS | East Alameda County Conservation Strategy |
| eBART | East Contra Costa County BART Extension |
| EDR | Environmental Data Resources, Inc. |
| EIR | environmental impact report |
| EMF | electromagnetic field |
| EMR | electromagnetic radiation |
| EMU | electrical multiple unit |
| EPA | United States Environmental Protection Agency |
| ERNS | Emergency Response Notification System |
| ESA | environmental site assessment |
| FAA | Federal Aviation Administration |
| FCC | Federal Communications Commission |
| FEMA | Federal Emergency Management Agency |
| FESA | Federal Endangered Species Act |
| FHWA | Federal Highway Administration |
| FMMP | Farmland Mapping and Monitoring Program |
| FRA | Federal Railroad Administration |
| FTA | Federal Transit Administration |
| g | gravity |
| g/hp-hr | gram per horsepower-hour |
| GHG | greenhouse gas |
| GO | General Order |
| gpd | gallons per day |
| gpy | gallons per year |
| GSP | groundwater sustainability plan |
| HAP | hazardous air pollutant |
| HCP | habitat conservation plan |
| HMBP | hazardous materials business plan |
| HMIRS | Hazardous Materials Incident Reporting System |
| HP | horsepower |
| HPSR | historic properties survey report |

| | |
|---|---|
| HRA | health risk assessment |
| HRER | historical resources evaluation report |
| HSC | California Health and Safety Code |
| Hz | Hertz |
| I- | Interstate Highway |
| IARC | International Agency for Research on Cancer |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| in/sec | inch(es) per second |
| INP | Isabel Neighborhood Plan |
| ISA | initial site assessment |
| kV | kilovolts |
| kW | kilowatt |
| kWh | kilowatt-hour |
| LAVTA | Livermore-Amador Valley Transportation Authority |
| LAVWMA | Livermore-Amador Valley Water Management Agency |
| lbs/day | pounds per day |
| $L_{dn}$ | day-night average noise level |
| $L_{eq}$ | equivalent A-weighted noise level |
| $L_{eq}$ (h) | equivalent A-weighted noise level over 1 hour |
| LHFS | longhorn fairy shrimp |
| LID | low-impact development |
| LLNL | Lawrence Livermore National Laboratory |
| $L_{max}$ | maximum sound level |
| LQG | large-quantity generators |
| LS | less-than-significant impact |
| LSM | less-than-significant impact with mitigation |
| LUST | leaking underground storage tank |
| m | milli (1 thousanth) |
| MACT | maximum achievable control technology |
| MAP-21 | Moving Ahead for Progress in the 21st Century Act |
| MAX | Modesto Area Express |
| MBTA | Migratory Bird Treaty Act |
| MEISR | maximally exposed individual sensitive receptor |
| mG | milliGauss |
| mgd | million gallons per day |
| mg/L | milligrams per liter |
| mph | miles per hour |
| MM | Modified Mercalli |
| MMRP | mitigation monitoring and reporting program |
| MRP | Municipal Regional Stormwater NPDES Permit |

| | |
|---|---|
| MRZ | Mineral Resource Zone |
| MSAT | mobile source air toxics |
| MS4 | Municipal Separate Storm Sewer Systems |
| msl | mean sea level |
| MTC | Metropolitan Transportation Commission |
| MW | megawatt |
| $M_w$ | Moment Magnitude scale |
| NAAQS | National Ambient Air Quality Standards |
| NAHC | Native American Heritage Commission |
| National Register | National Register of Historic Places |
| NCCP | natural community conservation plan |
| NEPA | National Environmental Policy Act |
| NESHAPs | National Emissions Standards for Hazardous Air Pollutants |
| NHPA | National Historic Preservation Act |
| NI | no impact |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | nitrogen dioxide |
| NOI | notice of intent |
| NOP | notice of preparation |
| $NO_x$ | oxides of nitrogen |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List (Superfund sites) |
| NSPS | New Source Performance Standards |
| NSR | New Source Review |
| NWIC | Northwest Information Center |
| O&M | operations and maintenance |
| OEHHA | California's Office of Environmental Health Hazard Assessment |
| OHP | California Office of Historic Preservation |
| PCB | polychlorinated biphenyl |
| PDA | Priority Development Area |
| PEIR | Program EIR |
| PG&E | Pacific Gas and Electric Company |
| PGA | peak ground acceleration |
| PM | particulate matter |
| $PM_{2.5}$ | fine particulate matter, less than 2.5 microns in diameter |
| $PM_{10}$ | respirable particulate matter, less than 10 microns in diameter |
| ppm | parts per million |
| PPV | peak particle velocity |
| PRC | Public Resources Code |
| PV | photovoltaic |

| | |
|---|---|
| PWS | planning watershed |
| RCRA | Resource Conservation and Recovery Act |
| RDP | ridership development plan |
| ROG | reactive organic gas |
| ROW | right-of-way |
| RTA | rail transit agency |
| RTD | (San Joaquin) Regional Transit District |
| RTP | regional transportation plan |
| RWQCB | Regional Water Quality Control Board |
| SB | Senate Bill |
| SEMS | Superfund Enterprise Management System |
| SEP | BART System Expansion Policy |
| SFBAAB | San Francisco Bay Area Air Basin |
| SGMA | Sustainable Groundwater Management Act |
| SHPO | State Historic Preservation Officer |
| SIP | State Implementation Plan |
| SJRRC | San Joaquin Regional Rail Commission |
| SJKF | San Joaquin kit fox |
| SLIC | spills, leaks, investigations and cleanup |
| SNL | Sandia National Laboratory |
| $SO_2$ | sulfur dioxide |
| $SO_x$ | oxides of sulfur |
| SPCC | Spill Prevention, Control, and Countermeasure |
| SQG | small-quantity generators |
| SSPP | BART System Safety Program Plan |
| State | State of California |
| SU | significant and unavoidable impact |
| SVP | Society of Vertebrate Paleontology |
| SWMP | Stormwater Management Plan |
| SWP | State Water Project |
| SWPPP | Stormwater Pollution Prevention Plan |
| SWRCB | State Water Resources Control Board |
| TAC | toxic air contaminant |
| T-BACT | best available control technology |
| TDS | total dissolved solids |
| TIP | transportation improvement program |
| TLV | Threshold Limit Value |
| TMDL | total maximum daily load |
| TOD | transit-oriented development |
| tpd | ton(s) per day |

| | |
|---|---|
| tpy | ton(s) per year |
| TPSS | traction power substation |
| UGB | urban growth boundary |
| ULSD | ultra-low-sulfur diesel |
| U.S. | United States |
| USACE | United States Army Corps of Engineers |
| USFS | United States Forest Service |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| UST | underground storage tank |
| UXO | Unexploded Ordinance |
| V | volts |
| VdB | vibration decibel |
| V/m | volts per meter |
| VMT | vehicle miles traveled |
| VOC | volatile organic compound |
| VPFS | vernal pool fairy shrimp |
| WDR | waste discharge requirements |
| WPT | western pond turtle |
| WUIC | Wildland-Urban Interface Code |
| Zone 7 | Zone 7 Water Agency of the Alameda County Flood Control and Water Conservation District |
| ºF | degrees Fahrenheit |
| µ | micro (1 millionth) |
| µS/cm | microSiemens per centimeter |
| µT | microtesla |

# SUMMARY

## A. EIR OVERVIEW

The San Francisco Bay Area Transit District (BART) is proposing the BART to Livermore Extension Project, which is being evaluated in this Draft Environmental Impact Report (EIR). The Proposed Project, which is also referred to as the Conventional BART Project, would extend transit service 5.5 miles east into eastern Alameda County from the existing Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) within and adjacent to the Interstate (I-) 580 right-of-way (ROW), through the cities of Dublin and Pleasanton, to a proposed new terminus station located at the Isabel Avenue/I-580 interchange in the city of Livermore (referred to herein as Isabel Station). In addition, a new parking facility would be constructed at the new Isabel Station and a new BART storage and maintenance facility would be constructed beyond the Isabel Station, north of I-580. The Proposed Project includes new and modified bus routes, connecting the new Isabel Station to downtown Livermore, Lawrence Livermore National Laboratory (LLNL), the Vasco Road Altamont Corridor Express (ACE) station, and other areas east of the BART system. The overall performance of these bus routes would be improved via the implementation of transit priority infrastructure enhancements.

In compliance with the California Environmental Quality Act (CEQA), this Draft EIR describes the potential environmental effects of the Proposed Project, as well as mitigation measures and alternatives that would avoid or reduce significant adverse environmental impacts. This Draft EIR evaluates the potential impacts of the Proposed Project and three Build Alternatives—the Diesel Multiple Unit (DMU) Alternative (which includes a variant referred to as the Electrical Multiple Unit [EMU] Option), the Express Bus/Bus Rapid Transit (BRT) Alternative, and the Enhanced Bus Alternative. The three Build Alternatives were identified in initial screening as alternatives which potentially could meet most of the project objectives and be completed within a reasonable timeframe, and therefore merited full evaluation in this EIR. In addition, the No Project Alternative (or No Build Alternative) is evaluated.

## B. BACKGROUND

In November 2009, BART released the Draft Program Environmental Impact Report (PEIR) for the BART to Livermore Extension Program (State Clearinghouse No. 2008062026). The Draft PEIR considered nine alignment alternatives for extending the existing BART service eastward from the Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) to Livermore. BART released a Final PEIR in June 2010. The Final PEIR included an additional

alignment alternative to Downtown Livermore, referred to as Alternative 2B (Portola-Vasco), which combined features of several of the alternatives studied in the Draft PEIR. On July 1, 2010, the BART Board of Directors certified the Final PEIR and selected Alternative 2B (Portola-Vasco) as the preferred alternative.

Initially, the City of Livermore recommended the Alternative 2B (Portola-Vasco) alignment; however, following further public discussion, the City determined that it preferred an alignment along I-580 from Dublin/Pleasanton Station to Greenville Road, with stations at Isabel Avenue and Greenville Road. This alignment was then incorporated into the City of Livermore's General Plan.

This Draft EIR serves as a second tier, project-level EIR for the BART to Livermore Extension Project, pursuant to CEQA. The Proposed Project in this Draft EIR would extend BART service approximately 5.5 miles east from the Dublin/Pleasanton Station to a new station in the I-580 median at Isabel Avenue in Livermore. The Proposed Project's alignment corresponds to: (1) the alignment of Alternative 4 (Isabel Avenue/I-580 interchange) in the PEIR; (2) portions of the alignment of Alternative 2B (Portola-Vasco), which was selected by the BART Board of Directors; and (3) the City of Livermore's preferred alignment within the I-580 median.

## C. PROJECT OBJECTIVES

The Tri-Valley Area has been one of the fastest growing subregions of the San Francisco Bay Area (Bay Area). As a result, travel demand in the region has continued to increase, and gridlock occurs regularly on I-580 in the Tri-Valley Area.

The proposed 5.5-mile BART extension from the Dublin/Pleasanton Station to a new station at Isabel Avenue in Livermore would improve the regional transit network by enhancing the link between Livermore and the greater Bay Area. By shortening travel times and improving reliability, the BART extension would generate additional transit ridership and provide an alternative to traffic congestion. The BART to Livermore Extension Project would help accommodate projected future growth in employment and population, reduce pressure to expand roads, and support the region's efforts to meet State of California (State) greenhouse gas reduction goals.

Given the transportation characteristics and future travel demand in east Alameda County and along the I-580 corridor in particular, the following objectives have been identified by BART for extension of transit service to Livermore:

- Provide a cost-effective intermodal link of the existing BART system to the inter-regional rail network and a series of Priority Development Areas (PDAs) identified by the City of Livermore, the Metropolitan Transportation Commission, and the Association of Bay Area

Governments. These PDAs include the Livermore Isabel Avenue BART Station PDA, the Livermore Downtown PDA, and the Livermore East Side PDA.

- Support the regional goals of integrating transit and land use policies to create opportunities for transit-oriented development in PDAs in the Livermore area.
- Provide an effective commute alternative to traffic congestion on I-580.
- Improve air quality and reduce greenhouse gas (GHG) and other emissions associated with automobile use.

## D. SUMMARY OF PROPOSED PROJECT AND ALTERNATIVES

This subsection describes the proposed BART to Livermore Extension Project that is evaluated in this Draft EIR. The Proposed Project, which is also referred to as the Conventional BART Project, involves extending the BART system, using conventional BART technology, from the existing terminus of the Daly City-Dublin/Pleasanton Line at the Dublin/Pleasanton Station to a new station located east of Isabel Avenue (State Route 84) in the city of Livermore.

In addition to the Proposed Project, three Build Alternatives, as well as the No Project Alternative (or No Build Alternative), are evaluated in this EIR. The Build Alternatives were identified in initial screening as alternatives with the potential to meet most of the project objectives and be completed within a reasonable timeframe; therefore, they merited full evaluation in this EIR. The three Build Alternatives are as follows:

- DMU Alternative, which includes a variant referred to as the EMU Option
- Express Bus/BRT Alternative
- Enhanced Bus Alternative

The Proposed Project and Build Alternatives are described below and summarized in Table S-1.

### 1. No Project Alternative

The No Project Alternative describes the consequences if the BART Board decides not to proceed with either the Proposed Project or any of the Build Alternatives. For this EIR, the No Project Alternative represents the region's existing transportation network—consisting of highways, arterial roads, public transit, and bicycle and pedestrian facilities—inclusive of planned improvements through 2040. In addition, the No Project Alternative acknowledges the expected population and employment growth in the nine-county Bay Area region through 2040. This alternative does not include the extension of rail or transit services beyond the improvements currently planned for implementation.

**TABLE S-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/ BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| **Components of Proposed Project and Build Alternatives** | | | | |
| | | **BART/Rail Facilities** | | |
| Rail Service Extension | ▪ Extend service 5.5 miles east to Isabel Avenue in I-580 median.<br>▪ Beyond Dublin/Pleasanton Station, convert 0.7 mile of existing tail tracks to mainline tracks, and extend track 4.8 miles to new station.<br>▪ Remove existing BART car storage in I-580 median and relocate to new storage and maintenance facility. | ▪ Extend service 5.5 miles east to Isabel Avenue in I-580 median.<br>▪ Beyond Dublin/Pleasanton Station, existing BART tail tracks remain.<br>▪ Install DMU track 5.5 miles from Dublin/Pleasanton Station to new Isabel Station in I-580 median. | -- | -- |
| Dublin/Pleasanton Station | ▪ No change. | ▪ New DMU transfer platform on north side of the Dublin/Pleasanton Station.<br>▪ New 0.3-mile tail track for BART car storage west of station (storage for approximately 20 additional BART cars). | ▪ New bus transfer platforms north and south of BART station platform.<br>▪ New direct bus-only ramps from I-580 express lanes to Dublin/Pleasanton Station.<br>▪ Extend tail track 0.1-mile east of station (storage for approximately 10 additional BART cars). | ▪ No change. |
| Isabel Station | ▪ BART platform in I-580 median, with pedestrian overcrossings to bus facility at Isabel North and station parking at Isabel South.<br>▪ New two-story end-of-line operations building (houses train supervisory booth and associated staff facilities). | ▪ Similar to Proposed Project. | -- | -- |

**TABLE S-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/ BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| Parking | ▪ At Isabel Station, total of 3,412 parking spaces: 2,835 in a seven-level parking structure and 577 parking spaces in two surface parking lots. | ▪ At Isabel Station, total of 2,428 parking spaces in a six-level parking structure. | ▪ At Dublin/Pleasanton Station, relocate approximately 210 existing parking spaces to either (1) a surface lot adjacent to existing lot south of I-580; or (2) a three-level parking structure on the existing BART lot south of I-580.<br>▪ At Laughlin Road, new surface parking lot with approximately 230 parking spaces. | -- |
| Storage and Maintenance Facility (for rail vehicles) | ▪ Extend tail tracks 1.9 miles from Isabel Station to 68-acre storage and maintenance facility north of I-580.<br>▪ Capacity for storage of approximately 172 BART vehicles.<br>▪ Westbound I-580 underpass for tail tracks (from median to north of I-580).<br>▪ Bridges over Arroyo las Positas and Cayetano creeks and hillside tunnel for tail tracks. | ▪ Extend tail tracks 1.8 miles from Isabel Station to 32-acre storage and maintenance facility north of I-580.<br>▪ Capacity for approximately 12 DMU vehicles (six married pairs).<br>▪ Westbound I-580 underpass for tail tracks (from median to north of I-580).<br>▪ Bridges over Arroyo las Positas and Cayetano creeks and hillside tunnel for tail tracks. | -- | -- |
| Wayside Facilities (power and communications support, such as power substations and switching stations) | ▪ Wayside facilities along the project corridor at Croak Road and at Kitty Hawk Road/Isabel Avenue. | ▪ Wayside facilities along the project corridor at Croak Road and at Kitty Hawk Road/Isabel Avenue. | -- | -- |

**TABLE S-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/ BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| Additional BART Cars to Accommodate Increased Ridership | ▪ 36 BART cars. | ▪ 24 BART cars. | ▪ 12 BART cars. | -- |
| **Caltrans Facilities and Surface Frontage Roads** | | | | |
| I-580 Relocation | ▪ Modifications extend for 5.6 miles along I-580. Typical relocation by approximately 46 feet, from just east of Hacienda Drive interchange to west of Portola Avenue overcrossing. At the proposed Isabel Station, relocation by approximately 67 feet.<br>▪ Modifications at four interchanges: Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue.<br>▪ Modifications to surface frontage roads. | ▪ Modifications extend for 7.1 miles along I-580. Typical relocation by approximately 46 feet, from west of Dougherty Road/Hopyard Road interchange to west of Portola Avenue overcrossing. West of Hacienda Drive interchange, on-ramp relocation up to approximately 140 feet. At the proposed Isabel Station, relocation by approximately 67 feet.<br>▪ Modifications at six interchanges: Dougherty Road/Hopyard Road, Hacienda Drive, Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue.<br>▪ Modifications to surface frontage roads. | ▪ Modifications extend for 2.2 miles along I-580. Typical relocation by 88 feet from west of Dougherty Road to the Tassajara Road/Santa Rita Road overcrossing. At the Dublin/Pleasanton Station, relocation up to 100 feet.<br>▪ Modifications at three interchanges: Dougherty Road/Hopyard Road, Hacienda Drive, and Tassajara Road.<br>▪ Modifications to surface frontage roads in Dublin. | -- |

**TABLE S-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/ BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| | | **Bus Services** | | |
| Bus Routes[a, b] | ▪ New/modified bus routes to Isabel Station instead of the Dublin/Pleasanton Station: LAVTA X-B, R-B, 12; RTD 150; and MAX BART Express.<br>▪ Eliminated routes: LAVTA 12X, 20X, and Rapid. | ▪ Same as Proposed Project. | ▪ Buses use direct ramps from I-580 express lanes to Dublin/Pleasanton Station. New/modified routes: LAVTA X-B, R-B, and 12.<br>▪ Eliminated routes: LAVTA 20X, and Rapid. | ▪ Connections at Dublin/ Pleasanton Station same as existing conditions with new/modified routes: LAVTA X-A, R-B, and 12. Eliminated routes: LAVTA 20X, and Rapid. |
| | | **Bus Infrastructure** | | |
| Transit Signal Priority | ▪ Installation of equipment at approximately two locations. | ▪ Same as Proposed Project. | ▪ Installation of equipment at approximately four locations. | ▪ Installation of equipment at approximately six locations. |
| Improved Bus Shelters and Seating, Digital Messaging Boards, Pre-paid Ticketing. | ▪ Installation at approximately 29 locations. | ▪ Same as Proposed Project. | ▪ Similar to Proposed Project. | ▪ Similar to Proposed Project. |
| Bus Bulbs | ▪ Installation of bus bulbs at approximately six locations. | ▪ Same as Proposed Project. | ▪ Installation of bus bulbs at approximately 10 locations. | ▪ Similar to Express Bus/BRT Alternative. |
| **Footprint** [a] | | | | |
| | | **Permanent** | | |
| Portion of Footprint Occupied by Existing Transportation Uses (Acres) | 229 | 268 | 55 | --[a] |
| Portion of Footprint within Parcels not Owned by BART (Acres) [Number of Parcels] | 147 [117 parcels] | 102 [137 parcels] | 10 [34 parcels] | --[a] |

**TABLE S-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/ BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| Portion of Footprint within BART-owned Parcels (Acres) [Number of Parcels] | 35 [5 parcels] | 35 [7 parcels] | 12 [7 parcels] | -- [a] |
| **Total Footprint – including I-580 (Acres)** | **411** | **405** | **77** | -- [a] |
| | | **Temporary** | | |
| Construction Staging Areas (Acres) | 29 | 32 | 6 | -- [a] |

Notes:
-- = Not applicable; LAVTA = Livermore-Amador Valley Transit Authority; MAX = Modesto Area Express; RTD = San Joaquin Regional Transit District; R-B = Rapid service; X-B = Express service (peak period); Caltrans = California Department of Transportation.
All units of measure are approximate, and distances are rounded to the nearest 0.1 mile.
A married pair is a set of two vehicles that are permanently coupled and treated as if they were a single unit.
[a] This EIR describes and analyzes the Enhanced Bus Alternative, as well as the feeder bus routes and bus infrastructure improvements associated with the feeder bus routes for the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, at a programmatic level. The bus routes are conceptual and were developed for the purpose of estimating BART ridership and operating costs. Candidate locations for bus infrastructure improvements, anticipated to be constructed within existing street rights-of-way, are described to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.
[b] Several components of the proposed bus routes are similar to Wheels Forward, a program of changes to the LAVTA transit system implemented in August 2016 to provide more frequent buses and new routes in Livermore, Dublin, and Pleasanton. The new, modified, or eliminated routes under the Proposed Project and Build Alternatives are described in relation to the previous bus route network. Elements shared by the Proposed Project and Build Alternatives and the Wheels Forward program include improved bus service from Downtown Livermore to BART, improved bus service to Las Positas College, and improved bus shelters to serve the new Express and Rapid routes. Other capital improvements, such as real-time arrival message boards at bus stations, expansion of transit signal priority to additional intersections, and installation of bus bulbs, are not included in the Wheels Forward program. Additionally, the Proposed Project and Build Alternatives would include improved bus service to Lawrence Livermore National Laboratory and the east side of Livermore. Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid route serves most of the existing Route 12 stops on Dublin Boulevard, as well as North Canyons Parkway and Las Positas College, and a restructured Route 14 serves areas of Livermore previously served by Route 12. Therefore, these restructured routes would generally serve the areas previously served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA.
Sources: Arup and Anil Verma Associates, Inc., 2017; Arup, 2017a.

## 2. Conventional BART Project

The Conventional BART Project, shown in Figure S-1, involves extending the BART system using conventional BART technology, from the existing terminus of the Daly City-Dublin/Pleasanton Line at the Dublin/Pleasanton Station to a new station located at the Isabel Avenue/I-580 (State Route 84) interchange in the city of Livermore. The new alignment and the new Isabel BART Station (Isabel Station) would be constructed in the I-580 median. New parking facilities—consisting of a parking structure and a surface lot containing approximately 3,412 spaces—would be constructed immediately south of I-580 along East Airway Boulevard. In addition, a new, approximately 68-acre BART storage and maintenance facility would be constructed north of I-580, beyond the Isabel Station.

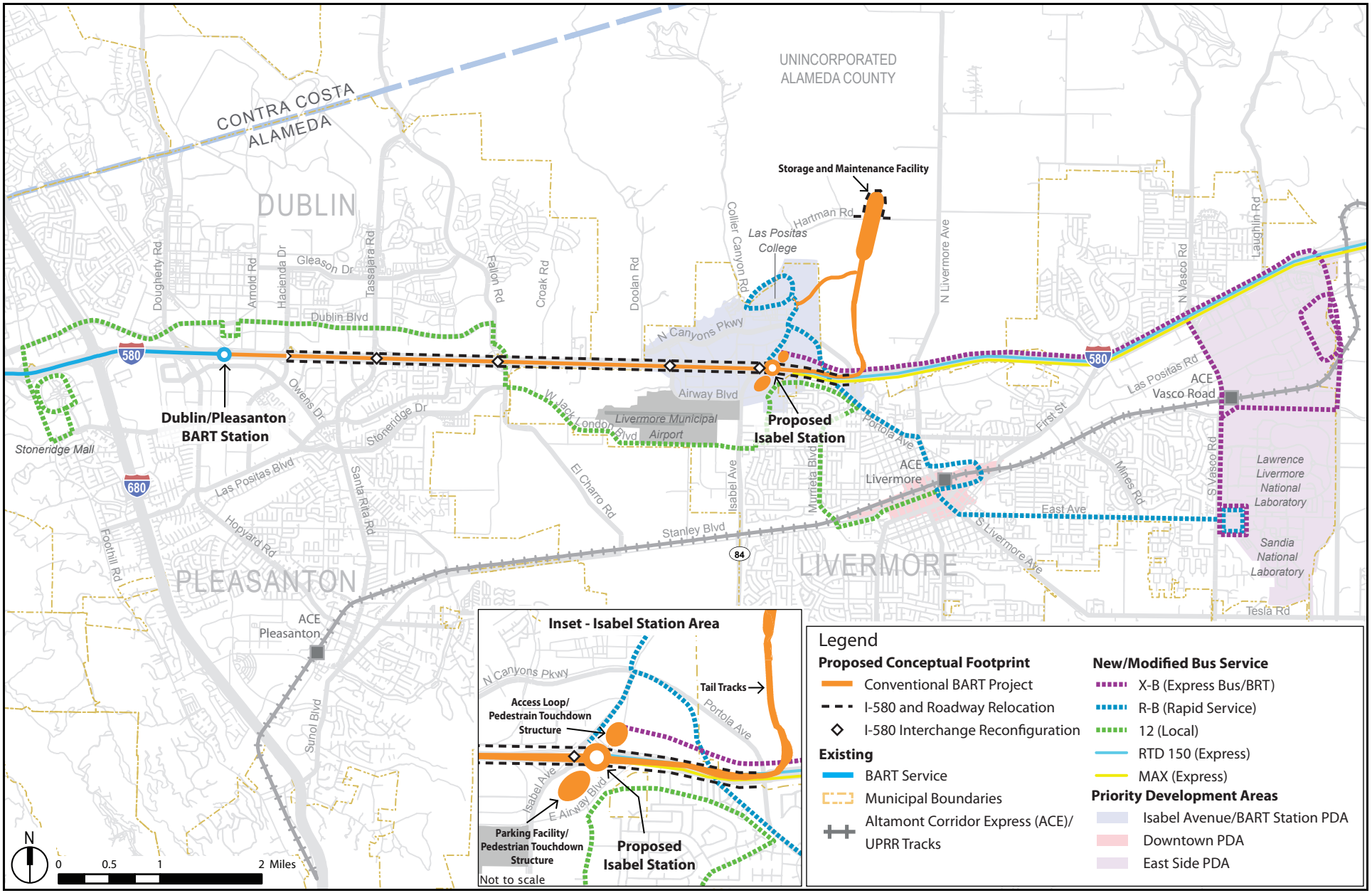
To accommodate the widening of the I-580 median for the new BART alignment and Isabel Station, the California Department of Transportation right-of-way would be widened along approximately 5.6 miles. The I-580 lanes would be relocated by a total of approximately 46 feet, from just east of the Hacienda Drive interchange to west of the Portola Avenue/I-580 overcrossing. At the proposed Isabel Station, I-580 would be relocated by approximately 67 feet to accommodate the new station within the median. The relocation of I-580 would require the modification of some interchanges and surface frontage roads.

The Proposed Project includes new and modified feeder bus routes that would connect the new Isabel Station to the Livermore Downtown PDA, the Livermore East Side PDA (which includes the Lawrence Livermore National Laboratory), and other areas east of the BART system, as well as to the Altamont Corridor Express (ACE) Stations in Downtown Livermore and Vasco Road.[1] The overall performance of these bus routes would be improved via the implementation of transit priority infrastructure enhancements, such as signal timing priority, bus shelters, and bus bulbs.

## 3. DMU Alternative

The DMU Alternative, shown in Figure S-2, differs from the Proposed Project in terms of vehicle technology. DMUs are self-propelled rail cars that use a diesel engine to generate their own power and run on a standard-gauge rail track, whereas BART trains use electricity and run on wide-gauge rail track.

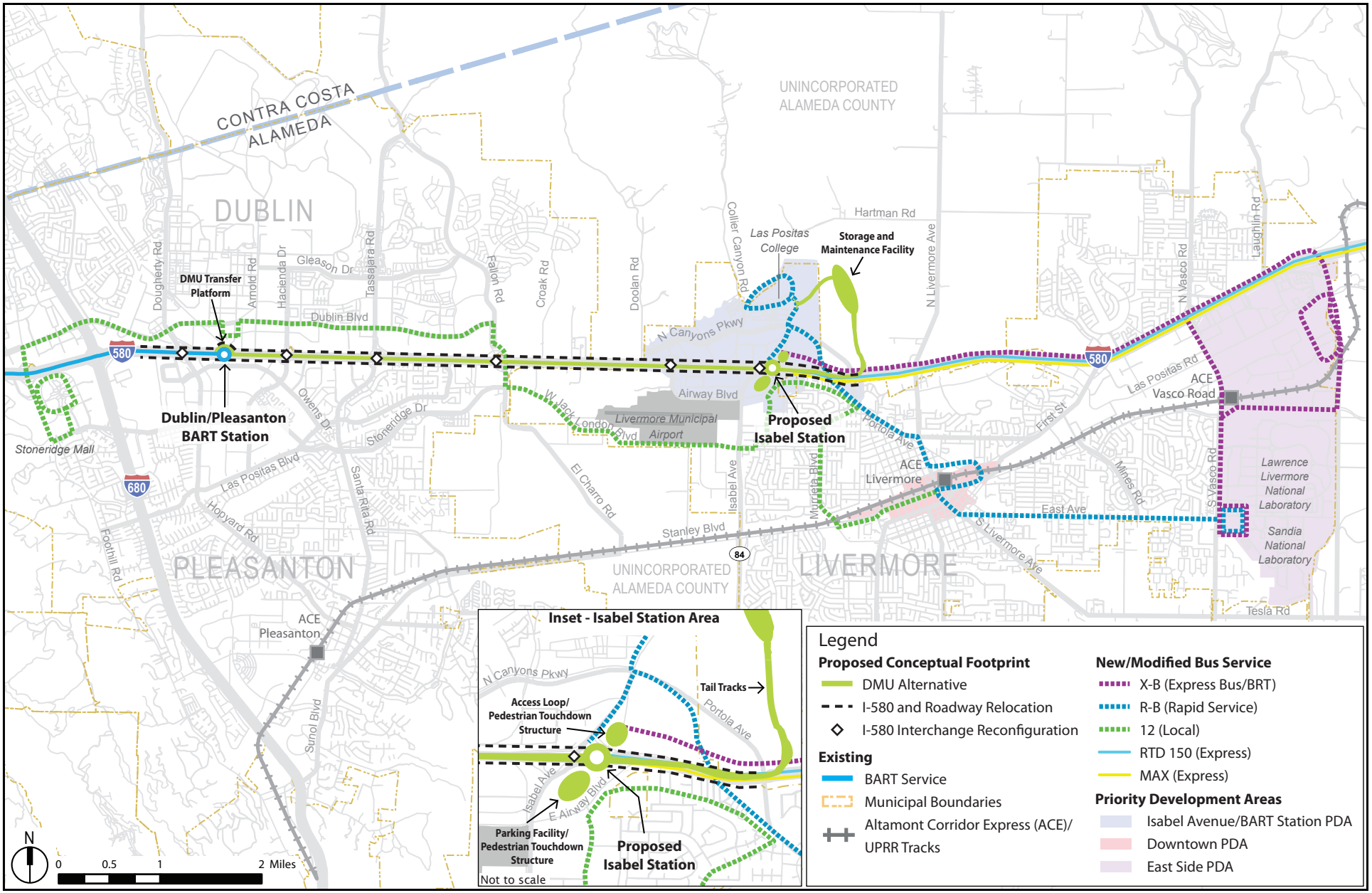
[1] Feeder bus routes would connect key activity nodes in Livermore to the BART system (either Dublin/Pleasanton Station or Isabel Station), and thereby improve service for existing BART patrons and support additional BART patronage.




Source: Arup, 2017a,b.

**BART to Livermore Extension Project EIR**

Figure S-1
Conventional BART Project Overview




Source: Arup, 2017a,b.

BART to Livermore Extension Project EIR

Figure S-2
DMU Alternative
Overview

The DMU Alternative would have a similar median alignment and station configuration as the Proposed Project, but would have a longer alignment and would include a new transfer platform at the Dublin/Pleasanton Station. A new parking structure for the Isabel Station, with approximately 2,428 parking spaces, would be constructed immediately south of I-580 along East Airway Boulevard. In addition, a new, approximately 32-acre storage and maintenance facility would be constructed north of I-580, beyond the terminus of the alignment.

To accommodate the median widening, approximately 7.1 miles of I-580 would be relocated by a total of approximately 46 feet, from west of Dougherty Road/Hopyard Road interchange to the Portola Avenue/I-580 overcrossing. Around the Dublin/Pleasanton Station, the north side of I-580 would be relocated to accommodate the new DMU transfer platform. At the proposed Isabel Station, I-580 would be relocated by a total of approximately 67 feet to accommodate the station in the median. The relocation of I-580 would require modification of some interchanges and surface frontage roads.

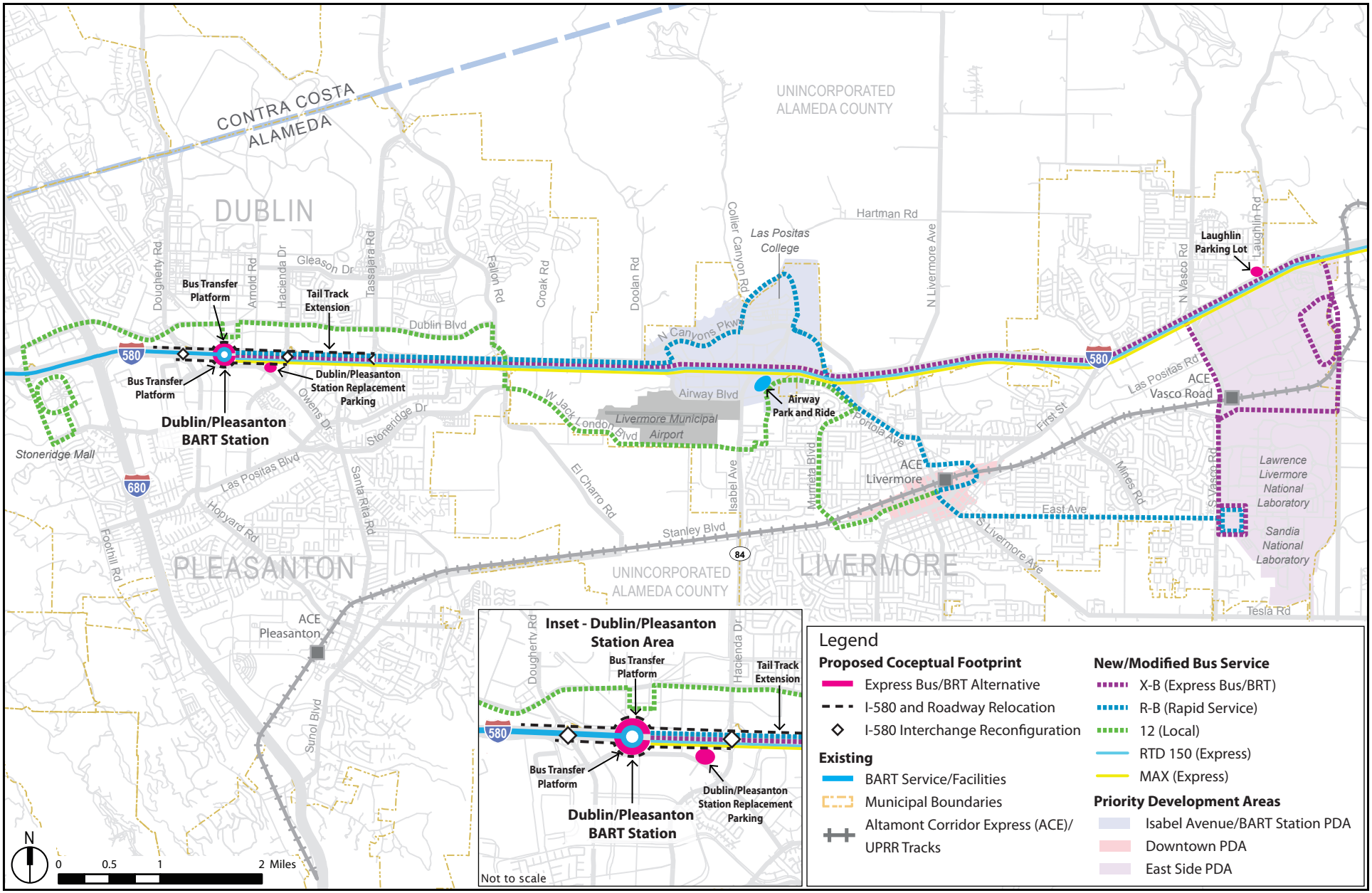
The DMU Alternative includes the same bus components as the Proposed Project, including new and modified feeder bus routes connecting the new station to areas east of the BART system.

A variant of the DMU Alternative—the EMU Option—is also being considered. The EMU Option is generally the same as the DMU Alternative, except that it is electrically powered rather than diesel-powered.

## 4. Express Bus/BRT Alternative

The Express Bus/BRT Alternative, shown in Figure S-3, seeks to achieve the project goals using bus technology only. Under this alternative, new bus transfer platforms would be constructed at the existing Dublin/Pleasanton Station; the bus platforms would be located to the outside of the existing BART station platforms. New bus ramps from the I-580 express lanes would be constructed for buses to enter and connect directly to the bus transfer platforms, allowing passengers to transfer from bus to BART without leaving the station.

To accommodate the new bus transfer platforms and facilities under this alternative, approximately 2.2 miles of I-580, from west of the Dougherty Road/Hopyard Road interchange to the Tassajara Road/Santa Rita Road interchange, would be relocated by approximately 88 feet. The relocation of I-580 would require modification of some interchanges and surface frontage roads.




Source: Arup, 2017a,b.

**BART to Livermore Extension Project EIR**

Figure S-3
Express Bus/BRT Alternative Overview

A new parking lot (or garage) with 210 parking spaces would be constructed at the Dublin/Pleasanton Station to replace parking lost due to the I-580 relocation. In addition, a remote, approximately 230-space park-and-ride lot would be constructed at Laughlin Road, with regular bus service during peak hours from the lot to the Dublin/Pleasanton Station.

This alternative includes a feeder bus operations plan similar to that of the Proposed Project and DMU Alternative. It would be designed to enhance direct connections between the Dublin/Pleasanton Station, Downtown Livermore, both the Downtown Livermore and Vasco Road ACE stations, and Livermore-area PDAs, as well as to maximize use of the I-580 high-occupancy vehicle/high-occupancy toll lanes. Bus service improvements include, but are not limited to, two new express/Rapid bus routes.

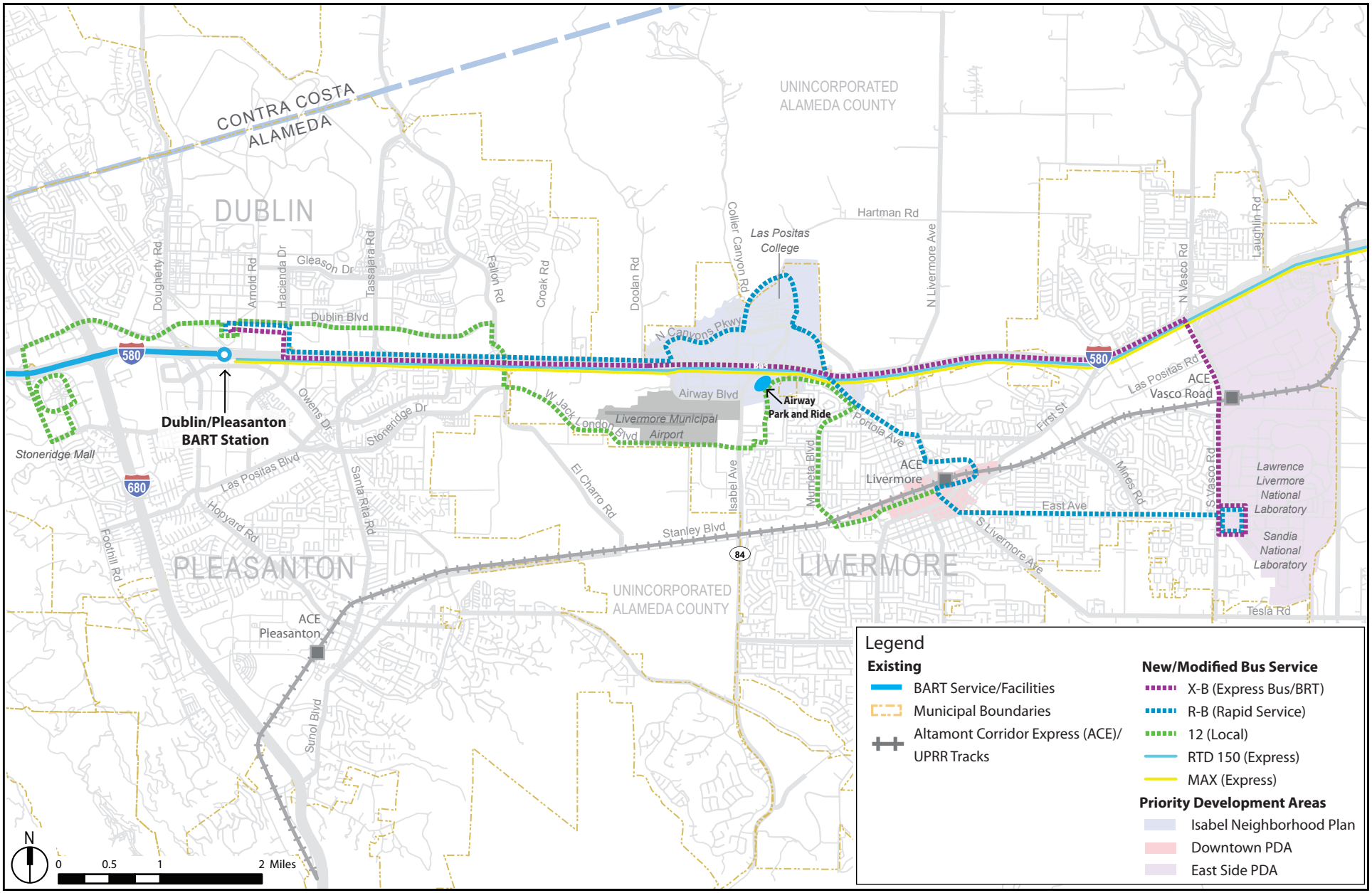
## 5. Enhanced Bus Alternative

Like the Express Bus/BRT Alternative, the Enhanced Bus Alternative, shown in Figure S-4, uses bus-related technology only, and does not include an extension of BART rail service or the development of a new rail station. Unlike the Express Bus/BRT Alternative, however, this alternative does not include any major capital improvements, and would not include the development of bus transfer platforms or direct bus ramps. This alternative provides lower-cost bus service improvements to improve access to the Dublin/Pleasanton Station.

The Enhanced Bus Alternative includes a bus operations plan that is similar to the plan for the feeder bus services for the Proposed Project and other Build Alternatives, designed to enhance direct connections to the Dublin/Pleasanton Station from Las Positas College, Downtown Livermore, and both the Downtown Livermore and Vasco Road ACE stations, as well as to serve existing and future Livermore PDAs.

## 6. Construction Schedule

Construction of the Proposed Project, DMU Alternative, or Express Bus/BRT Alternative is anticipated to begin in 2021 and last approximately 5 years through 2026. Construction activities would occur in phases at various locations along the project corridor. The Enhanced Bus Alternative, as well as the feeder bus improvements under the Proposed Project and other Build Alternatives would be constructed over approximately 2 months.




Source: Arup, 2017a,b.

**BART to Livermore Extension Project EIR**

Figure S-4
Enhanced Bus Alternative
Overview

## 7. Costs

The estimated costs for construction, operation, and maintenance of the Proposed Project and Build Alternatives are summarized below. Cost estimates are based on the preliminary engineering completed for the Proposed Project and Build Alternatives.

### a. Capital Costs

The total estimated capital costs for the Proposed Project and Build Alternatives are presented in Table S-2. The capital costs for the Proposed Project and Build Alternatives, with costs escalated to the mid-point of construction, are as follows: approximately $1,635 million for the Proposed Project; approximately $1,599 million for the DMU Alternative; approximately $1,665 million for the EMU Option; approximately $376 million for the Express Bus/BRT Alternative; and approximately $25 million for the Enhanced Bus Alternative.

**TABLE S-2 ESTIMATED CAPITAL COSTS FOR THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Dollars ($ Millions) | | | | |
|---|---|---|---|---|---|
| | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative |
| Total Cost (2016$) | $1,329 | $1,300 | $1,353 | $305 | $21 |
| Total Cost (escalated to construction mid-point) | $1,635 | $1,599 | $1,665 | $376 | $25 |

Notes: Estimates are based on primary engineering. Costs are based on 2016 dollars. Total project cost is escalated to the estimated mid-point of construction (2024).
Sources: Arup, 2017c; BART, 2017a.

The capital costs for the Proposed Project and Build Alternatives differ primarily based on the length of the rail alignment to be constructed and the length of I-580 corridor modifications that would be required to accommodate the Proposed Project and Build Alternatives. Specifically, the DMU Alternative would have the longest work zone along I-580, followed by the Proposed Project, with a substantially shorter work zone under the Express Bus/BRT Alternative, and no work along I-580 under the Enhanced Bus Alternative. In addition, the size of the storage and maintenance facility affects the cost of construction; e.g., the Proposed Project has a substantially larger facility than the DMU Alternative. The EMU Option has increased costs compared to the DMU Alternative, due to the additional infrastructure needed for electrification, i.e., the catenary system and wayside facilities.

The capital cost for the Proposed Project includes 25 percent of the cost to include a BART storage and maintenance facility. A BART storage and maintenance facility is needed to service the overall future needs of the Daly City-Dublin/Pleasanton Line.

### b. Operating and Maintenance Costs

The total estimated annual operating costs for the Proposed Project and Build Alternatives in 2025 and 2040 are presented in Table S-3. Operating and maintenance costs in 2025 and 2040 are as follows for the Proposed Project and Build Alternatives:

- **Proposed Project**. Approximately $19.0 million in 2025 and $22.8 million in 2040
- **DMU Alternative**. Approximately $14.5 million in 2025 and $16.8 million in 2040
- **EMU Option**. Approximately $14.4 million in 2025 and $16.6 million in 2040
- **Express Bus/BRT Alternative.** Approximately $2.1 million in 2025 and $3.0 million in 2040
- **Enhanced Bus Alternative.** Approximately $1.7 million in both 2025 and 2040

**TABLE S-3 OPERATING AND MAINTENANCE COSTS FOR THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Dollars ($ Millions) | | | | |
|---|---|---|---|---|---|
| | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative |
| 2025 – Operation and Maintenance Cost (2016$) | 19.0 | 14.5 | 14.4 | 2.1 | 1.7 |
| 2040 – Operation and Maintenance Cost (2016$) | 22.8 | 16.8 | 16.6 | 3.0 | 1.7 |

Notes: Costs are based on 2016 dollars.
Source: Arup, 2017d; BART, 2017b.

Operating and maintenance costs are higher for the Proposed Project and Build Alternatives in 2040 than in 2025 due to the higher level of service to accommodate increased ridership and the higher cost of providing service.

Similar to the capital cost, the operating cost for the Proposed Project includes 25 percent of the cost to operate a BART storage and maintenance facility.

## E. PURPOSE OF THIS EIR

An EIR is a document that analyzes the environmental impacts of a proposed project on the physical environment. The main purposes of an EIR are to (1) inform governmental decisionmakers and the public about the potential significant environmental effects of proposed activities; (2) identify alternatives and mitigation measures that can feasibly avoid or reduce significant environmental impacts; (3) disclose to the public any significant environmental impacts that cannot feasibly be avoided.

BART is the lead agency for the BART to Livermore Extension Project and is responsible for conducting the requisite environmental review and adopting a project. The BART Board of Directors will review the EIR and other considerations to determine whether the Proposed Project or an alternative should be approved as proposed, approved with modifications, or not approved. This Draft EIR will also be reviewed by other public agencies, including the local jurisdictions, and by interested individuals and groups, to evaluate the potential impacts of the BART to Livermore Extension Project as well as the proposed mitigation measures and alternatives to reduce potential environmental impacts.

The BART Board of Directors will use the Final EIR (which will include the Draft EIR, comments received during the public review period, responses to those comments, and any revisions to the Draft EIR as a result of public agency and public comments, together with any other revisions initiated by BART) to decide whether to approve the Proposed Project or an alternative, and to specify any applicable mitigation measures as part of project approval.

## F. SUMMARY OF IMPACTS AND MITIGATION MEASURES

Under CEQA Guidelines 15382, a significant impact on the environment is defined as 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.

As discussed in Chapter 3, Environmental Analysis, within the analysis for each respective resource topic, and shown in Table S-5 at the end of this chapter, the Proposed Project and Alternatives would result in several potentially significant impacts. The majority of the impacts identified would be mitigated to a less-than-significant level with implementation of the recommended mitigation measures. However, either project or cumulative impacts would be significant and unavoidable for the following resource topics:

- Transportation (for the Proposed Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative, and Enhanced Bus Alternative)

- Land Use and Agricultural Resources (for the Proposed Project and DMU Alternative/EMU Option)
- Visual Quality (for the Proposed Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)
- Cultural Resources (for the Proposed Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative, and Enhanced Bus Alternative)
- Biological Resources (for the Proposed Project and DMU Alternative/EMU Option)
- Air Quality (for the Proposed Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)
- Energy (for the Enhanced Bus Alternative only)

Table S-5 summarizes the significant environmental impacts and mitigation measures as identified in this EIR. The final significance determination is shown after implementation of mitigation measures. In many cases, significant impacts will be reduced to a less-than-significant level with implementation of mitigation measures. However, in some cases, impacts would remain significant and unavoidable, even after implementation of mitigation measures, or would remain significant and unavoidable because there are no feasible mitigation measures. The applicable mitigation measures to reduce the identified significant impacts to less-than-significant levels are also listed.

Impacts listed in the table include construction and operations impacts, as well as cumulative impacts, which are distinguished from project impacts by the addition of "(CU)" in the impact summary. Beneficial and less-than-significant impacts are not included in Table S-5.

## G. SUMMARY OF BENEFITS

The beneficial effects of the BART to Livermore Extension Project are not environmental impacts under CEQA, and an EIR is not required to evaluate these relative benefits. However, this EIR presents the beneficial effects of the Proposed Project and Build Alternatives, in order for the public and decisionmakers to understand the improvements that could be achieved with implementation.

The Proposed Project and Build Alternatives would have beneficial effects, as identified in Chapter 3, Environmental Analysis, and summarized below. The quantifiable benefits are shown in Table S-4. Although benefits would also occur in 2025, this discussion focuses on benefits in 2040, when the BART to Livermore Extension Project would be in full operation and benefits would be greatest. In addition, this discussion focuses on project-

level benefits. See Chapter 4, Other CEQA Considerations, and Chapter, 5, Project Merits, for additional discussion, including benefits under Cumulative Conditions.

**TABLE S-4 SUMMARY OF QUANTITATIVE BENEFICIAL EFFECTS IN 2040**

| Metric | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|---|
| **Transportation** | | | | | |
| BART System Ridership (average weekday) | +11,900 | +7,000 | +7,000 | +3,500 | +400 |
| Vehicle Miles Traveled (average weekday) | -244,000 | -140,600 | -140,600 | -92,600 | -6,500 |
| **Greenhouse Gas Emissions** | | | | | |
| Annual GHG Emissions (metric tons of $CO_2e$/year) | -11,200 | -3,500 | -6,000 | -3,700 | -- |
| **Energy** | | | | | |
| Regional Energy Consumption (millions British Thermal Units/year) | -130,800 | -35,000 | -66,500 | -56,800 | -- |

Note: -- = No benefit; The Enhanced Bus Alternative would increase GHG emissions by 600 metric tons of $CO_2e$/year and energy use by 8,200 million British Thermal Units/year.
All numbers have been rounded to the nearest hundred.
Data presented represents the difference between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase and negative values represent a decrease.

- **Transportation**. As described in Section 3.B, Transportation, benefits would occur with regard to increased systemwide BART ridership and reduction in total vehicle miles traveled (VMT), as well as pedestrian and bicycle improvements.[2]
  - In 2040, the Proposed Project and Build Alternatives would achieve both an increase in BART systemwide ridership and a reduction in total VMT, as travelers switch from driving to transit.
    - The Proposed Project would result in the greatest increase in BART systemwide ridership, by 11,900 additional riders, as well as the greatest reduction of VMT, by 244,000.
    - The DMU Alternative or EMU Option would increase ridership by 7,000 additional riders, and reduce VMT by 140,600.

[2] Total VMT is the combination of passenger VMT reductions and bus VMT increases (see Table 3.B-30 in Section 3.B, Transportation).

  - The Express Bus/BRT Alternative would increase ridership by 3,500 additional riders, and reduce VMT by 92,600.
  - The Enhanced Bus Alternative would result in the smallest increase in ridership, by 400 additional riders, and smallest reduction in VMT, by 6,500.
- Under **Impacts TRAN-10** and **TRAN-11**, the Proposed Project and DMU Alternative or EMU Option would have beneficial effects pertaining to bicycle and pedestrian access, circulation, and safety. Specifically, the Proposed Project and DMU Alternative (or EMU Option) would incorporate pedestrian and bicycle access improvements in the vicinity of the proposed Isabel Station, including (1) a new sidewalk along the north side of East Airway Boulevard; and (2) a new I-580 pedestrian and bicycle overcrossing of I-580 that would connect to the Isabel Station from both the north and south sides of I-580, eliminating the need for pedestrians to cross the I-580 ramps. The Express Bus/BRT Alternative and Enhanced Bus Alternative would not have any beneficial effects for pedestrians and bicyclists.

- **Air Quality.** As described in Section 3.K, Air Quality, under **Impact AQ-16**, the Proposed Project and Build Alternatives would be consistent with the 2017 Clean Air Plan—the most recently adopted air quality plan for the Bay Area—and support implementation of the plan. The Proposed Project and DMU Alternative or EMU Option would add a rail extension from Dublin/Pleasanton Station to Isabel Station. The Proposed Project and Build Alternatives would also add new express and rapid bus routes as well as bus-related infrastructure improvements.
- **Greenhouse Gas Emissions.** As described in Section 3.L, Greenhouse Gas Emissions, under **Impact GHG-4**, the Proposed Project, DMU Alternative, EMU Option, and Express Bus/BRT Alternative would result in a reduction in GHG emissions associated with reductions in VMT in 2040.
  - The Proposed Project would result in the greatest reduction in GHG emissions, 11,200 metric tons per year.
  - The EMU Option would reduce GHG emissions by 6,000 metric tons per year.
  - The DMU Alternative would reduce GHG emissions by 3,500 metric tons per year.
  - The Express Bus/BRT Alternative would reduce GHG emissions by 3,700 metric tons per year.
  - However, the Enhanced Bus Alternative would result in an increase of 600 metric tons per year, as emission reductions associated with its small number of riders and small VMT reductions would not be enough to outweigh the emissions from the bus itself. This would not represent a benefit.
- **Energy Consumption**. As described in Section 3.M, Energy, under **Impact EN-4,** the Proposed Project, DMU Alternative, EMU Option, and Express Bus/BRT Alternative

would result in a reduction in energy consumption associated with reductions in VMT in 2040.

- The Proposed Project would result in the greatest reduction in energy consumption, by 130,800 MMBTU per year.
- The EMU Option would reduce energy consumption by 66,500 MMBTU per year.
- The Express Bus/BRT Alternative would reduce energy consumption by 56,800 MMBTU per year.
- The DMU Option would reduce energy consumption by 35,000 MMBTU per year.
- However, the Enhanced Bus Alternative would result in an increase in energy consumption by 8,200 MMBTU per year, again because reductions associated with its small number of riders and small VMT reductions would not be enough to outweigh the energy consumption from the bus itself. This would not represent a benefit.

## H. AREAS OF CONTROVERSY

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. A full list of public comments received during the scoping period is available in the scoping report at http://www.bart.gov/about/projects/liv/environment, as well as summarized in Chapter 1, Introduction. The following is a short list of areas of controversy:

- Examine how the BART extension will affect the air quality in the study area, as well as localized impacts to sensitive receptors and residents
- Consider how a BART extension would affect greenhouse gas emissions
- Examine impacts to agricultural land
- Determine the combined noise impacts of the automobile traffic and BART trains
- Identify full parking need at Isabel Station
- Evaluate the traffic impacts from a new station
- Determine details of new bus operations
- Consider the impacts to scenic resources along I-580
- Consider both daytime and nighttime construction impacts on the freeway
- Issues to be resolved include adoption of a project and funding availability

# I. NEXT STEPS

This subsection describes the CEQA process commencing with publication of this Draft EIR.

## 1. Where Can I Review the Draft EIR?

Copies of the Draft EIR can be reviewed in a number of ways. The Draft EIR can be downloaded from BART's website at: http://www.bart.gov/about/projects/liv. To obtain a copy of the Draft EIR on CD-ROM, email BartToLivermore@bart.gov or call (888) 441-0434.

The Draft EIR can be reviewed at the following public libraries:

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

Pleasanton Library
400 Old Bernal Avenue
Pleasanton, CA 94566

Springtown Library
998 Bluebell Drive
Livermore, CA 94551

Dublin Public Library
200 Civic Plaza
Dublin, CA 94568

Rincon Library
725 Rincon Avenue
Livermore, CA 94551

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

San Francisco Bay Area Rapid Transit District
300 Lakeside Drive, 21st Floor
Oakland, CA 94612

Contact the BART to Livermore Extension Project to set up an appointment by using the email address or phone numbers above.

## 2. How Do I Comment on the Draft EIR?

This Draft EIR is being distributed for a 45-day public review and comment period, which extends from July 31, 2017 through September 14, 2017 at 5:00 p.m. During the public review period, two public meetings will be held to receive comments on the Draft EIR as noted below.

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 of the Proposed Project and Build Alternatives, 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.

Written comments should be submitted to:

San Francisco Bay Area Rapid Transit District
Attention: BART to Livermore Extension Project
300 Lakeside Drive, 21st Floor
Oakland, CA 94612

Comments may also be sent via the website (http://www.bart.gov/about/projects/liv), or via email at BartToLivermore@bart.gov. For more information, please email BartToLivermore@bart.gov or call (888) 441-0434. (Please note that comments cannot be accepted by phone.)

The Notice of the Availability of the Draft EIR, which explains how to submit written or verbal comments on the EIR and the dates and locations of the public meetings has been mailed to responsible agencies and noticed to the public in the following ways:

- Published in The Independent, Pleasanton Weekly, Pleasanton Express, Danville Express, East Bay Times, Tri Valley Times, and San Ramon Valley Times
- Mailed to addresses within 0.5 mile of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative
- Emailed to addresses on BART's email notification list and to individuals and organizations who have submitted a written request for notification concerning the Proposed Project

## 3. When and Where Will the Public Hearing Take Place?

There will be two public hearings:

| | |
|---|---|
| Date: Tuesday, August 22, 2017 | Date: Tuesday, August 29, 2017 |
| Time: 6:00-9:00pm | Time: 6:00-9:00pm |
| Location: Robert Livermore Community Center<br>4448 Loyola Way<br>Livermore, CA 94550 | Location: Shannon Community Center<br>11600 Shannon Avenue<br>Dublin, CA 94568 |

## 4. What Will Happen at the Public Hearing?

At the public hearing, BART staff will describe the BART to Livermore Extension Project 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 EIR. The Final EIR will consist of the Draft EIR, comments received during the public review period, responses to those comments, and any

revisions to the Draft EIR as a result of public agency and public comments, together with any other revisions initiated by BART.

## 5. How Will a Decision Be Made to Adopt a Project?

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 Project. The BART Board of Directors will consider the potential project impacts and the benefits as well as any other economic, legal, social, technological, or other considerations to determine whether the Proposed Project or an Alternative should be approved as proposed, approved with modifications, or not approved.

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 require support by substantial evidence in the record:

- Changes or alterations have been required in, or incorporated into, the action that 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 of Directors decides to approve the Proposed Project or an Alternative that has significant effects identified in the Final EIR, but that are not avoided or substantially lessened, the BART Board of Directors must prepare a Statement of Overriding Considerations that makes findings that any unavoidable significant effects are acceptable due to overriding considerations as described in CEQA Guidelines Section 15093. In preparing this statement, CEQA requires the BART Board of Directors to balance the specific benefits of the proposed action against its unavoidable environmental impacts. If the benefits of the proposed action outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered acceptable.

If a project goes forward, it may also require evaluation under the National Environmental Policy Act (NEPA). Projects that make certain modifications to a federal highway or require federal funding are subject to NEPA. Both the Proposed Project and the DMU Alternative would likely require federal funding. The Express Bus/BRT Alternative would affect access to I-580. Therefore, the Proposed Project and two of the three Build Alternatives would likely require an Environmental Impact Statement under NEPA. An Environmental Impact Statement, should one be necessary, would be prepared subsequent to completion of the

CEQA process and BART Board of Directors adoption of the Proposed Project, DMU Alternative (or EMU Option), or Express Bus/BRT Alternative. It is anticipated that the Enhanced Bus Alternative would not be subject to NEPA.

## 6. How Will the Mitigation Measures Identified in the EIR Be Implemented?

As part of the project approval process, the BART Board of Directors must also consider and adopt a mitigation monitoring and reporting program. This program will include all mitigation measures that BART will implement to avoid or reduce significant effects identified in the Final EIR. For each measure, the program will identify the following items: the responsible party for implementing the mitigation measure, the timeframe by which the measure should be implemented, and whether there are interim milestones to determine the successes or effectiveness of the mitigation measure. BART will use the mitigation monitoring reporting program as a mechanism to track implementation of all mitigation measures during construction and operation of the adopted project.

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| **3.B TRANSPORTATION** | | | | | | | | |
| Impact TRAN-1: Result in a significant delay, safety hazard, or diminished access during construction | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure TRAN-1:** Develop and Implement a Construction Phasing and Traffic Management Plan | LSM |
| Impact TRAN-3: General-purpose lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions | | ✓ | ✓ | ✓ | ✓ | | No feasible mitigation measures | SU |
| Impact TRAN-4: General-purpose lane freeway segments operating at unacceptable LOS, under 2040 Project Conditions | | ✓ | ✓ | ✓ | | | No feasible mitigation measures | SU |
| Impact TRAN-5: HOV/express lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions | | | ✓ | ✓ | | | No feasible mitigation measures | SU |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact TRAN-7: Intersections operating at unacceptable LOS, under 2025 Project Conditions | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure TRAN-7a:** Improvements for Intersections #2, #5, #39, and #48 under 2025 Project Conditions (*Conventional BART Project*) **Mitigation Measure TRAN-7b:** Improvements for Intersections #2, #5, and #48 under 2025 Project Conditions (*DMU Alternative/EMU Option)* **Mitigation Measure TRAN-7c:** Improvements for Intersection #48 under 2025 Project Conditions (*Express Bus/BRT Alternative)* | LSM (Express Bus/BRT Alternative) SU (Conventional BART and DMU Alternative/EMU Option) |
| Impact TRAN-8: Intersections operating at unacceptable LOS, under 2040 Project Conditions | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure TRAN-8a:** Improvements for Intersections #1, #2, #5, #35, #39, #45, #48, and #50 under 2040 Project Conditions (*Conventional BART Project*) **Mitigation Measure TRAN-8b:** Improvements for Intersections #1, #2, #5, and #48 under 2040 Project Conditions (*DMU Alternative/EMU Option*) **Mitigation Measure TRAN-8c:** Improvements for Intersection #5 under 2040 Project Conditions (*Express Bus/BRT Alternative*) | SU |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact TRAN-16(CU): General-purpose lane freeway segments operating at unacceptable LOS, under 2040 Cumulative Conditions | | ✓ | ✓ | ✓ | | | No feasible mitigation measures | SU |
| Impact TRAN-19(CU): Intersections operating at unacceptable LOS, under 2025 Cumulative Conditions | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure TRAN-19a:** Improvements for Intersections #5, #38, #39, and #48 under 2025 Cumulative Conditions (*Conventional BART Project*) **Mitigation Measure TRAN-19b:** Improvements for Intersections #2, #5, #48, and #50 under 2025 Cumulative Conditions (*DMU Alternative/EMU Option*) **Mitigation Measure TRAN-19c:** Improvements for Intersection #2 under 2025 Cumulative Conditions (*Express Bus/BRT Alternative*) **Mitigation Measure TRAN-19d:** Improvements for Intersection #48 and #50 under 2025 Cumulative Conditions (*Enhanced Bus Alternative*) | LSM (Express Bus/BRT Alternative and Enhanced Bus Alternative) SU (Conventional BART and DMU Alternative/EMU Option) |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact TRAN-20(CU): Intersections operating at unacceptable LOS, under 2040 Cumulative Conditions | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure TRAN-20a:** Improvements for Intersections #1, #2, #17, #35, #38, #39, #45, #48, and #50 under 2040 Cumulative Conditions (*Conventional BART Project*) **Mitigation Measure TRAN-20b:** Improvements for Intersections #1, #2, #5, #17, #35, #39, #48, and #50 under 2040 Cumulative Conditions (*DMU Alternative/EMU Option*) **Mitigation Measure TRAN-20c:** Improvements for Intersections #1, #2, #5, and #50 under 2040 Cumulative Conditions (*Express Bus/BRT Alternative*) **Mitigation Measure TRAN-20d:** Improvements for Intersections #1, #2, #5, #17, and #50 under 2040 Cumulative Conditions (*Enhanced Bus Alternative*) | SU |
| **3.C LAND USE AND AGRICULTURAL RESOURCES** | | | | | | | | |
| Impact AG-1: Directly convert Farmland | | ✓ | ✓ | ✓ | | | **Mitigation Measure AG-1:** Provide Compensatory Farmland under Permanent Protection | SU |
| Impact AG-3: Conflict with zoning for agricultural use | | ✓ | ✓ | ✓ | | | See **Mitigation Measure AG-1** (above) | SU |
| Impact AG-5(CU): Convert or result in conversion of Farmland | | ✓ | ✓ | ✓ | | | No feasible mitigation measures | SU |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| **3.D POPULATION AND HOUSING** | | | | | | | | |
| Impact PH-2: Displace substantial numbers of existing housing or people necessitating the construction of replacement housing elsewhere | | ✓ | ✓ | ✓ | | | **Mitigation Measure PH-2:** Acquisition of Property and Relocation Assistance | LSM |
| Impact PH-3: Displace substantial numbers of existing businesses | | ✓ | ✓ | ✓ | ✓ | | See **Mitigation Measure PH-2** (above) | LSM |
| **3.E VISUAL QUALITY** | | | | | | | | |
| Impact VQ-1: Substantially degrade the existing visual quality or create a new source of substantial light or glare during construction | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure VQ-1.A:** Visually Screen Staging Areas<br>**Mitigation Measure VQ-1.B:** Minimize Light Spillover During Construction | LSM |
| Impact VQ-3: Substantially degrade the existing visual quality | | ✓ | ✓ | ✓ | | | **Mitigation Measure VQ-3.A:** Design Sound Wall with Architectural Treatments<br>**Mitigation Measure VQ-3.B:** Design Parking Garage with Architectural Treatments<br>**Mitigation Measure VQ-3.C:** Screen Storage and Maintenance Facility | SU |
| Impact VQ-4: Have a substantial adverse effect on a scenic vista | | ✓ | ✓ | ✓ | | | No feasible mitigation measures | SU |
| Impact VQ-5: Substantially damage scenic resources within State scenic highway | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure VQ-5:** Revegetate Areas of Removed Landscaping | SU |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact VQ-6: Create a new source of substantial light or glare | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure VQ-6:** Design and Install Lighting Fixtures to Reduce Spillover | LSM (Express Bus/BRT Alternative) SU (Conventional BART and DMU Alternative/EMU Option) |
| Impact VQ-7(CU): Have a substantial visual impact under Cumulative Conditions | | ✓ | ✓ | ✓ | ✓ | | No feasible mitigation measures | SU |
| **3.F CULTURAL RESOURCES** | | | | | | | | |
| Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure CUL-2.A:** Archaeological Resources Investigation for the Cayetano Creek Area (*Conventional BART Project and DMU Alternative/EMU Option*) **Mitigation Measure CUL-2.B:** Discovery of Previously Unknown Archaeological Resources (*Conventional BART Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative, and Enhanced Bus Alternative*) | LSM |
| Impact CUL-3: Disturb any human remains | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure CUL-3:** Discovery of Previously Unknown Human Remains | LSM |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact CUL-4(CU): Cause a substantial adverse change in the significance of a historical resource, archaeological resources, or disturb human remains under Cumulative Conditions | | ✓ | ✓ | ✓ | ✓ | ✓ | See **Mitigation Measure CUL-2.A**, **CUL-2.B**, and **CUL-3** (above) | SU |
| **3.G GEOLOGY, SOILS, SEISMICITY, MINERAL, AND PALEONTOLOGICAL RESOURCES** | | | | | | | | |
| Impact PALEO-1: Loss of paleontological resources | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure PALEO-1A:** Surface Paleontological Survey of the Cayetano Creek Area (*Conventional BART Project and DMU Alternative/EMU Option*) **Mitigation Measure PALEO-1B:** Paleontological Monitoring (*Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative*) **Mitigation Measure PALEO-1C:** Discovery of Previously Unknown Paleontological Resources (*Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative*) | LSM |
| Impact GEO-5: Fault rupture | | ✓ | | | | | **Mitigation Measure GEO-5:** Geotechnical Investigation of the Cayetano Creek Area and Development of Project Design Features | LSM |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| **3.H HYDROLOGY AND WATER QUALITY** | | | | | | | | |
| Impact HYD-5: Substantially alter drainage patterns – erosion, sedimentation, flooding | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure HYD-5:** Hydraulic Capacity for Non-Flood Hazard Area Crossings | LSM |
| Impact HYD-9: Impede or redirect flood flows within a 100-year flood hazard area | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure HYD-9:** Floodway Hydraulic Analysis | LSM |
| **3.I BIOLOGICAL RESOURCES** | | | | | | | | |
| Impact BIO-1: Adversely affect special-status plants, either directly or through habitat modifications | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-1.A:** Botanical Surveys for Areas Not Previously Surveyed and Refinement of Project Design<br>**Mitigation Measure BIO-1.B:** Salvage and Relocation of Rare Plants that Cannot be Avoided | LSM |
| Impact BIO-2: Adversely affect vernal pool fairy shrimp and longhorn fairy shrimp | | ✓ | ✓ | ✓ | | | **Mitigation Measure BIO-2:** Consult with USFWS and Reduce Impacts on Vernal Pool Invertebrates and Their Habitat in the I-580 Corridor Area (north of Croak Road) and Cayetano Creek Area | LSM |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact BIO-3: Adversely affect California tiger salamander and California red-legged frog | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-3.A:** Consult with USFWS, Survey Potential Habitat, and Reduce Impacts on Special-status Amphibians during Construction<br>**Mitigation Measure BIO-3.B:** Provide Compensatory Habitat to Mitigate for the Loss and Disturbance of CTS and CRLF Habitat<br>**Mitigation Measure BIO-3.C:** General Measures for Biological Resources Protection during Construction | LSM |
| Impact BIO-4: Adversely affect western spadefoot | | ✓ | ✓ | ✓ | | | **Mitigation Measure BIO-4:** Preconstruction Survey and Avoidance Measures for the Western Spadefoot | LSM |
| Impact BIO-5: Adversely affect western pond turtle | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-5:** Preconstruction Surveys and Relocation of Western Pond Turtle | LSM |
| Impact BIO-6: Adversely affect western burrowing owl | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-6.A:** Preconstruction Surveys for Burrowing Owl (*Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative*)<br>**Mitigation Measure BIO-6.B:** Off-site Compensatory Habitat for Burrowing Owl (*Conventional BART Project and DMU Alternative/EMU Option*) | LSM |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact BIO-7: Adversely affect nesting raptors and other nesting birds | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure BIO-7:** Identify and Avoid Active Nesting Birds during Nesting Season | LSM |
| Impact BIO-8: Adversely affect special-status bats | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-8:** Preconstruction Surveys and Avoidance Measures for Pallid Bat | LSM |
| Impact BIO-9: Adversely affect American badger | | ✓ | ✓ | ✓ | | | **Mitigation Measure BIO-9:** Preconstruction Surveys and Avoidance Measures for American Badger | LSM |
| Impact BIO-10: Adversely affect San Joaquin kit fox | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-10.A:** Preconstruction Surveys and Avoidance Measures for the San Joaquin Kit Fox (*Conventional BART Project and DMU Alternative/EMU Option*)<br>**Mitigation Measure BIO-10.B:** Provide Compensatory Habitat to Mitigate for the Loss and Disturbance of San Joaquin Kit Fox Habitat (*Conventional BART Project and DMU Alternative/EMU Option*)<br>See **Mitigation Measure BIO-3.C** above *(Express Bus/BRT Alternative)* | LSM |
| Impact BIO-11: Have a substantial adverse effect on State or federally protected wetlands or waters | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-11.A:** Avoid and Minimize Impacts to Wetlands, Waters of the U.S. and/or Waters of the State<br>**Mitigation Measure BIO-11.B:** Compensatory Mitigation for Wetlands, Waters of the U.S. and/or Waters of the State | LSM |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact BIO-12: Have a substantial adverse effect on riparian habitat or sensitive natural communities | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-12.A:** Identify and Avoid Sensitive Natural Communities<br>**Mitigation Measure BIO-12.B:** Compensate for Impacts to CDFW-regulated Sensitive Upland Plant Communities | LSM |
| Impact BIO-15: Result in loss of protected tees identified in local policies or ordinances | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure BIO-15:** Conduct an Inventory of Protected Trees, Protect Trees that Remain, and Plant Replacement Trees | LSM |
| Impact BIO-16(CU): Adversely affect species identified as a candidate, sensitive, or special-status under Cumulative Conditions | | ✓ | ✓ | ✓ | | | No additional mitigation measures beyond those identified for project impacts | SU |
| **3.J NOISE AND VIBRATION** | | | | | | | | |
| Impact NOI-1: Expose persons to or generate noise or vibration levels in excess of standards during construction | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure NOI-1:** Limit Construction Hours and Methods for Pile Driving and Other Construction Activities | LSM |
| Impact NOI-5: Result in a substantial permanent increase in ambient noise levels from roadway realignment and traffic distribution in the project vicinity under 2025 Project Conditions | | ✓ | ✓ | ✓ | | | **Mitigation Measure NOI-5:** Construct Noise Barrier along Airway Boulevard | LSM |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact NOI-6: Result in a substantial permanent increase in ambient noise levels from roadway realignment and traffic distribution in the project vicinity under 2040 Project Conditions | | ✓ | ✓ | ✓ | | | See **Mitigation Measure NOI-5** (above) | LSM |
| Impact NOI-7: Expose persons to or generate excessive groundborne vibration or groundborne noise levels under 2025 and 2040 Project Conditions | | | ✓ | | | | **Mitigation Measure NOI-7:** Vibration-Reducing Design Elements | LSM |
| **3.K AIR QUALITY** | | | | | | | | |
| Impact AQ-1: Result in potentially significant, localized dust-related air quality impacts during construction | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure AQ-1:** BAAQMD Construction Best Management Practices | LSM |
| Impact AQ-2: Generate emissions of $NO_x$, PM, and ROGs exceeding BAAQMD significance thresholds during construction | | ✓ | ✓ | ✓ | | | **Mitigation Measure AQ-2:** Construction Emissions Reduction Plan – for Mitigating Mass Emissions for $NO_x$ | LSM |
| Impact AQ-3: Generate TAC and $PM_{2.5}$ emissions that result in health risks above the BAAQMD significance thresholds during construction | | ✓ | ✓ | ✓ | ✓ | | **Mitigation Measure AQ-3:** Construction Emissions Reduction Plan – for Mitigating Cancer Risk | LSM |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact AQ-7(CU): Generate TAC and $PM_{2.5}$ emissions that result in health risks above the BAAQMD significance thresholds during construction under Cumulative Conditions | | ✓ | ✓ | ✓ | | | See **Mitigation Measure AQ-3** (above) | SU |
| Impact AQ-12: Result in increased emissions of TACs and $PM_{2.5}$, resulting in increased health risk above BAAQMD significance thresholds under 2040 Project Conditions | ✓ | | | | | | Not applicable | S |
| Impact AQ-18(CU): Result in increased emissions of TACs and $PM_{2.5}$, resulting in increased health risk above BAAQMD significance thresholds under 2025 Cumulative Conditions | | ✓ | ✓ | ✓ | ✓ | | No feasible mitigation measures | SU |
| Impact AQ-19(CU): Result in increased emissions of TACs and $PM_{2.5}$, resulting in increased health risk above BAAQMD significance thresholds under 2040 Cumulative Conditions | ✓ | ✓ | ✓ | ✓ | | | No feasible mitigation measures | S (No Project Alternative) SU (Conventional BART and DMU Alternative/EMU Option) |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| **3.L GREENHOUSE GAS EMISSIONS** | | | | | | | | |
| Impact GHG-3: Generate GHG emissions, either directly or indirectly, above BAAQMD significance thresholds, or conflict with plans, policies, or regulations that reduce GHG emissions, under 2025 Project Conditions | | | | | | ✓ | **Mitigation Measure GHG-3:** Obtain Carbon Offsets For Bus Emissions | LSM |
| Impact GHG-4: Generate GHG emissions, either directly or indirectly, above BAAQMD significance thresholds, or conflict with plans, policies, or regulations that reduce GHG emissions, under 2040 Project Conditions | ✓ | | | | | | Not applicable | S |
| Impact GHG-6(CU): Generate GHG emissions, either directly or indirectly, above BAAQMD significance thresholds, or conflict with plans, policies, or regulations that reduce GHG emissions under 2040 Cumulative Conditions | ✓ | | | | | | Not applicable | S |

TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| **3.M ENERGY** | | | | | | | | |
| Impact EN-3: Result in wasteful, inefficient, or unnecessary consumption of energy, under 2025 Project Conditions | | | | | | ✓ | **Mitigation Measure EN-3:** Incorporate Renewable Energy Features | SU |
| Impact EN-4: Result in wasteful, inefficient, or unnecessary consumption of energy, under 2040 Project Conditions | ✓ | | | | | ✓ | See **Mitigation Measure EN-3** (above) | S (No Project Alternative)<br>SU (Enhanced Bus Alternative) |
| Impact EN-6(CU): Result in wasteful, inefficient, or unnecessary consumption of energy, under 2040 Cumulative Conditions | ✓ | | | | | | Not applicable | S |
| **3.N PUBLIC HEALTH AND SAFETY** | | | | | | | | |
| Impact PHS-1: Create a potential public or environmental health hazard; undue potential risk for health-related accidents; or result in a safety hazard for people residing or working in the project area during construction | | ✓ | ✓ | ✓ | ✓ | ✓ | **Mitigation Measure PHS-1.A:** Prepare Phase I ESA and Phase II ESA, as Necessary<br>**Mitigation Measure PHS-1.B:** Soil Management Plan<br>**Mitigation Measure PHS-1.C:** Hazardous Materials and Hazardous Waste Management Plan<br>**Mitigation Measure PHS-1.D:** Fueling Procedures during Construction<br>**Mitigation Measure PHS-1.E:** Emergency Response Plan during Construction | LSM |

**TABLE S-5 SUMMARY OF SIGNIFICANT IMPACTS**

| Impact Summary | No Project Alternative | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative | Mitigation Measure Title | Impact Significance after Mitigation |
|---|---|---|---|---|---|---|---|---|
| Impact PHS-2: Physically interfere with an adopted emergency response or evacuation plan during construction | | ✓ | ✓ | ✓ | ✓ | | See **Mitigation Measure TRAN-1** (above) | LSM |
| **3.O COMMUNITY SERVICES** | | | | | | | | |
| Impact CS-1: Need for new or physically altered governmental facilities to maintain acceptable service ratios, response times, or other performance objectives for police, fire, and emergency response during construction | | ✓ | ✓ | ✓ | ✓ | | See **Mitigation Measure TRAN-1** (above) | LSM |
| **3.P UTILITIES** | | | | | | | | |
| Impact UTIL-1: Substantially disrupt utility services, including power, natural gas, communications, drinking water supplies, wastewater transport, or stormwater transport, during construction activities | | ✓ | ✓ | ✓ | ✓ | | **UTIL-1.A:** Restrict Service Interruptions to Off-Peak Periods<br>**UTIL-1.B:** Arrange Temporary Backup Service<br>**UTIL-1.C:** Notify Customers of Service Interruptions | LSM |

Notes: LSM=Less-than-Significant impact with mitigation; S=Significant impact of No Project Alternative (mitigation is inapplicable); SU=Significant and unavoidable, even with mitigation or no feasible mitigation available.
DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit; LOS = level of service; USFWS = United States Fish and Wildlife Service; CTS = California tiger salamander; CRLF = California red-legged frog; BUOW = burrowing owl; SJKF = San Joaquin kit fox; $NO_X$ = nitrogen oxides; PM = particulate matter; ROG = reactive organic gas; BAAQMD = Bay Area Air Quality Management District; TAC = toxic air contaminant; $PM_{2.5}$ = fine particulate matter less than 2.5 microns in diameter; GHG = greenhouse gas.

# CHAPTER 1
# INTRODUCTION

## A. EIR OVERVIEW

BART is proposing the BART to Livermore Extension Project, which is being evaluated in this Draft EIR. The Proposed Project, which is also referred to as the Conventional BART Project, would extend transit service 5.5 miles east into eastern Alameda County from the existing Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) within and adjacent to the Interstate (I-) 580 right-of-way (ROW), through the cities of Dublin and Pleasanton, to a proposed new terminus station located at the Isabel Avenue/I-580 interchange in the city of Livermore (referred to herein as Isabel Station). In addition, a new parking facility would be constructed at the new Isabel Station and a new BART storage and maintenance facility would be constructed beyond the Isabel Station, north of I-580. The Proposed Project includes new and modified bus routes, connecting the new Isabel Station to downtown Livermore, Lawrence Livermore National Laboratory (LLNL), the Vasco Road Altamont Corridor Express (ACE) station, and other areas east of the BART system. The overall performance of these bus routes would be improved via the implementation of transit priority infrastructure enhancements.

In compliance with CEQA, this Draft EIR describes the potential environmental effects of the Proposed Project, as well as mitigation measures and alternatives that would avoid or reduce significant adverse environmental impacts. This Draft EIR evaluates the potential impacts of the Proposed Project and three Build Alternatives—the Diesel Multiple Unit (DMU) Alternative (which includes a variant referred to as the Electrical Multiple Unit [EMU] Option), the Express Bus/Bus Rapid Transit (BRT) Alternative, and the Enhanced Bus Alternative. The three Build Alternatives were identified in initial screening as alternatives which potentially could meet most of the project objectives and be completed within a reasonable timeframe, and therefore merited full evaluation in this EIR. In addition, the No Project Alternative (or No Build Alternative) is evaluated.

The Proposed Project and the three Build Alternatives are collectively referred to as either the BART to Livermore Extension Project or the Proposed Project and Build Alternatives. Furthermore, the Proposed Project, Build Alternatives, and the No Project Alternative are collectively referred to as the Proposed Project and Alternatives.

The major goals and objectives of the BART to Livermore Extension Project evaluated in this Draft EIR are as follows:

- Provide a cost-effective intermodal link of the existing BART system to the inter-regional rail network and a series of Priority Development Areas (PDAs) identified by the City of Livermore, the Metropolitan Transportation Commission (MTC), and the Association of Bay Area Governments (ABAG). These PDAs include the Livermore Isabel Avenue BART Station PDA, the Livermore Downtown PDA, and the Livermore East Side PDA.
- Support the regional goals of integrating transit and land use policies to create opportunities for transit-oriented development (TOD) in PDAs in the Livermore area.
- Provide an effective commute alternative to traffic congestion on I-580.
- Improve air quality and reduce greenhouse gas (GHG) and other emissions associated with automobile use.

Each of the Build Alternatives would use a different transit technology to provide greater transit service east from the Dublin/Pleasanton Station. The DMU Alternative, like the Proposed Project, would extend rail service to a new station 5.5 miles to the east of the Dublin/Pleasanton Station, but would use a standard gauge track and rail vehicles known as diesel multiple units (DMUs). The EMU Option would be the same as the DMU Alternative but would use electric rail vehicles known as electric multiple units (EMUs). The Express Bus/BRT Alternative would use Express Bus and BRT technology only and would not include an extension of rail service or the development of a new station. The Enhanced Bus Alternative would provide lower-cost bus service improvements (such as bulb-outs, bus shelters, and transit signal priority) to improve access to the Dublin/Pleasanton Station and would not include any major capital improvements. As required by CEQA, this EIR also considers anticipated environmental consequences in the event that neither the Proposed Project nor any of the Build Alternatives are adopted, referred to as the No Project Alternative. The Proposed Project and Alternatives are described in detail in Chapter 2, Project Description.

## B. PURPOSE OF THE EIR

In accordance with CEQA, California Public Resources Code (PRC) Section 21002.1, BART has prepared this EIR for the following purposes:

- To identify the significant effects on the environment of the Proposed Project, to identify alternatives to the Proposed Project, and to identify the manner in which the significant effects can be mitigated or avoided
- To mitigate or avoid the significant effects of the Proposed Project and Build Alternatives 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 Project
- To provide meaningful public disclosure and focus on potentially significant effects on the environment of the Proposed Project

This Draft EIR has been prepared in accordance with CEQA (PRC Section 21000 et seq.) and the CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 et seq.). 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 principal responsibility for carrying out or approving a project and conducting environmental review.

The lead agency is charged with the duty of substantially lessening or avoiding significant environmental effects of projects subject to CEQA where feasible (see PRC Section 21002, CEQA Guidelines Sections 15002(a)(3) and 15021(a)(2)). As defined in 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.

The EIR informs public agency decision-makers and the public of the significant environmental effects of the Proposed Project and the ways in which those impacts can be reduced to less-than-significant levels, where feasible, either through mitigation measures or the implementation of alternatives to the project. Where feasible mitigation measures are insufficient to reduce an impact to less-than-significant, the effect is considered significant and unavoidable. This document is considered a Draft EIR under CEQA because it is subject to revision following review and comment by other agencies and members of the public.

As described below in the Project Background subsection, in 2010, BART completed a Program EIR (PEIR) for the BART to Livermore Extension Program that studied various alternative alignments. The BART Board of Directors certified the PEIR and selected a preferred alternative in July 2010. The PEIR is available online at http://www.bart.gov/about/projects/liv/environment.

This Draft EIR is a project-level EIR that evaluates the Proposed Project and Alternatives in a greater level of detail than was possible in the PEIR, and certification of this document is a required step before construction of the Proposed Project or one of the Build Alternatives can proceed. The BART Board of Directors must consider the information in this EIR and the public comments on significant effects identified in this EIR (included in

the Final EIR) before making a determination on the Proposed Project or Alternatives. The BART Board of Directors will use the Final EIR (which will consist of the Draft EIR, comments received during the public review period, responses to those comments, and any revisions to the Draft EIR as a result of public agency and public comments, together with any other revisions initiated by BART) in deciding whether to approve, modify, or disapprove the Proposed Project or one of the Build Alternatives, and to specify any applicable mitigation measures as part of project approval.

## C. PROJECT BACKGROUND

This section describes the existing and planned BART service in the San Francisco Bay Area (Bay Area) and the BART to Livermore Extension PEIR.

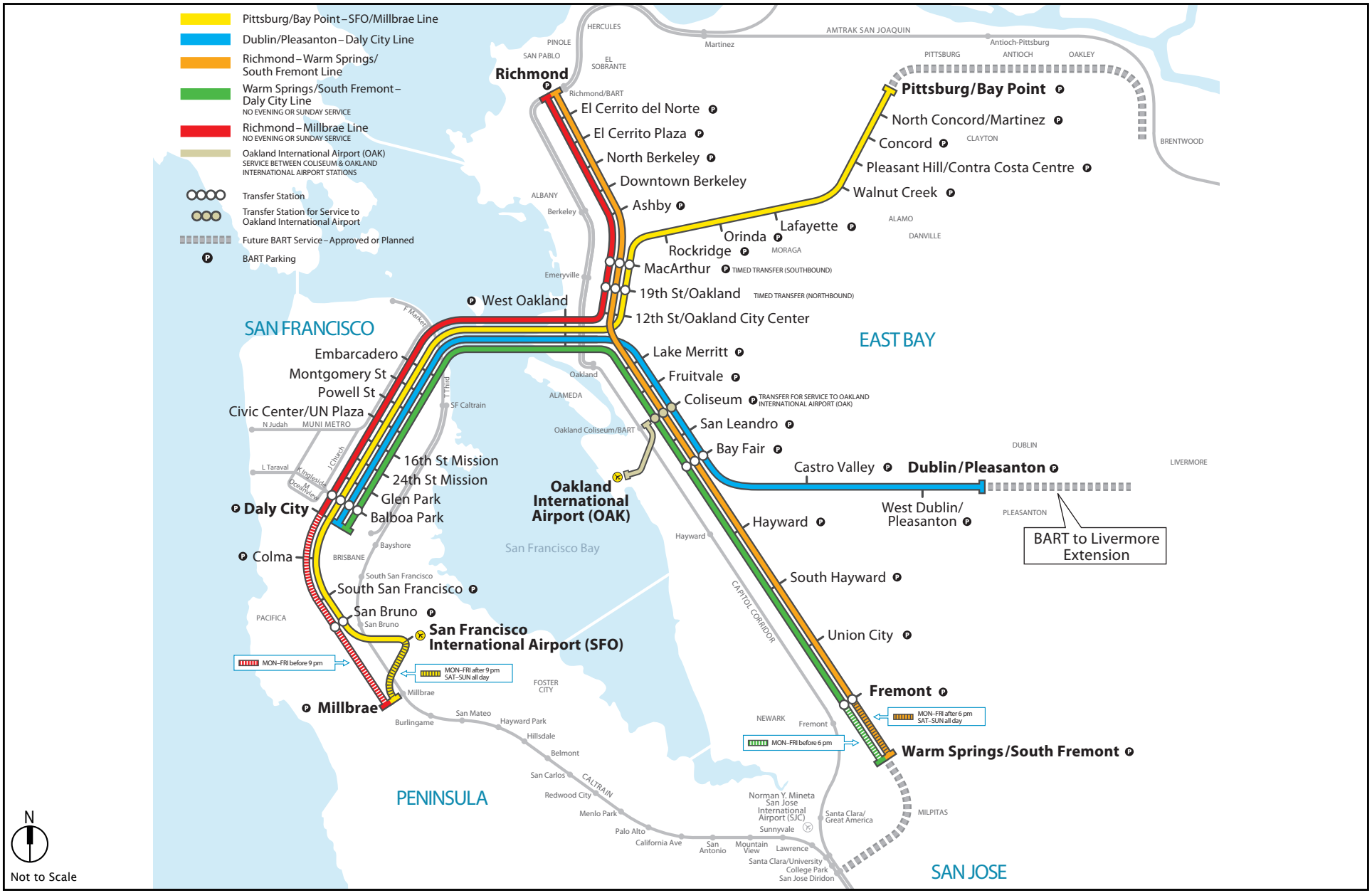
### 1. Existing and Planned BART Service

BART has been in operation since 1972 and currently operates in four Bay Area counties—San Francisco, Alameda, Contra Costa, and San Mateo—and will soon operate in a fifth county, Santa Clara. The BART systemwide map is shown in Figure 1-1. BART has 6 lines (Red, Yellow, Orange, Blue, Green, and the Oakland Airport Connector), 46 stations, and 112 route miles.

Expansion of the original BART system has included extensions to: (1) Dublin/Pleasanton in eastern Alameda County; (2) Pittsburg/Bay Point in eastern Contra Costa County; (3) San Francisco International Airport in San Mateo County, with a terminus in Millbrae; (4) Oakland International Airport in Alameda County via an automated guideway transit connection; and (5) extension of the Fremont line 5.4 miles south to the new Warm Springs/South Fremont Station, which began passenger service on March 25, 2017.

In eastern Alameda County, BART service extends as far east as the Dublin/Pleasanton Station, which opened in 1997 and is located in the median of I-580 just east of the Dougherty Road/I-580 interchange. The West Dublin/Pleasanton Station, an infill station west of I-680 and also located in the median of I-580, opened in 2011. These stations provide transit connections to the Tri-Valley Area, including to the cities of Dublin, Pleasanton, and Livermore. Since opening, the Dublin/Pleasanton line has been heavily used. In 2016, Dublin/Pleasanton Station had an average of 16,220 weekday entries and exits and the West Dublin/Pleasanton Station had an average of 7,268 weekday entries and exits.[1]

[1] San Francisco Bay Area Rapid Transit District (BART), 2016. 2016 Monthly Ridership Reports. Available at: http://www.bart.gov/about/reports/ridership/, accessed February 22, 2017.




Source: BART, 2017.

**BART to Livermore Extension Project EIR**

Figure 1 - 1
Introduction
Regional BART System and Proposed BART to Livermore Extension Project

Several additional extension projects are currently under construction or environmental review, including the East Contra Costa County extension (eBART) and the Silicon Valley extension. The eBART extension will introduce a new rail passenger service comprising approximately 10 miles of new track between the Pittsburg/Bay Point Station (existing end-of-the-line station) and a new terminus in the city of Antioch, with an intermediate Pittsburg Center Station.[2] The Silicon Valley extension is a proposed 16-mile extension with six new stations, extending south from the Warm Springs/South Fremont Station into Santa Clara County. The extension is being developed in two phases. Phase I is the northernmost 10-mile alignment referred to as the Silicon Valley Berryessa Extension, which currently is under construction. This extension will have two new BART stations: the Milpitas BART Station, located between Montague Expressway and Capitol Avenue in the city of Milpitas, and the Berryessa BART Station between Berryessa Road and Mabury Road in the city of San Jose. Phase II, which would extend an additional 6 miles with stations at Alum Rock, Downtown San Jose, Diridon, and Santa Clara near the Caltrain Station (new terminus), is currently undergoing environmental review.[3]

## 2. BART to Livermore Extension Program

In November 2009, BART released the Draft PEIR for the BART to Livermore Extension Program. The purpose of the PEIR was to evaluate possible alignments for BART expansion, and the Draft PEIR considered nine different alignment alternatives for extending the existing BART service eastward from the Dublin/Pleasanton Station to Livermore. For purposes of programmatic analysis, the PEIR assumed use of Conventional BART technology, that is, BART's existing heavy rail, electric-powered technology. The PEIR analysis was focused on alignment alternatives and was not intended to evaluate alternative technologies such as DMU or bus alternatives. The BART Board of Directors did not select a technology at the end of the PEIR process. Instead, the evaluation of alternative technologies was deferred to this project-level EIR.

Seven of the nine alternative alignments studied programmatically in the Draft PEIR would have extended farther east than the Isabel Avenue/I-580 interchange, which is the location proposed for the terminus station for the Proposed Project. Thus, the geographic scope of the PEIR, which extended east to Greenville Road, was larger than the geographic scope of the Proposed Project and Build Alternatives studied in this EIR.

The routes and station locations studied in the PEIR were based on prior BART studies and input from BART's local partners in Alameda County and the Tri-Valley Area. The PEIR

[2] San Francisco Bay Area Rapid Transit District (BART), 2017. Projects. Available at: http://www.bart.gov/about/projects, accessed January 13, 2017.
[3] Santa Clara Valley Transportation Authority (VTA), 2017. BART Stations. Available at: http://www.vta.org/bart/stations, accessed January 16, 2017.

evaluated accessibility, ability to improve transit service, potential impacts to the environment, availability of vacant land, overall costs, compatibility with the local urban growth boundary, and more. Details of the challenges and benefits of specific alignment alternatives are described in the PEIR.

BART released a Final PEIR in June 2010. The Final PEIR included an additional alignment alternative to Downtown Livermore, referred to as Alternative 2B (Portola-Vasco), which combined features of several of the alternatives studied in the Draft PEIR. The Portola-Vasco alignment extended eastward from Dublin/Pleasanton Station in the median of I-580 before extending south along Portola Avenue to a new station in Downtown Livermore. From Downtown Livermore, it extended along the Union Pacific Railroad tracks to Vasco Road where a second station and a maintenance yard would be constructed. On July 1, 2010, the BART Board of Directors certified the PEIR and selected Alternative 2B (Portola-Vasco) as the preferred alternative.

Initially, the City of Livermore recommended the Portola-Vasco alignment; however, following further public discussion, the City determined that it preferred an alignment along I-580 from Dublin/Pleasanton Station to Greenville Road with stations at Isabel Avenue and Greenville Road. This alignment was then incorporated into the City of Livermore's General Plan.

As part of the continuing BART to Livermore planning process, BART has produced this second tier, project-level Draft EIR for a BART extension to a new station at Isabel Avenue. The Proposed Project in this Draft EIR corresponds to the alignment of Alternative 4 (Isabel Avenue/I-580 interchange) in the PEIR. In addition, both the City's preferred I-580 alignment and BART's Portola-Vasco alignment share the 5.5-mile segment from Dublin/ Pleasanton Station to Isabel Avenue in the I-580 median.

The project-level evaluation in this Draft EIR is limited to the Proposed Project (and alternatives to the Proposed Project) extending in the I-580 median to the proposed station east of the Isabel Avenue/I-580 interchange, together with tail track, storage and maintenance facility, and other facilities such as wayside facilities and parking structure.

From Isabel Avenue, a future extension farther east of BART or other type of technology could extend to either Downtown Livermore or along I-580 to Greenville Road. Such an extension, as contemplated in the PEIR, would be the subject of a separate project-level evaluation in a future environmental document. The Proposed Project does not preclude extending transit service farther east in an alignment within, or extending out of, the I-580 median. Chapter 5, Project Merits, describes which technologies could be implemented for a future extension, based on whether the Proposed Project or one of the alternatives is adopted.

# D. REGIONAL CONTEXT

This section provides an overview of the regional context for the BART to Livermore Extension Project, discusses the existing transportation conditions in eastern Alameda County and existing transit services in the Tri-Valley Area, and outlines the key transit system expansion policies relevant to the Proposed Project and Alternatives.

The Tri-Valley Area is located east of the San Francisco Bay within the I-580 and I-680 corridors and consists of three valleys: the Amador, Livermore, and San Ramon valleys.[4] Livermore is in the Livermore Valley and Dublin and Pleasanton are in the Amador Valley; both valleys are in Alameda County. The combination of the Livermore and Amador Valleys is referred to as the Livermore-Amador Valley. The town of Danville and city of San Ramon are in the San Ramon Valley in Contra Costa County.

Within this area, eastern Alameda County is primarily defined by the cities of Dublin, Pleasanton, and Livermore, as well as unincorporated County lands to the north and south.[5] Figure 1-2 shows the regional context of the Proposed Livermore Extension Project, including city boundaries and geographic features.

Eastern Alameda County has been one of the fastest growing subregions of the Bay Area. As a result, travel demand has continued to increase despite frequent congestion on I-580. In addition, inter-regional commuting along I-580 from San Joaquin County to the Bay Area has exacerbated traffic issues throughout the project corridor. The regional trends of continued growth, a constrained road network, and limited transit options create the need for additional transit service to improve mobility throughout the area. Regional trends related to population and job growth, as well as the demand for transportation services and transit services, are described below.

## 1. Regional Growth Trends

By 2040, Alameda County is projected to experience an increase in population of approximately 27 percent (from 1,559,308 to 1,987,900 persons) and have an increase in households of approximately 28 percent (from 551,734 to 705,330 households).[6, 7]

[4] Bay Area Council Economic Institute, 2016. Tri-Valley Rising. Available at: http://www.bayareaeconomy.org/report/tri-valley-rising/, accessed October 28, 2016.
[5] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.
[6] United States Census Bureau, 2014. 2010-2014 American Community Survey 5-Year Estimates. Available at: https://factfinder.census.gov/.
[7] Association of Bay Area Governments (ABAG), 2013. op. cit.


Source: NOAA, 2016.

BART to Livermore Extension Project EIR

Figure 1-2
Introduction
Regional Context

Furthermore, by 2040, the county is projected to have an approximately 27 percent increase in jobs (from 746,688 to 947,650 jobs).[8, 9]

A large portion of Alameda County's growth is projected to occur in the eastern part of the county, primarily in the communities of Dublin, Pleasanton, and Livermore. As further described in Section 3.D, Population and Housing, Dublin is anticipated to experience the greatest growth of these three cities, with an increase in population of 49 percent and an increase in jobs of 65 percent. Pleasanton is projected to increase in population by 25 percent and in jobs by 9 percent, and Livermore is projected to increase in population by 24 percent and jobs by 18 percent.[10, 11, 12]

San Joaquin County, immediately east of Alameda County along the I-580 corridor, is projected to have an approximately 44 percent increase in population by 2040 (from 742,781 to 1,070,486 persons) and an approximately 38 percent increase in households (from 231,693 to 319,756 households). By 2040, San Joaquin County is projected to have an approximately 37 percent increase in jobs (from 219,330 to 299,717 jobs). [13, 14]

## 2. Regional Transportation Conditions

Throughout the Bay Area region, daily minutes of delay per worker due to commute congestion have continued to steadily increase, rising by over 40 percent over the past two decades. Further, between 2014 and 2015, freeway delays due to congestion increased by 22 percent in the region.[15]

Within Alameda County, the highways are key regional and interregional connectors. Overall, an estimated 66 percent of total miles traveled by vehicles in the county are on highways.[16] I-580 is the primary east-west transportation corridor in eastern Alameda

[8] United States Census Bureau, 2012. 2012 Economic Census, 2012 Economic Census of Island Areas, and 2012 Nonemployer Statistics. Available at: https://www.census.gov/programs-surveys/economic-census.html.

[9] Association of Bay Area Governments (ABAG), 2013. op. cit.

[10] United States Census Bureau, 2014. op. cit.

[11] United States Census Bureau, 2012. op. cit.

[12] Association of Bay Area Governments (ABAG), 2013. op. cit.

[13] Increase is from existing conditions in 2015.

[14] San Joaquin Council of Governments, 2014. Regional Transportation Plan, Sustainable Communities Strategy. Available at: http://www.sjcog.org/278/Adopted-2014-RTPSCS

[15] Metropolitan Transportation Commission (MTC), 2017a. Vital Signs, Time Spent in Congestion. Available at: http://www.vitalsigns.mtc.ca.gov/time-spent-congestion, accessed June 30, 2017.

[16] Alameda County Transportation Commission (Alameda CTC), 2016. Highways in Alameda County - Facts, Challenges and Opportunities. Available at: http://www.alamedactc.org/files/managed/Document/17989/Highways_FactSheet.pdf, accessed September 15, 2016.

County, and the topography of the areas north and south of I-580 limits alternative east-west transportation routes.

As one of the region's highway network hubs, Alameda County experiences a disproportionately high share of the region's congestion. In 2015, the county accounted for over 33 percent of all regional freeway traffic congestion (measured by vehicle hours of delay).[17] Specifically, the westbound segment of I-580 running approximately from the San Joaquin County line to Hacienda Drive in Dublin and Pleasanton was the 17th most congested highway segment in the Bay Area in 2015, with the congestion primarily occurring during the morning commute.[18]

Rapid development within eastern Alameda County and in the Tri-Valley Area, as well as inter-regional commuting from San Joaquin County, has resulted in severe congestion along I-580. For example, between 2006 and 2010, approximately 26 percent of the workers in San Joaquin County (68,401 workers) commuted out of the county, and approximately 10 percent (26,121 workers) commuted to Alameda County specifically.[19] Based on the projected growth trends for Alameda and San Joaquin counties described above, commuting along I-580 is expected to continue increasing in the future, resulting in greater congestion.

## 3. Existing Transit Services in Eastern Alameda County

Existing transit services in eastern Alameda County include BART, ACE, and the Livermore Amador Valley Transit Authority (LAVTA), as described below.

### a. San Francisco Bay Area Rapid Transit District

As described above, BART operates a heavy rail, electrified, rapid transit system in Alameda, Contra Costa, San Francisco, and San Mateo counties, and will soon operate in Santa Clara County. BART's Daly City-Dublin/Pleasanton line provides regional rail access to the Tri-Valley Area. The line originates at the Daly City BART 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 current 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 LAVTA, (Contra Costa) County Connection, Tri Delta Transit, San Joaquin Regional Transit District, Modesto Area Express, Stanislaus Regional Transit, and Amtrak California.

[17] Metropolitan Transportation Commission (MTC), 2017a. op. cit.
[18] Ibid.
[19] California Employment Development Department (EDD), 2015. San Joaquin County to County Commuting Estimates. March.

### b. Altamont Corridor Express

The San Joaquin Regional Rail Commission (SJRRC) is the designated owner, operator, and policy-making body for the Altamont Corridor Express (ACE) service, which focuses on connecting northern San Joaquin County, the Tri-Valley and Silicon Valley by providing daily train service from Stockton to San Jose. The ACE service was initiated in October 1998, with two daily round-trip trains between Stockton and San Jose. Running primarily on tracks owned by the Union Pacific Railroad, 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 currently operates four weekday peak period commuter rail trains between Stockton and San Jose, and serves the Tri-Valley Area at three stations: Pleasanton, Downtown Livermore, and Vasco Road in Livermore. Each of these stations provides commuter parking and transit connections. The Downtown Livermore ACE Station functions as a regional transit hub and connects to eight LAVTA bus routes as well as to Amtrak California intercity bus service. There are no direct connections between the ACE system and BART. LAVTA provides a bus route from the West Dublin/Pleasanton Station to the ACE Pleasanton Station, which is about 3.5 miles to the south near the Pleasanton Fairgrounds and Civic Center.

The proposed ACEforward Program, described further in the Rail Service Expansion subsection below, would provide service from Lathrop to Manteca, Modesto, Turlock, and Merced, and increase the number of daily round trips.[20]

### c. Livermore Amador Valley Transit Authority

LAVTA provides local bus public transit service (Wheels) in the Tri-Valley Area. LAVTA provides fixed-route bus service, consisting of express, local, and school service routes, as well as a flexible dial-a-ride service. LAVTA structures its bus service around two primary transit hubs: the Dublin/Pleasanton Station and the downtown Livermore Transit Center/Livermore ACE Station. Fourteen bus routes provide service to the Dublin/Pleasanton Station and eight bus routes provide service to the Livermore Transit Center.[21] In June 2016, LAVTA approved the Wheels Forward program, which reconfigured existing bus routes and provided more frequent buses, including adding new routes in Livermore, Dublin, and Pleasanton and a new route with all-day 15-minute headways that will receive signal priority at intersections.[22]

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[20] San Joaquin Regional Rail Commission, 2016. Supplemental Notice of Preparation of an EIR. ACEforward – Notice of Additional Project Element – Niles Junction Connections.

[21] Livermore Amador Valley Transit Authority (LAVTA), 2016a. Wheels System Map. Available at: http://www.wheelsbus.com/wp-content/uploads/2015/07/UPDATED16-LAVTA-0002_LAVTA-System-Map-Brochure_5-Fold_3-4x8-5-1.pdf, accessed October 27, 2016.

[22] Livermore Amador Valley Transit Authority (LAVTA), 2016b. Tri-Valley Overhauls Bus System to Provide Better, More Frequent Service. June 22.

## 4. Transit Expansion Policies

While BART has specific objectives for extending transit services into Livermore, BART's System Expansion Policy (SEP), MTC's project performance assessment process, and MTC's Resolution #3434 TOD policy provide guidance for major BART investments. Each of these policies is discussed below. As described further below, MTC's Resolution #3434 TOD Policy is not applicable to the Proposed Project or any of the alternatives and is discussed for informational purposes only.

### a. BART System Expansion Policy

To guide BART in the extension and expansion of its system, its Board of Directors adopted a Policy Framework for System Expansion in 1999 and a System Expansion Project Advancement Criteria and Process in 2002 (together known as the SEP).

The SEP identifies criteria for project advancement to be applied when determining whether a new BART expansion project should be recommended for advancement. 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 (RDP) – How well does the project support BART ridership goals, and have the local jurisdictions prepared plans to promote transit supportive land 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 SEP is the requirement that one or more RDPs be undertaken for proposed expansion projects of the existing BART system. The RDP(s) seek to increase ridership to support the proposed BART extension and to support development of that ridership through local measures such as transit-supportive land uses and investment in access programs and projects.

### (1) Ridership Estimates

Future ridership at the corridor level is estimated using a standard travel demand model that incorporates assumptions about land use, transportation policies, and projected growth. Under the SEP, projected average weekday daily entries and exits associated with new stations are categorized into five ratings, from low to high, as follows:

- Low – less than 5,000 average daily entries and exits
- Low Medium – 5,000 to 9,999 average daily entries and exits
- Medium – 10,000 to 13,999 average daily entries and exits
- Medium High – 14,000 to 20,000 average daily entries and exits
- High – more than 20,000 average daily entries and exits

Ridership projections are taken into consideration by BART and may determine the need for an RDP to include measures that provide a framework for transit supportive land uses and future investment at station areas along the proposed route. Section 3.B, Transportation, and Chapter 5, Project Merits, provide further detail on forecast ridership levels.

### (2) Ridership Development Plans

As provided by BART's SEP, in determining whether to advance a system expansion project, BART will consider whether RDPs developed for each station can collectively demonstrate that the project will support increased ridership 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, improvements to multi-modal access including pedestrian and bicycle access, increases in transit feeder services, and development of additional automobile-serving parking facilities (including parking in the station area).

In accordance with the project advancement process in the SEP, the City of Livermore is preparing an RDP in coordination with BART's preparation of this EIR for the BART to Livermore Extension Project; the RDP, known as the Isabel Neighborhood Plan, is described below.

### (3) Isabel Neighborhood Plan

The Isabel Neighborhood Plan (INP) would create a TOD plan for the area around the potential future BART station at Isabel Avenue, allowing for denser development around the proposed station area than is currently permitted by the City of Livermore General Plan. The INP is a specific plan that covers approximately 1,138 acres both north and south of I-580 in northwest Livermore. The INP intends to set design standards, create safe and vibrant neighborhoods, create circulation improvements, and promote

compatibility with existing residential development and community character. Full buildout of the INP would entail the following net new uses:

- 4,095 residential housing units
- 1,655,850 square feet of office space
- 240,880 square feet of business park
- 324,310 square feet of neighborhood commercial space
- 296,320 square feet of general commercial space
- 9,148 jobs

The City of Livermore is the lead agency for the INP EIR, which is undergoing a separate environmental review and approval process from the BART to Livermore Extension Project, and the City anticipates that the Draft INP and its Draft EIR will be available for public review in the fall of 2017 and will be considered for approval in the winter of 2017/2018. The City of Livermore is preparing the INP to guide future development around a potential BART station. For the purpose of this EIR, it is assumed the INP would be implemented under the Proposed Project or DMU Alternative/EMU Option, but not under the Express Bus/BRT Alternative or Enhanced Bus Alternative. Please see Section 3.A, Introduction to Environmental Analysis, for further discussion of the INP.

### b. Metropolitan Transportation Commission's Project Performance Assessment Process

Plan Bay Area 2013 (Plan Bay Area) is the San Francisco Bay Area's Regional Transportation Plan and Sustainable Communities Strategy.[23] A draft update of Plan Bay Area (Plan Bay Area 2040) was published in March 2017. Revisions to the draft Plan Bay Area 2040 and an accompanying Final EIR were published in July 2017; however, this update has not been adopted as of the preparation of this Draft EIR. The MTC used its project performance assessment process to assess transportation projects in Plan Bay Area 2040 which 1) sought discretionary regional funding; and 2) had total project costs greater than $100 million.

The BART to Livermore Extension Project is listed in both Plan Bay Area and in Plan Bay Area 2040. However, because BART has not yet adopted the Proposed Project or one of the alternatives, the BART to Livermore Extension Project was not included in the Plan Bay Area 2040 project performance assessment or transportation conformity modeling. Should the BART Board of Directors adopt either the Proposed Project, the DMU Alternative/EMU Option, or the Express Bus/BRT Alternative and desire discretionary regional funding to design and construct it, the adopted project would be subject to

[23] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), 2013. Plan Bay Area 2013. Available at: http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf.

MTC's project performance assessment process, assuming MTC continues to use this process to prioritize discretionary regional funding in future updates to Plan Bay Area. A brief description of this process as it was performed for Plan Bay Area 2040 is provided below. The Enhanced Bus Alternative would not be subject to project performance assessment as its total project costs would be below $100 million.

The Plan Bay Area 2040 project performance assessment was conducted using quantitative and qualitative metrics. The targets assessment (qualitative) evaluated the extent to which a project supports the region's ability to meet the targets in Plan Bay Area 2040. The benefit-cost assessment (quantitative) evaluated the cost-effectiveness of each project as compared with benefits including travel time, travel time reliability, travel cost, air pollution, collisions, noise, and health. Relative to other projects seeking regional discretionary funding, high-performing projects had both a high targets score and a high benefit-cost ratio. In addition, MTC used a qualitative approach to identify the project's level of support for communities of concern and confirmed that the process provides access to residents of the affected community. Some low-performing projects were included in Plan Bay Area 2040 under the compelling case process, which required project sponsors to document that either: 1) the travel model did not adequately capture project benefits; 2) the project was a cost-effective means of reducing $CO_2$, PM, ozone precursor emission; or 3) the project improved transportation mobility/reduces air toxics and PM emissions in communities of concern.[24]

### c. Metropolitan Transportation Commission's Resolution #3434 Transit-Oriented Development Policy

MTC Resolution #3434 was adopted in 2001 to set forth the Regional Transit Expansion Program, together with a comprehensive funding strategy of local, regional, state and federal funding sources.[25] The resolution was amended in 2005 to include a TOD policy and amended again in 2007. The TOD policy is intended to assist Bay Area jurisdictions in addressing the following goals: (1) improving the cost-effectiveness of regional investments in new transit expansions; (2) easing the chronic housing shortage; (3) creating vibrant new communities; and (4) helping preserve regional open space by ensuring cooperation in creating development patterns that support transit services.[26] The

[24] Metropolitan Transportation Commission (MTC), 2017b. Plan Bay Area 2040, Performance Assessment Report. March.

[25] Metropolitan Transportation Commission (MTC), 2001. MTC Resolution No. 3434. December 19. Amended September 24, 2008.

[26] Metropolitan Transportation Commission (MTC), 2005. MTC Resolution 3434 Transit Oriented Development (TOD) Policy for Regional Transit Expansion Projects. July 27. Available at: https://todresources.org/app/uploads/sites/2/2016/06/2005MTCTODPolicy.pdf, accessed September 14, 2016.

TOD policy applies only to those projects specified in the TOD policy, which are a subset of the total amount of projects funded by Resolution #3434.

The key elements of the regional TOD policy are as follows:

- Corridor-level housing thresholds to quantify appropriate minimum levels of residential 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
- Corridor working groups that bring together congestion management agencies, 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

MTC's corridor-level housing thresholds require the overall corridor threshold be met or exceeded through a combination of existing and planned land uses within 0.5-mile of the current end-of-line station and proposed stations. The amount of housing required under these thresholds depends on the type of transit, with greater capital-intensive modes requiring a higher number of housing units.

While the BART to Livermore Extension Project is included in Resolution #3434, it is not listed as one of the transit extension projects subject to the TOD policy. Therefore, these thresholds do not apply to the Proposed Project or any of the alternatives. Nevertheless, for informational purposes, this EIR includes a discussion of the BART to Livermore Extension Project's consistency with these thresholds. Chapter 5, Project Merits, further describes Resolution #3434 in relation to the Proposed Project and Build Alternatives.

## 5. Rail Service Expansion

This subsection discusses two of the major rail service expansion plans in the Bay Area, the Regional Rail Plan and ACEforward.

### (1) Regional Rail Plan

As required by the voters in the Regional Measure 2 Traffic Congestion Relief Program, MTC, Caltrain, BART, and the 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. MTC adopted the Regional Rail Plan—Final Report on September 26, 2007.[27]

The Regional Rail Plan examined ways to incorporate passenger trains into existing rail systems, improve connections to other rail lines and transit, expand the regional rapid transit network, increase rail capacity, and coordinate rail investment around transit-friendly communities and businesses. Overall, the plan evaluated potential improvements and extensions of railroad, rapid transit, and high-speed rail services in the near-term (5 to 10 years), medium-term (10 to 25 years), and long-term (beyond 25 years).

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

### (2) ACEforward

SJRRC proposes to implement ACEforward, a phased rail infrastructure and service improvement plan to increase frequency, increase service reliability, and enhance passenger facilities along the existing ACE service corridor from San Jose to Stockton and to extend ACE service to Modesto and Merced. This improvement plan would provide the foundation for SJRRC's long-term vision of inter-city/commuter passenger rail services.

ACEforward includes near-term and longer-term improvements. Near-term improvements include plans to increase service to six trains per day and extend service to Modesto. Longer-term improvements include plans to expand service to 10 trains per day and extending service to Merced. Among the longer-term improvements are 11 alternatives to connect ACE to BART in the Tri-Valley Area:[28]

- Alternative P-TV-1a: ACE to BART Isabel Avenue at grade
- Alternative P-TV-1b: ACE to BART Isabel Avenue on elevated structure
- Alternative P-TV-1c: DMU/EMU to BART Isabel Avenue
- Alternative P-TV-1d: Bus shuttle from ACE Livermore to BART Isabel Avenue
- Alternative P-TV-2a: ACE to BART Dublin/Pleasanton at grade
- Alternative P-TV-2b: ACE to BART Dublin/Pleasanton on elevated structure

[27] Metropolitan Transportation Commission (MTC), San Francisco Bay Area Rapid Transit District (BART), and Caltrain, 2007. Regional Rail Plan for the San Francisco Bay Area, Final Report. September.

[28] San Joaquin Regional Rail Commission, 2017. ACEforward Draft Environmental Impact Report, Description of Longer-Term Improvements, page 3-19. May.

- Alternative P-TV-2c: DMU/EMU to BART Dublin/Pleasanton
- Alternative P-TV-2d: Existing bus shuttle from ACE Pleasanton to BART West Dublin/Pleasanton
- Alternative P-BART-1: BART to Greenville and ACE Greenville Road
- Alternative P-BART-2: BART to ACE Livermore intermodal and ACE Vasco Road
- Alternative P-BART-3: BART to ACE Livermore and ACE Vasco Road intermodal

Most of these alternatives would connect directly to the BART system. For example, Alternatives P-TV-1a, b, and c would extend ACE to the proposed Isabel Station; and Alternatives P-TV-2a, b, and c would extend ACE to the Dublin/Pleasanton Station. Alternatives P-BART-1, 2, and 3 would extend BART to meet ACE at Greenville, the Livermore intermodal or the Vasco Road intermodal. The remaining two alternatives would use a bus shuttle to make the ACE to BART connection.

ACEforward is currently under environmental review and the Draft EIR was published in May 2017. The ACEforward Draft EIR evaluates the near-term improvements at the project level and evaluates the longer-term improvements at the program level. At this time, the 11 alternatives for connections to BART have not been developed sufficiently to allow a project-level evaluation in the Draft EIR and they are not anticipated to be fully developed until at least 2023.[29]

## E. CEQA ENVIRONMENTAL REVIEW PROCESS

The Proposed Project and Alternatives are being evaluated under CEQA. The environmental review process is described below. Topics include the scoping process and Notice of Preparation (NOP) for the Draft EIR, a summary of the areas of known controversy and issues to be resolved, the public review process for the Draft EIR, preparation of the Final EIR, and the project approvals process, including the Statement of Overriding Considerations and Mitigation Monitoring and Reporting Program.

### 1. BART to Livermore Extension Project EIR Scoping

#### a. Notice of Preparation

As a first step in complying with the procedural requirements of CEQA, BART filed an NOP with the California Office of Planning and Research (State Clearinghouse), to announce that a project-level EIR would be prepared, on August 30, 2012. The purpose of the public

[29] San Joaquin Regional Rail Commission, 2017. op. cit. Introduction, page 1-14. May.

scoping period was to solicit comments on the scope and content of the environmental analysis performed in the Draft EIR. The public scoping period began on August 30, 2012 and ended on October 1, 2012. A copy of the NOP and related materials described below are included in Appendix A of this EIR. The NOP is also available on the BART website at: http://www.bart.gov/about/projects/liv/environment.

### b. Scoping Notification

Copies of the NOP were sent to 49 public agencies and approximately 9,200 residents and businesses within 0.5-mile of the project alignment as described in the NOP.

BART created outreach materials to notify stakeholders and the larger Tri-Valley community about the Proposed Project and the scoping meeting. The outreach materials are described below.

- **Mailer.** A scoping meeting notification was mailed to addresses within 0.5-mile of the Proposed Project alignment (including the remote parking location at Laughlin Road). The meeting notification was sent to approximately 9,200 addresses.
- **Community Flyer.** A community flyer describing the NOP and scoping meeting was prepared and distributed at BART stations and other community locations. The flyer provided the scoping notice in four languages in addition to English: Spanish, Korean, simplified Chinese,[30] and Vietnamese.
- **Newspaper Notices.** Newspaper notices of the NOP and scoping meeting were published in the San Ramon Valley Times, Tri-Valley Times, Livermore Independent, and San Francisco Chronicle. Translations were also published in foreign language papers, including the Viet Nam, the Daily News, Kyocharo News—San Francisco (Korean), The Korea Times, Korean Daily News, World Journal (Chinese), Sing Tao Daily (Chinese), and El Mundo (Spanish).
- **BART Website.** The NOP and scoping meeting information was provided on the BART website (http://www.bart.gov/about/projects/liv), including translations of the notice information in Spanish, Korean, simplified Chinese, and Vietnamese.
- **Email.** The NOP and meeting notification were distributed by BART's project partner, the City of Livermore, via email to approximately 850 addressees, including the Livermore City Council, Livermore Planning Commission, and City staff. The City posted the NOP on its website; it was also posted in the Livermore Patch (a local news and events website).

[30] Simplified Chinese characters are one of the two standardized Chinese character sets used in contemporary Chinese written language in mainland China. The other set is the traditional Chinese character set.

### c. Scoping Meeting

On September 19, 2012, an EIR scoping meeting was held at Robert Livermore Community Center (4444 East Avenue, Livermore) to provide information on the Proposed Project and receive comments on the scope of the EIR. The scoping meeting included an informal open house, a presentation by BART on the Proposed Project, and a public comment session. Approximately 85 members of the public and elected officials attended the meeting.

During the scoping meeting, 22 speakers made verbal comments and 18 people provided comments on comment cards. In addition, during the scoping period, 39 written comment letters/emails were received. The Areas of Known Controversy and Issues to be Resolved subsection below lists the topics identified as potentially significant concerns that require consideration in the EIR. Numerous suggestions concerning potential alternatives were also provided by the commenters; these suggestions have been incorporated in the EIR, where applicable and feasible.

## 2. 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. Key issues of concern that were raised during the scoping period are listed below, organized alphabetically by the environmental topics addressed in this EIR. This list identifies the primary concerns that were raised and repeated in several letters 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 this EIR. A full list of public comments received during the scoping period is available in the scoping report at http://www.bart.gov/about/projects/liv/environment.

### a. Air Quality

- Examine the air quality impacts to sensitive receptors and residents in the project area.

### b. Greenhouse Gases and Climate Change

- Would additional traffic and congestion cause a net increase in GHGs in spite of GHG reductions due to the BART extension?

### c. Land Use

- Examine impacts to agricultural land.
- How do Livermore's Priority Development Areas (PDAs) relate to the BART extension plan?

- What is the zoning and what are the existing land uses around the station site, and is there sufficient land to accommodate a fully integrated neighborhood?

### d. Noise and Vibration

- Examine the impacts on sensitive receptors in the project area.
- What are the cumulative noise impacts of the automobile traffic and BART trains?

### e. Public Health and Safety

- Would there be any change to the Airport Protection Area and air traffic patterns?

### f. Transportation

- **Parking**
  - Identify full parking need at Isabel Station.
  - Address overflow parking that could affect surrounding areas.
  - Address the issue of parking demand by commuters from San Joaquin County and other areas east of the Altamont Pass.
- **Station Design and Operation**
  - What traffic improvements would be needed on local roadways providing access to the station?
  - Where would the tail tracks be located, and would they preclude an extension beyond Isabel?
  - Would the station be accessible to pedestrians from adjacent neighborhoods?
  - What is the breakdown of BART riders arriving at the Dublin/Pleasanton station: pedestrian, automobile, bus, other?
- **Traffic Impacts**
  - Identify the impacts of parking demand at the Isabel Station by westbound travelers, including traffic impacts on streets leading to the Dublin/Pleasanton Station.
  - What traffic impacts would there be to local roads?
- **Buses**
  - What type of buses with what characteristics (fuel, capacity, size, noise levels) would be used and how many miles per year would they be traveling?
  - What are the proposed bus routes and details of operations?
  - How would buses affect local traffic conditions and air quality?

  - Who would be responsible for operating and maintaining the buses?

- **Construction Impacts**
  - Consider both daytime and nighttime construction impacts on the freeway.

### g. Visual Resources

- Consider the cumulative impacts to scenic resources along I-580 due to the PDAs and developments in Dublin and Pleasanton.

### h. Community Services

- Would BART service and housing surrounding BART stations bring additional crime to Livermore?

### i. Other Topics

- **Recreation**
  - Examine impacts on Shadow Cliffs to Morgan Regional Trail, which travels along Isabel Avenue.
  - Evaluate impacts to Brushy Peak Regional Preserve.
- **Public Services**
  - What new public services, such as schools and recreation, as well as personal services, would be required by intensified development, and where would they be located?
- **Alternatives**
  - Provide abundant automobile parking at the proposed Isabel Station.
  - Study a bus rapid transit alternative running from several locations in Livermore, Dublin, and Pleasanton to the existing Dublin/Pleasanton Station. Include a direct connection from the high-occupancy vehicle lanes into the Dublin/Pleasanton Station.
  - Consider an express bus alternative with service to the existing Dublin/Pleasanton Station from transit centers at Greenville and Isabel Avenue.
- **Issues to Be Resolved**
  - Adoption of a project.
  - Funding availability.

## 3. Draft EIR

This Draft EIR has been prepared following the requirements of CEQA. The focus of the analyses is on the physical impacts that would occur in the project corridor if the Proposed Project or an alternative were adopted and implemented. The Draft EIR describes the existing conditions in the project corridor and then assesses how those conditions would change with construction and operation of the Proposed Project and Alternatives. Where significant impacts are identified, the Draft EIR recommends mitigation measures to reduce or eliminate the potentially significant impacts. Where feasible mitigation measures or alternatives are insufficient to reduce an impact to less than significant, the effect is considered significant and unavoidable.

## 4. Public Review of the Draft EIR

### a. Accessing the Draft EIR

Copies of the Draft EIR can be reviewed in a number of ways. The Draft EIR can be downloaded from BART's website at: http://www.bart.gov/about/projects/liv. To obtain a copy of the Draft EIR on CD-ROM, email BartToLivermore@bart.gov or call (888) 441-0434.

The Draft EIR can be reviewed at the following public libraries:

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

Pleasanton Library
400 Old Bernal Avenue
Pleasanton, CA 94566

Springtown Library
998 Bluebell Drive
Livermore, CA 94551

Dublin Public Library
200 Civic Plaza
Dublin, CA 94568

Rincon Library
725 Rincon Avenue
Livermore, CA 94551

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

San Francisco Bay Area Rapid Transit District
Attention: BART to Livermore Extension Project
300 Lakeside Drive, 21st Floor
Oakland, CA 94612

Contact the BART to Livermore Extension Project to set up an appointment by using the email address or phone numbers above.

### b. Commenting on the Draft EIR

This Draft EIR is being distributed for a 45-day public review and comment period, which extends from July 31, 2017 through September 14, 2017 at 5:00 p.m. During the public review period, two public meetings will be held to receive comments on the Draft EIR as noted below.

Readers are invited to submit comments on the adequacy of the document; that is, does this Draft EIR identify and analyze the possible environmental impacts of the Proposed Project and Alternatives, and recommend appropriate mitigation measures? Comments are most helpful when they are specific and focused on 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. Per CEQA Guidelines Section 15096(d), responsible agencies are requested to provide comments on the project activities within the agency's area of expertise and to support those comments with either oral or written documentation.[31]

Written comments should be submitted to:

San Francisco Bay Area Rapid Transit District
Attention: BART to Livermore Extension Project
300 Lakeside Drive, 21st Floor
Oakland, CA 94612

Comments may also be sent via the website (http://www.bart.gov/about/projects/liv), or via email at BartToLivermore@bart.gov. For more information, please call (888) 441-0434. (Please note, however, that comments cannot be accepted by phone.)

Two public meetings will be held to accept comments on the Draft EIR. The purpose of these meetings is to provide an opportunity for public agencies and members of the public to comment on the Draft EIR; comments can be provided verbally or written comments can be submitted. Meetings will be held at the following times and locations:

Date: Tuesday, August 22, 2017

Time: 6:00-9:00pm

Location: Robert Livermore Community Center
4448 Loyola Way
Livermore, CA 94550

Date: Tuesday, August 29, 2017

Time: 6:00-9:00pm

Location: Shannon Community Center
11600 Shannon Avenue
Dublin, CA 94568

[31] 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.

The Notice of the Availability of the Draft EIR, which explains how to submit written or verbal comments on the EIR and the dates and locations of the public meetings has been mailed to responsible agencies and noticed to the public in the following ways:

- Published in The Independent, Pleasanton Weekly, Pleasanton Express, Danville Express, East Bay Times, Tri Valley Times, and San Ramon Valley Times
- Mailed to addresses within 0.5-mile of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative
- Emailed to addresses on BART's email notification list and to all individuals and organizations who have submitted a written request for notification concerning the Proposed Project

## 5. Final EIR

Following the close of the public review and comment period, BART will prepare written responses to address all substantive written and oral comments received on the Draft EIR. The Final EIR will consist of the Draft EIR, comments received during the public review period, responses to those comments, and any revisions to the Draft EIR as a result of public agency and public comments, together with any other revisions initiated by BART.

## 6. Project Review and Approval

The BART Board of Directors must certify that it has reviewed and considered the information in the Final EIR and that the Final EIR has been completed in conformity with the requirements of CEQA before any decision can be made regarding the project.

An EIR is an informational document; its purpose is to make the public and decision-makers aware of the environmental impacts of a project. As described previously, BART is the lead agency for this EIR, and the BART Board of Directors will review the Final EIR and weigh the potential project impacts against the benefits and any other economic, legal, social, technological, and other considerations to determine whether the Proposed Project or an alternative should be approved as proposed, approved with modifications, or not approved.

Pursuant to CEQA Guidelines Section 15091, no public agency shall approve or carry out a project for which an EIR has been certified that 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 project, 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 alternatives identified in the Final EIR.

### 7. Statement of Overriding Considerations

If the BART Board of Directors decides to approve the Proposed Project or an alternative with significant effects that are identified in the Final EIR, but which are not avoided or substantially lessened, the BART Board of Directors must prepare a Statement of Overriding Considerations that makes findings that any unavoidable significant effects are acceptable due to overriding considerations as described in CEQA Guidelines Section 15093. 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 adopted project 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.

### 8. 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 (MMRP) for any required mitigation measures. The MMRP will include all mitigation measures that BART intends to implement to avoid or reduce significant effects identified in the Final EIR. For each measure, the MMRP will identify the following items: the responsible party for implementing the mitigation measure; the timeframe by which the measure shall be implemented; and whether there are criteria to determine the success or effectiveness of the mitigation measure. BART will use the MMRP as a mechanism to track implementation of all mitigation measures required for the adopted project.

## F. NATIONAL ENVIRONMENTAL POLICY ACT

This EIR evaluates the Proposed Project and Alternatives under CEQA. If a project goes forward, it may also require evaluation under National Environmental Policy Act (NEPA). Projects which make certain modifications to a federal highway or require federal

funding are subject to NEPA. Both the Proposed Project and the DMU Alternative would likely require federal funding. The Express Bus/BRT Alternative would affect access to I-580. Therefore, the Proposed Project and two of the three Build Alternatives would likely require an Environmental Impact Statement under NEPA. An Environmental Impact Statement, should one be necessary, would be prepared subsequent to completion of the CEQA process and BART Board of Directors adoption of the Proposed Project, DMU Alternative (or EMU Option), or Express Bus/BRT Alternative. It is anticipated that the Enhanced Bus Alternative would not be subject to NEPA.

Projects which modify a federal highway or require federal funding are also subject to requirements for evaluation of impacts on properties listed or eligible for listing on the National Register of Historic Places, under National Historic Preservation Act Section 106 (Section 106), and publicly owned parks, recreational areas, historic sites of national, state or local significance, and wildlife and waterfowl refuges under the federal Department of Transportation Act Section 4(f), codified at United States Code Title 49, Section 303 (Section 4(f)). Evaluations under Section 106 and Section 4(f) would be prepared in conjunction with NEPA review.

## G. ORGANIZATION OF THIS EIR

This Draft EIR is organized as described below by chapter.

- **Summary** – This section summarizes the Proposed Project and Alternatives and the impacts and mitigation measures identified in this Draft EIR.
- **Chapter 1, Introduction** – This chapter provides a historical overview of the Proposed Project 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.
- **Chapter 2, Project Description** – This chapter provides a detailed description of the Proposed Project and Alternatives, system operations, projected ridership, capital and operating costs, and anticipated construction schedule and activities. In addition, this chapter describes the alternatives that were considered but withdrawn.
- **Chapter 3, Environmental Analysis** – The Proposed Project and Alternatives are analyzed in this chapter for each of the EIR's environmental topics. Each environmental topic section describes the environmental setting (or existing conditions); outlines the regulatory framework; and discusses the construction-related, operations-related, and cumulative impacts. Each impact discussion includes the standards used to determine the significance of environmental impacts, and provides mitigation measures that would avoid or minimize significant or potentially significant environmental impacts, where feasible.

- **Chapter 4, Other CEQA Considerations** – As required by Section 15126.2 of the CEQA Guidelines, this chapter summarizes significant and unavoidable environmental impacts, irreversible changes to the environment, and growth-inducing impacts of the Proposed Project and Alternatives. This chapter also describes the environmentally superior alternative.
- **Chapter 5, Project Merits** – This chapter evaluates how well the Proposed Project and Alternatives enhance or improve upon the existing conditions, meet BART SEP objectives, support MTC Resolution #3434, and support Plan Bay Area.
- **Chapter 6, List of Preparers and References** – This section identifies the individuals responsible for the preparation of this EIR and provides a list of references.

## H. INTENDED USES OF THIS EIR

As described previously, the BART Board of Directors will review this report and other considerations to determine whether the Proposed Project or an alternative should be approved as proposed, approved with modifications, or not approved. This Draft EIR will also be reviewed by other public agencies, including the local jurisdictions, and by the interested individuals and groups, to evaluate the potential impacts of the BART to Livermore Extension Project as well as the proposed mitigation measures and alternatives to reduce potential environmental impacts.

Other public agencies besides the lead agency have discretionary authority over permits or other approvals needed for a project. These agencies, known as responsible agencies, will review the Draft EIR and may comment during the public review period. In particular, the Proposed Project, the DMU Alternative, and to a lesser degree, the Express Bus/BRT Alternative, include widening the California Department of Transportation (Caltrans) ROW and relocating the I-580 lanes to accommodate rail or bus infrastructure in the highway median. Existing freeway interchanges, on- and off-ramps, freeway structures such as overcrossings, and surface frontage roads would be reconfigured to accommodate the increased ROW width. These alterations must be approved by Caltrans, which owns and has jurisdiction over the ROW. In addition, construction activities that could impede vehicle movement are subject to the authorized configurations and traffic safety requirements of Caltrans. Therefore, Caltrans will be one of the primary responsible agencies for the BART to Livermore Extension Project and will rely on this EIR for its approvals.

In addition, other agencies, known as trustee agencies, may review this document because the BART to Livermore Extension Project may affect resources over which they have jurisdiction. The responsible and trustee agencies from whom permits or approvals would likely be needed 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 | Action/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 U.S. Army Corps of Engineers Permit application |
| 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. An Individual Permit and Section 404(b)(1) Alternatives Analysis may be required. | ENG form 4345 "Application for a Department of the Army permit" or Individual Permit |
| 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 | Section 7 Biological Opinion for the take of federally listed species |
| Federal Aviation Administration | Federal Aviation Administration Regulations Part 77 – Objects Affecting Navigable Airspace | Review of project for potential effects on aircraft safety | Project plans |
| Federal Transit Administration | NEPA, Moving Ahead for Progress in the 21st Century Act | Environmental Impact Statement; approval and funding decision | Review of Environmental Impact Statement |
| **State** | | | |
| California Department of Fish and Wildlife | California Endangered Species Act; Fish and Game Code Sections 1601–1603 review | Sections 1601–1603 – Lake and Streambed Alteration Agreement, review of project for potential to alter streamflows or the bed and bank of a stream, lake, or pond. California Endangered Species Act – Review of project for "take" of endangered and other special status plant or animal species. | Review of this EIR<br>Form # FG2023 "Notification of Lake or Streambed Alteration."<br>Section 2081 Permit for the take of State listed species |
| California Department of Transportation (Caltrans) | California Streets and Highways Code | Modifications to the State Highway System or within State-owned ROW | Project reports and 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 | Action/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 |
| California Department of Toxics Substances Control or U.S. Environmental Protection Agency | Resource Conservation and Recovery Act, Title 22 of the California Code of Regulations 66262 | Hazardous waste identification number | Obtain registration number(s) for hazardous waste generation (e.g., maintenance-related operations) from U.S. Environmental Protection Agency or California Department of Toxics Substances Control dependent upon quantity and type of hazardous waste generated |
| State Water Resources Control Board | Section 401 of Clean Water Act<br>Section 402(o) of Clean Water Act | Section 401 – Clean Water Act Section 401 Water Quality Certification<br>Section 402 – National Pollutant Discharge Elimination System General Permits, which regulate discharges of stormwater from construction and industrial activities | Regional Water Quality Board certification.<br>Permit Registration Documents for Notice of Intent and/or No Exposure Certification for stormwater general permit coverage |
| State Historic Preservation Office | Section 106 of the National Historic Preservation Act | Review of Section 106 determination | SHPO concurrence with Section 106 determination |
| Native American Heritage Commission | PRC Section 5097 | Review of project for potential disturbance to Native American heritage/burial sites | Consultation letter; review of this EIR |

TABLE 1-1 PUBLIC AGENCIES WITH POSSIBLE FUTURE PERMIT AND/OR APPROVAL AUTHORITY

| Agency | Statutory Authority | Permit or Approval Jurisdiction, Actions Covered | Action/Approvals Required |
|---|---|---|---|
| **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 U.S. Army Corps of Engineers jurisdiction (certification required before U.S. Army Corps of Engineers Section 404 permit may become effective)<br>Section 402 – National Pollutant Discharge Elimination System permit, which regulates discharge into surface waters | Application for Section 401 Water Quality Certifications and/or Report of Waste Discharge<br>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; Stormwater Pollution Prevention Plan |
| Metropolitan Transportation Commission | Section 176 (c) of Clean Air Act of 1970 as amended; MTC Resolution #3075; | 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 |
| Bay Area Air Quality Management District (BAAQMD) | Clean Air Act of 1970 as amended; BAAQMD Regulation 2 (Permits) | Agency with responsibility for permitting of stationary air pollutant sources; Issuing Permit to Operate | Issue permit for diesel-fueled emergency generator |
| **Local** | | | |
| Alameda County | Encroachment permit | Possible encroachment permit for construction within County-owned ROW | Project plans |
| City of Livermore | Encroachment permit; 44 Code of Federal Regulations (CFR) 60.3 (Flood plain management criteria) | Possible encroachment permit for construction within City-owned ROW; review project for consistency with 44 CFR 60.3 | Project plans, including hydraulic design |
| City of Pleasanton | Encroachment permit | Possible encroachment permit for construction within City-owned ROW | Project plans |
| City of Dublin | Encroachment permit | Possible encroachment permit for construction within City-owned ROW | Project plans |

TABLE 1-1 PUBLIC AGENCIES WITH POSSIBLE FUTURE PERMIT AND/OR APPROVAL AUTHORITY

| Agency | Statutory Authority | Permit or Approval Jurisdiction, Actions Covered | Action/Approvals Required |
|---|---|---|---|
| Alameda County Transportation Commission | CEQA | Review project for conformance with Alameda County Transportation Commission'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; 44 CFR 60.3 (Flood plain management criteria); encroachment permit | Review project for conformance with Zone 7 requirements; review project for consistency with 44 CFR 60.3 and obtain encroachment permit for Zone 7 facilities | Project plans, including hydraulic design |
| Livermore Amador Valley Transit Authority | CEQA | Review project for conformance with Livermore Amador Valley Transit Authority transit plans | Review of this EIR |
| Livermore-Pleasanton Fire Department | California Health and Safety Code Section 25404 | Local Certified Unified Program Agency with responsibility for issuing Unified Permits in the cities of Livermore and Pleasanton. | Issue Unified Permit for hazardous materials use, hazardous waste generation, and/or aboveground petroleum tanks (e.g., maintenance-related operations, fuel storage areas) |
| Alameda County Department of Environmental Health | California Health and Safety Code Section 25404 | Local Certified Unified Program Agency with responsibility for issuing Unified Permits in the city of Dublin and unincorporated areas of Livermore and Pleasanton | Issue Unified Permit for hazardous materials use, hazardous waste generation, and/or aboveground petroleum tanks (e.g., maintenance-related operations, fuel storage areas) |

# CHAPTER 2
# PROJECT DESCRIPTION

## A. INTRODUCTION

This chapter describes the proposed BART to Livermore Extension Project that is evaluated in this Draft EIR. The Proposed Project, which is also referred to as the Conventional BART Project, involves extending the BART system, using conventional BART technology, from the existing terminus of the Daly City-Dublin/Pleasanton Line at the Dublin/Pleasanton Station to a new station located east of Isabel Avenue (State Route 84) in the city of Livermore. The Proposed Project is described in detail in this chapter.

In addition to the Proposed Project, three Build Alternatives, as well as the No Project Alternative (or No Build Alternative), are evaluated in this EIR. The three Build Alternatives were identified in initial screening as alternatives with the potential to meet most of the project objectives and be completed within a reasonable timeframe; therefore, they merited full evaluation in this EIR. The BART Board of Directors will adopt a project for implementation based on their review of the Proposed Project and Alternatives.

The three Build Alternatives are as follows:

- Diesel Multiple Unit (DMU) Alternative, which includes a variant referred to as the Electrical Multiple Unit (EMU) Option
- Express Bus/Bus Rapid Transit (BRT) Alternative
- Enhanced Bus Alternative

This Draft EIR is a second-tier project-level Draft EIR that continues the BART to Livermore planning process of the Final Program EIR for the BART to Livermore Extension Program (PEIR). The Proposed Project in this Draft EIR corresponds to Alternative 4 (Isabel Avenue/Interstate [I-] 580) in the PEIR. In addition, the same alignment, in the I-580 median from the existing Dublin/Pleasanton Station as far as the Isabel Avenue/I-580 interchange, was also included as part of Alternative 2B (Downtown/Vasco) in the Final PEIR, although Alternative 2B extended to Downtown Livermore and provided stations in Downtown Livermore and at Vasco Road without a station at Isabel Avenue/I-580. The BART Board of Directors certified the PEIR in July 2010 and selected Alternative 2B, Portola-Vasco, as the preferred alignment. See Chapter 1, Introduction, for further discussion of the project background.

This chapter presents the following topics:

- **(A) Introduction** – This section includes the project objectives and a summary of the Proposed Project and Alternatives.
- **(B through F) Detailed description of the Proposed Project and Alternatives** – The No Project Alternative is presented first (B), followed by the Proposed Project (C), the DMU Alternative with EMU Option (D), the Express Bus/BRT Alternative (E), and then the Enhanced Bus Alternative (F).

  Details presented for the Proposed Project and Alternatives are as follows: (1) BART system and related rail improvements, including technology used, route/alignment, and facilities (i.e., new or modified stations and non-station facilities); (2) I-580 and roadway relocation and reconfiguration required to accommodate the BART infrastructure improvements; (3) new or modified bus routes and bus-related infrastructure improvements; and (4) operations, including hours of operation, frequency of service, fleet size, anticipated travel times and fares, and fare collection.
- **(G) Construction** – This section describes the major construction activities, the types of equipment anticipated to be used, and the expected duration of construction.
- **(H) Sustainability** – This section discusses the design features of the Proposed Project and Build Alternatives.
- **(I) Projected Ridership** – This section covers the number of passenger boardings and exits.
- **(J) Costs and Funding Sources** – This section addresses the costs and possible funding sources associated with the Proposed Project as well as all of the Alternatives.
- **(K) Alternatives Considered but Withdrawn** – This section describes the alternatives considered but withdrawn from detailed consideration in the EIR, for reasons that include (1) failure to meet most of the basic project objectives; (2) infeasibility; and (3) inability to avoid or reduce significant environmental impacts.

This Draft EIR provides a project-level analysis of the rail and associated BART facilities, as well as the roadway relocation proposed under the Proposed Project, DMU Alternative, and EMU Option. For the Express Bus/BRT Alternative, the project level analysis covers bus infrastructure improvements at Dublin/Pleasanton Station as well as roadway relocation. With regard to the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder bus routes for the Proposed Project and other Build

Alternatives, this EIR presents a programmatic-level analysis.[1] Following adoption of the project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the bus routes and bus infrastructure improvements could be subject to subsequent environmental review, if necessary due to new or greater environmental impacts.

## 1. Project Objectives

The objectives of the BART to Livermore Extension Project are as follows:

- Provide a cost-effective intermodal link of the existing BART system to the inter-regional rail network and a series of Priority Development Areas (PDAs) identified by the City of Livermore, the Metropolitan Transportation Commission, and the Association of Bay Area Governments. These PDAs include the Livermore Isabel Avenue BART Station PDA, the Livermore Downtown PDA, and the Livermore East Side PDA.
- Support the regional goals of integrating transit and land use policies to create opportunities for transit-oriented development (TOD) in the Livermore area PDAs.
- Provide an effective alternative to traffic congestion on I-580.
- Improve air quality and reduce greenhouse gas and other emissions associated with automobile use.

## 2. Summary of Proposed Project and Alternatives

The Proposed Project and Build Alternatives differ in their configurations of rapid transit and passenger bus technologies, as summarized below (see Table 2-1 for a list of key characteristics). The design of the Proposed Project and Build Alternatives does not preclude a future rail alignment extension to the east, either in the I-580 median or to Downtown Livermore.

- **No Project Alternative.** The No Project Alternative describes the consequences if the BART Board decides not to proceed with either the Proposed Project or any of the Build Alternatives. For this EIR, the No Project Alternative represents the region's existing transportation network consisting of highways, arterial roads, public transit, and bicycle and pedestrian facilities, inclusive of planned improvements through 2040. In addition, the No Project Alternative accounts for population and employment growth in the nine-county San Francisco Bay Area (Bay Area) region through 2040. This alternative does not include the extension of rail or transit services beyond the improvements currently planned for implementation, described below.

[1] For this purpose of this analysis, feeder bus routes are defined as bus routes that would connect key activity nodes in the city of Livermore to the BART system (either Dublin/Pleasanton Station or Isabel Station), and thereby improve service for existing BART patrons and support additional BART patronage.

TABLE 2-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| **Components of Proposed Project and Build Alternatives** | | | | |
| | | **BART/Rail Facilities** | | |
| Rail Service Extension | ▪ Extend service 5.5 miles east to Isabel Avenue in I-580 median.<br>▪ Beyond Dublin/Pleasanton Station, convert 0.7 mile of existing tail tracks to mainline tracks, and extend track 4.8 miles to new station.<br>▪ Remove existing BART car storage in I-580 median and relocate to new storage and maintenance facility. | ▪ Extend service 5.5 miles east to Isabel Avenue in I-580 median.<br>▪ Beyond Dublin/Pleasanton Station, existing BART tail tracks remain.<br>▪ Install DMU track 5.5 miles from Dublin/Pleasanton Station to new Isabel Station in I-580 median. | -- | -- |
| Dublin/Pleasanton Station | ▪ No change. | ▪ New DMU transfer platform on north side of the Dublin/Pleasanton Station.<br>▪ New 0.3-mile tail track for BART car storage west of station (storage for approximately 20 additional BART cars). | ▪ New bus transfer platforms north and south of BART station platform.<br>▪ New direct bus-only ramps from I-580 express lanes to Dublin/Pleasanton Station.<br>▪ Extend tail track 0.1 mile east of station (storage for approximately 10 additional BART cars). | ▪ No change. |
| Isabel Station | ▪ BART platform in I-580 median, with pedestrian overcrossings to bus facility at Isabel North and station parking at Isabel South.<br>▪ New two-story end-of-line operations building (houses train supervisory booth and associated staff facilities). | ▪ Similar to Proposed Project. | -- | -- |
| Parking | ▪ At Isabel Station, total of 3,412 parking spaces: 2,835 in a seven-level parking structure and 577 parking spaces in two surface parking lots. | ▪ At Isabel Station, total of 2,428 parking spaces in a six-level parking structure. | ▪ At Dublin/Pleasanton Station, relocate approximately 210 existing parking spaces to either (1) a surface lot adjacent to | -- |

TABLE 2-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| | | | existing lot south of I-580; or (2) a three-level parking structure on the existing BART lot south of I-580.<br>▪ At Laughlin Road, new surface parking lot with approximately 230 parking spaces. | |
| Storage and Maintenance Facility (for rail vehicles) | ▪ Extend tail tracks 1.9 miles from Isabel Station to 68-acre storage and maintenance facility north of I-580.<br>▪ Capacity for storage of approximately 172 BART vehicles.<br>▪ Westbound I-580 underpass for tail tracks (from median to north of I-580).<br>▪ Bridges over Arroyo las Positas and Cayetano creeks and hillside tunnel for tail tracks. | ▪ Extend tail tracks 1.8 miles from Isabel Station to 32-acre storage and maintenance facility north of I-580.<br>▪ Capacity for approximately 12 DMU vehicles (six married pairs).<br>▪ Westbound I-580 underpass for tail tracks (from median to north of I-580).<br>▪ Bridges over Arroyo las Positas and Cayetano creeks and hillside tunnel for tail tracks. | -- | -- |
| Wayside Facilities (power and communications support, such as power substations and switching stations) | ▪ Wayside facilities along the project corridor at Croak Road and at Kitty Hawk Road/Isabel Avenue. | ▪ Wayside facilities along the project corridor at Croak Road and at Kitty Hawk Road/Isabel Avenue. | -- | -- |
| Additional BART Cars to Accommodate Increased Ridership | ▪ 36 BART cars. | ▪ 24 BART cars. | ▪ 12 BART cars. | -- |
| **Caltrans Facilities and Surface Frontage Roads** | | | | |
| I-580 Relocation | ▪ Modifications extend for 5.6 miles along I-580. Typical relocation by approximately 46 feet, from just east of Hacienda Drive interchange to west of | ▪ Modifications extend for 7.1 miles along I-580. Typical relocation by approximately 46 feet, from west of Dougherty Road/Hopyard | ▪ Modifications extend for 2.2 miles along I-580. Typical relocation by 88 feet from west of Dougherty Road to the | -- |

TABLE 2-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| | Portola Avenue overcrossing. At the proposed Isabel Station, relocation by approximately 67 feet.<br>▪ Modifications at four interchanges: Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue.<br>▪ Modifications to surface frontage roads. | Road interchange to west of Portola Avenue overcrossing. West of Hacienda Drive interchange, on-ramp relocation up to approximately 140 feet. At the proposed Isabel Station, relocation by approximately 67 feet.<br>▪ Modifications at six interchanges: Dougherty Road/Hopyard Road, Hacienda Drive, Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue.<br>▪ Modifications to surface frontage roads. | Tassajara Road/Santa Rita Road overcrossing. At the Dublin/Pleasanton Station, relocation up to 100 feet.<br>▪ Modifications at three interchanges: Dougherty Road/Hopyard Road, Hacienda Drive, and Tassajara Road.<br>▪ Modifications to surface frontage roads in Dublin. | |
| | | **Bus Services** | | |
| Bus Routes[a, b] | ▪ New/modified bus routes to Isabel Station instead of the Dublin/Pleasanton Station: LAVTA X-B, R-B, 12; RTD 150; and MAX BART Express.<br>▪ Eliminated routes: LAVTA 12X, 20X, and Rapid. | ▪ Same as Proposed Project. | ▪ Buses use direct ramps from I-580 express lanes to Dublin/Pleasanton Station. New/modified routes: LAVTA X-B, R-B, and 12.<br>▪ Eliminated routes: LAVTA 20X, and Rapid. | ▪ Connections at Dublin/ Pleasanton Station same as existing conditions with new/modified routes: LAVTA X-A, R-B, and 12. Eliminated routes: LAVTA 20X, and Rapid. |
| | | **Bus Infrastructure** | | |
| Transit Signal Priority | ▪ Installation of equipment at approximately two locations. | ▪ Same as Proposed Project. | ▪ Installation of equipment at approximately four locations. | ▪ Installation of equipment at approximately six locations. |
| Improved Bus Shelters and Seating, Digital Messaging Boards, Pre-paid Ticketing. | ▪ Installation at approximately 29 locations. | ▪ Same as Proposed Project. | ▪ Similar to Proposed Project. | ▪ Similar to Proposed Project. |

**TABLE 2-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| Bus Bulbs | ▪ Installation of bus bulbs at approximately six locations. | ▪ Same as Proposed Project. | ▪ Installation of bus bulbs at approximately 10 locations. | ▪ Similar to Express Bus/BRT Alternative. |
| **Footprint** [a] | | | | |
| | | **Permanent** | | |
| Portion of Footprint Occupied by Existing Transportation Uses (Acres) | 229 | 268 | 55 | -- [a] |
| Portion of Footprint within Parcels not Owned by BART (Acres) [Number of Parcels] | 147 [117 parcels] | 102 [137 parcels] | 10 [34 parcels] | -- [a] |
| Portion of Footprint within BART-owned Parcels (Acres) [Number of Parcels] | 35 [5 parcels] | 35 [7 parcels] | 12 [7 parcels] | -- [a] |
| **Total Footprint – including I-580 (Acres)** | **411** | **405** | **77** | -- [a] |
| | | **Temporary** | | |
| Construction Staging Areas (Acres) | 29 | 32 | 6 | -- [a] |

Notes:
-- = Not applicable; LAVTA = Livermore-Amador Valley Transit Authority; MAX = Modesto Area Express; RTD = San Joaquin Regional Transit District; R-B = Rapid service; X-B = Express service (peak period); Caltrans = California Department of Transportation.
All units of measure are approximate, and distances are rounded to the nearest 0.1 mile.
A married pair is a set of two vehicles that are permanently coupled and treated as if they were a single unit.
[a] This EIR describes and analyzes the Enhanced Bus Alternative, as well as the feeder bus routes and bus infrastructure improvements associated with the feeder bus routes for the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, at a programmatic level. The bus routes are conceptual and were developed for the purpose of estimating BART ridership and operating costs. Candidate locations for bus infrastructure improvements, anticipated to be constructed within existing street rights-of-way, are described to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.
[b] Several components of the proposed bus routes are similar to Wheels Forward, a program of changes to the LAVTA transit system implemented in August 2016 to provide more frequent buses and new routes in Livermore, Dublin, and Pleasanton. The new, modified, or eliminated routes under the Proposed Project and Build Alternatives are described in relation to the previous bus route network. Elements shared by the Proposed Project and Build Alternatives and the Wheels Forward program include improved bus service from Downtown Livermore to BART, improved bus service to Las Positas College, and improved bus shelters to serve the new Express and

**TABLE 2-1 KEY COMPONENTS OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Conventional BART Project | DMU Alternative (With EMU Option) | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| Rapid routes. Other capital improvements, such as real-time arrival message boards at bus stations, expansion of transit signal priority to additional intersections, and installation of bus bulbs, are not included in the Wheels Forward program. Additionally, the Proposed Project and Build Alternatives would include improved bus service to Lawrence Livermore National Laboratory and the east side of Livermore. Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid route serves most of the existing Route 12 stops on Dublin Boulevard, as well as North Canyons Parkway and Las Positas College, and a restructured Route 14 serves areas of Livermore previously served by Route 12. Therefore, these restructured routes would generally serve the areas previously served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA. | | | | |

Sources: Arup and Anil Verma Associates, Inc., 2017a; Arup, 2017a.

- **Conventional BART Project.** The Proposed Project involves extending the Daly City-Dublin/Pleasanton Line from its existing terminus at the Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) approximately 5.5 miles to the east, to a new station located at the Isabel Avenue/I-580 (State Route 84) interchange in the city of Livermore. The new alignment and the new Isabel BART Station (Isabel Station) would be constructed in the I-580 median. New parking facilities—a parking structure and surface lot containing a total of approximately 3,412 spaces—would be constructed immediately south of I-580 along East Airway Boulevard. In addition, a new, approximately 68-acre BART storage and maintenance facility would be constructed north of I-580, beyond the Isabel Station.

  To accommodate the widening of the I-580 median for the new BART alignment and Isabel Station, the California Department of Transportation (Caltrans) right-of-way (ROW) would be widened along approximately 5.6 miles. The I-580 lanes would be relocated by a total of approximately 46 feet, from just east of the Hacienda Drive interchange to west of the Portola Avenue/I-580 overcrossing. At the proposed Isabel Station, I-580 would be relocated by approximately 67 feet to accommodate the new station within the median. The relocation of I-580 would require modification of some interchanges and surface frontage roads.

  The Proposed Project includes new and modified feeder bus routes that would connect the new Isabel Station to PDAs in Downtown Livermore; to the East Side PDA, including Lawrence Livermore National Laboratory (LLNL); and to other areas east of the BART system, as well as the Altamont Corridor Express (ACE) Stations in Downtown Livermore and Vasco Road. The overall performance of these bus routes would be improved via the implementation of transit priority infrastructure enhancements, such as signal timing priority, bus shelters, and bus bulbs.

- **DMU Alternative.** The DMU Alternative differs from the Proposed Project in terms of vehicle technology. DMUs are self-propelled rail cars that use a diesel engine to generate their own power and run on a standard-gauge rail track, whereas BART trains use electricity and run on wide-gauge rail track.

  The DMU Alternative would have a similar median alignment and station configuration as the Proposed Project, but would have a longer alignment and includes a new transfer platform at the Dublin/Pleasanton Station. A new parking structure for the Isabel Station, with approximately 2,428 parking spaces, would be constructed immediately south of I-580 along East Airway Boulevard. In addition, a new, approximately 32-acre storage and maintenance facility would be constructed north of I-580, beyond the terminus of the alignment.

  To accommodate the median widening, approximately 7.1 miles of I-580 would be relocated by a total of approximately 46 feet, from west of the Dougherty Road/Hopyard Road interchange to the Portola Avenue/I-580 overcrossing. Around the Dublin/Pleasanton Station, the north side of I-580 would be relocated to accommodate

the new DMU transfer platform. At the proposed Isabel Station, I-580 would be relocated approximately 67 feet to accommodate the station within the median. The relocation of I-580 would require modification of some interchanges and surface frontage roads.

The DMU Alternative includes the same feeder bus component as the Proposed Project, including new and modified bus routes connecting the new station to areas east of the BART system.

A variant of the DMU Alternative—the EMU Option—is also being considered. The EMU Option is generally the same as the DMU Alternative, except that it is electrically powered rather than diesel-powered. A more detailed description of the EMU Option is provided below.

- **Express Bus/BRT Alternative.** The Express Bus/BRT Alternative seeks to achieve the project goals using bus technology only. This alternative does not include an extension of BART rail service or development of a new rail station. Under this alternative, new bus transfer platforms would be constructed at the existing Dublin/Pleasanton Station. Buses would enter these bus-only transfer areas via direct bus-only ramps from the I-580 express lanes, allowing passengers to transfer from bus to BART within the station.

  To accommodate the new bus transfer platforms and facilities under this alternative, approximately 2.2 miles of I-580, from west of the Dougherty Road/Hopyard Road interchange to the Tassajara Road/Santa Rita Road interchange, would be relocated by approximately 88 feet. The relocation of I-580 would require modification of some interchanges and surface frontage roads.

  A new parking lot or garage with approximately 210 parking spaces would be constructed at the Dublin/Pleasanton Station to replace the 210 parking spaces removed for the relocation of I-580 to accommodate the bus platforms. In addition, a remote, approximately 230-space park-and-ride lot would be constructed at Laughlin Road; regular bus service would be provided during peak hours from the Laughlin parking lot to the Dublin/Pleasanton Station.

  This alternative includes a feeder bus operations plan similar to that of the Proposed Project and DMU Alternative. The plan would be designed to enhance direct connections between the Dublin/Pleasanton Station and Downtown Livermore, the downtown and Vasco Road ACE stations, and the Livermore-area PDAs, as well as to maximize the use of the I-580 express lanes. Bus service improvements include but are not limited to two new Express/Rapid bus routes.

- **Enhanced Bus Alternative.** Like the Express Bus/BRT Alternative, the Enhanced Bus Alternative uses bus-related technology only and does not include an extension of BART rail service or the development of a new rail station. Unlike the Express Bus/BRT

Alternative, however, this alternative does not include any major capital improvements and would not involve the development of bus transfer platforms or direct bus ramps.

The Enhanced Bus Alternative includes a bus operations plan that is similar to the plan for the feeder bus services for the Proposed Project and other Build Alternatives, designed to enhance direct connections to the Dublin/Pleasanton Station from Las Positas College, Downtown Livermore, the downtown and Vasco Road ACE stations, and the East Side PDA. This alternative provides lower-cost bus service improvements to improve access to the Dublin/Pleasanton Station.

As shown in Table 2-1, the majority of the area within the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative consists of existing transportation-related uses, including I-580 and roadways. However, a portion of the footprints would be located within parcels that are not currently used for transportation-related activities and are not owned by BART; BART would acquire a portion or the entirety of these parcels. A detailed representation of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative is shown in Appendix B. In addition, the parcels that would be required to be acquired in part or in full are listed in Appendix C and further discussed in Section 3.D, Population and Housing.

## B. NO PROJECT ALTERNATIVE

The No Project Alternative describes the consequences if the BART Board decides not to proceed with either the Proposed Project or any of the Build Alternatives. The purpose of describing and analyzing a No Project Alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project.

### 1. Transportation Network

For the purpose of this EIR, the No Project Alternative represents the region's existing transportation network—consisting of highways, arterial roads, public transit, and bicycle and pedestrian facilities—as well as planned improvements to the transportation network through 2040, which are summarized below and described in detail in Section 3.B, Transportation. This alternative represents the network as it exists in 2016, plus the programs and plans currently identified in regional transportation plans that would be implemented through 2040 and for which funding has been identified. Planned improvements to the transportation network include the following: (1) segments of I-580; (2) local roadways and intersections in the cities of Dublin, Pleasanton, and Livermore; and (3) improvements to core transit service planned by BART, ACE, and the Livermore-Amador Valley Transit Authority (LAVTA). A more detailed description of the transportation improvements in the project area is provided in Section 3.B, Transportation.

BART system improvements include several near-term and long-term major investments to increase capacity, as follows:

- Fleet of the Future – Expansion of BART's current fleet from 669 cars to as many as 1,116 cars
- Train Control Modernization Project – An updated train control system that will allow BART to run trains more frequently and reliably
- Hayward Maintenance Complex – To ensure that BART has sufficient capacity to repair and maintain the fleet of its expanded system
- Traction Power Improvements – Upgrade or install five traction power substations to serve the congested corridor to adequately power additional BART service

Together, these projects will allow BART to run up to 30 trains per hour per direction through the Transbay Tube to alleviate the existing pinch point, and increase capacity from the current 24,000 to 35,000 passengers per hour per direction.

In addition, BART and its project partners are in the process of advancing several system extension projects, including the BART to Silicon Valley Berryessa Extension Project (extension from Fremont to Berryessa in north San Jose) and the Eastern Contra Costa County Extension Project, known as eBART (extension from Pittsburg/Bay Point to Antioch). BART is also implementing improvements at several stations.

## 2. Population and Employment Growth

Section 3.A, Introduction to Environmental Analysis, and Section 3.D, Population and Housing, presents information about population and employment projections through 2040.

## 3. BART Operations

Current BART service to the Dublin/Pleasanton Station is provided by the Daly City-Dublin/Pleasanton Line, which operates between the Daly City BART Station and the Dublin/Pleasanton Station. BART service to the Dublin/Pleasanton Station is provided as follows:

- Weekdays: 4:00 a.m. to 12:00 a.m., with trains every 15 minutes
- Saturdays: 6:00 a.m. to 12:00 a.m., with trains every 20 minutes
- Sundays/Holidays: 8:00 a.m. to 12:00 a.m., with trains every 20 minutes

Under the No Project Alternative, the BART operating plan in 2025 would be consistent with the current operating plan. However, BART intends to have 12-minute headways

(instead of 15-minute headways) at some time after 2025; these headways are reflected in the No Project Alternative in 2040.[2]

The No Project Alternative would require an additional 465 BART cars to accommodate the increased ridership anticipated in 2040.

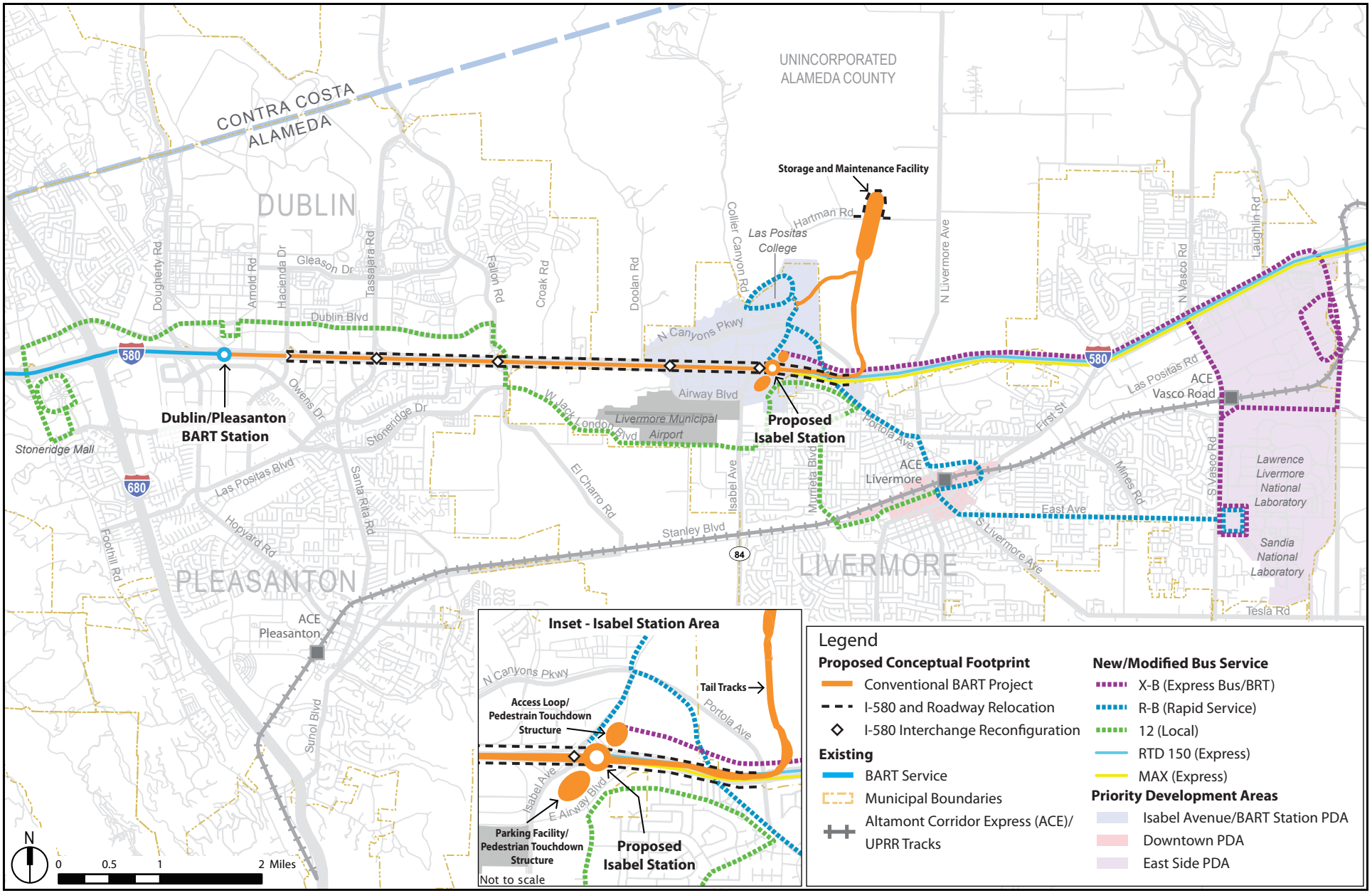
## C. PROPOSED PROJECT – CONVENTIONAL BART PROJECT

The Proposed Project is the approximately 5.5-mile extension of BART service on the Dublin/Pleasanton-Daly City Line from the existing Dublin/Pleasanton Station (current terminus) to a new BART station at the Isabel Avenue/I-580 interchange in the city of Livermore using conventional BART technology.[3, 4]

Key components of the project include the BART extension and related BART infrastructure, relocation of I-580 lanes and associated surface frontage roadway reconfigurations to accommodate the proposed BART alignment within the I-580 median, and new and modified bus services and facilities to improve transit east of the BART extension. These components are listed below, and the conceptual plan is shown in Figure 2-1. A more detailed representation of the footprint of the Proposed Project is shown in Appendix B.

- **BART System Improvements.** The extension of BART to Livermore would primarily entail the construction of new tracks, a new BART station, and a new storage and maintenance facility, as listed below. No changes to the Dublin/Pleasanton Station are proposed.
  - **BART Track Extension.** The BART mainline tracks would be extended approximately 5.5 miles within the I-580 median, which would require widening of the median. Immediately east of the Dublin/Pleasanton Station, the existing tail tracks would be converted to mainline tracks. New mainline tracks would be constructed from the end of the converted track to the proposed Isabel Station. As described above, the design of the Proposed Project does not preclude a future extension of the rail alignment to the east, either in the I-580 median or to Downtown Livermore.

[2] Headway is the time between successive transit vehicles operating on the same route.
[3] Arup and Anil Verma Associates, Inc., 2017a. BART to Livermore Extension Contract Drawings, 10 Percent Preliminary Engineering (Draft). July.
[4] Arup and Anil Verma Associates, Inc., 2017b. 10 Percent Preliminary Engineering Design Basis Memoranda (Draft), Alternative 1: Conventional BART, Alternative 2: DMU/EMU to Isabel Station and Maintenance Facility, Alternative 3: Express Bus/BRT.




Source: Arup, 2017a,b.

**BART to Livermore Extension Project EIR**

Figure 2 - 1
Conventional BART Project Overview

- **New Isabel Station.** The proposed Isabel Station would be constructed just east of the Isabel Avenue/I-580 interchange. The station would be constructed in the I-580 median and would connect to parking and multi-modal transit facilities by pedestrian bridges crossing I-580 to the north and south. The main parking facility, with approximately 3,412 parking spaces, would be south of I-580, accessible from East Airway Boulevard. The main bus transfer facility would be north of I-580 and accessible from Isabel Avenue. A new BART end-of-line operations building would be constructed at the Isabel Station.
- **New BART Storage and Maintenance Facility.** BART evaluated several locations for a new BART storage yard that would provide storage space for approximately 172 BART cars. A location north of I-580 and parallel to Cayetano Creek was selected as the preferred location (see the Alternatives Considered but Withdrawn subsection [Section 2.K], below for a discussion of the other locations). Subsequently, a maintenance facility was included with the storage yard to meet the maintenance needs of a BART extension to the proposed Isabel Station as well as the Daly City-Dublin/Pleasanton Line.

  The new 68-acre combined BART storage and maintenance facility would be constructed north of I-580, providing storage space for approximately 172 BART cars. Tail tracks would extend east from the Isabel Station in the median of I-580, cross under westbound I-580 in an underpass structure, cross under Portola Avenue bridge, and extend north and parallel to Cayetano Creek. The distance from the station to the yard would be approximately 1.9 miles.

- **I-580 and Frontage Road Relocation.** To accommodate the widening of the I-580 median, approximately 5.6 miles of I-580 would be relocated by approximately 46 feet, from just east of the Hacienda Drive interchange to west of the Portola Avenue overcrossing. At the proposed Isabel Station, I-580 would be relocated by approximately 67 feet to accommodate the new station. The existing lane configuration would be relocated to Caltrans standards and would have the same number of travel lanes, including express lanes, as currently exist. Freeway interchanges and on- and off-ramps along the corridor would be reconfigured to accommodate the freeway relocation, and some surface frontage roads and adjacent features would be modified or relocated. The following four interchanges would be reconfigured, either partially or completely: Tassajara Road/Santa Rita Road; Fallon Road/El Charro; Airway Boulevard; and Isabel Avenue.
- **New/Modified Bus Routes and Improvements.** New and modified LAVTA feeder bus routes would connect the new Isabel Station to Downtown Livermore, LLNL, the Vasco

Road ACE station, and other areas east of the BART system.[5] Transit infrastructure enhancements would also be implemented to increase the performance of the bus connections. New and modified routes include Rapid service (R-B), peak-period Express service (X-B), 12, San Joaquin Regional Transit District (RTD) 150, and Modesto Area Express (MAX). Routes that would be eliminated are LAVTA 12X, 20X, and R-B.[6] The overall performance of these routes would be improved via the implementation of bus-related transit priority infrastructure enhancements.

## 1. BART System Improvements

The proposed improvements to the BART system—including train technology, track alignment, station facilities, and non-station facilities—are described below and shown in Figure 2-2.

### a. Conventional BART Project Technology

The BART train technology that would be used for the Proposed Project would be the same as that used in the majority of the BART system. It is referred to as conventional BART technology.

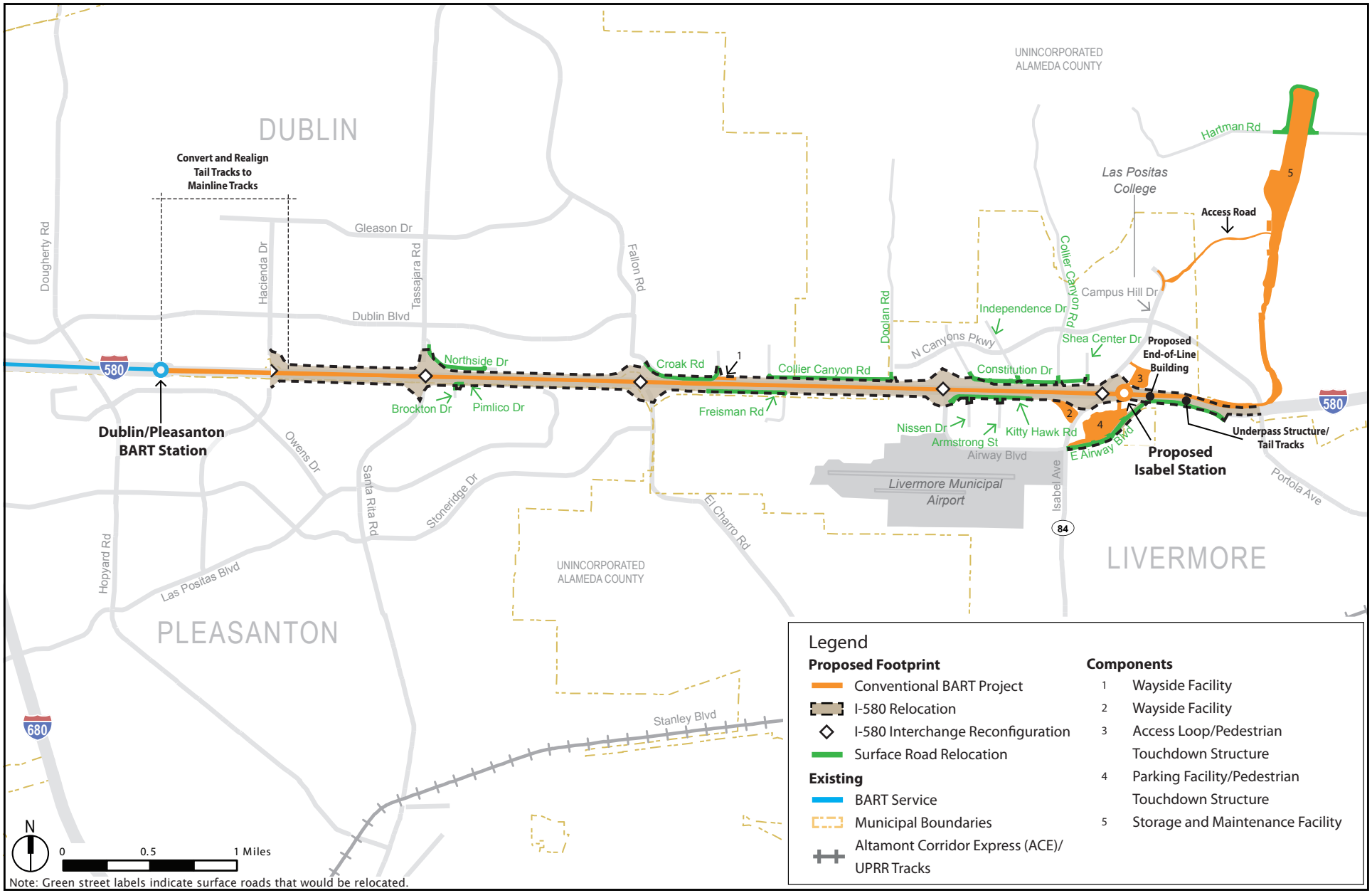
#### (1) Description

The conventional BART technology is an electric railway designed to carry large passenger loads using heavy rail.[7] BART trains run within an exclusive ROW, on a track system that is 5 feet, 6 inches wide; it is wider than the standard gauge (4 feet, 8.5 inches) used for most railroads in the United States.

[5]This EIR describes and analyzes the bus routes at a programmatic level. The routes are conceptual and were developed for the purpose of estimating BART ridership and operating costs. At the time that specific routes are developed by the bus operators, those routes would be subject to a separate environmental review if required.

[6] Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid would serve most of the existing Route 12 stops on Dublin Boulevard as well as North Canyons Parkway and Las Positas College, and a restructured Route 14 would serve the areas of Livermore currently served by Route 12. Therefore, these restructured routes would generally serve the areas currently served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA.

[7] Heavy rail is a mode of transit service operating on an electric railway with the capacity for a heavy volume of traffic. Heavy rail is characterized by high-speed, rapid-acceleration passenger rail cars operating singly or in multi-car trains on fixed rails (on ROWs separate from all other vehicular and foot traffic) and includes sophisticated signaling.




Note: Green street labels indicate surface roads that would be relocated.

Source: Arup, 2017b; Arup and Anil Verma Associates, Inc., 2017a.



Figure 2 - 2
Conventional BART Project Detail

### (2) Propulsion

BART trains are driven by 150-horsepower electric traction motors that are mounted on the axles of each car. Each car has four axles, for a total of four motors per train. These motors are powered by a 1,000-volt (V) direct current (DC) that is delivered to each of the motors via an electrified third rail.

### (3) Vehicles

The vehicles under the Proposed Project are the same as those that will be in use throughout the BART system at the time the project opens. These new BART cars are expected to begin service by 2017. As shown in Figure 2-3, these cars, built by Bombardier Transit Corporation, will feature a series of improvements over the existing BART vehicles, which have been in use since BART began service in 1972. Approximately 36 BART cars would be purchased as part of this project to provide the additional service needed for the new station and additional ridership.

## b. Conventional BART Project Alignment

The Proposed Project would extend BART service east of the existing Dublin/Pleasanton Station to a new BART station near the Isabel Avenue/I-580 interchange. The alignment and station would be constructed in the I-580 median. Approximately 5.5 miles of mainline track would extend to the new Isabel Station as follows:

- Within the existing median, approximately 0.7 mile of the existing tail tracks east of the Dublin/Pleasanton Station would be replaced with mainline tracks.
- Within the new median, approximately 4.8 miles of mainline tracks would be installed.

East of the proposed Isabel Station, approximately 1.9 miles of tail track would extend to the new storage and maintenance facility. Table 2-2 lists the proposed BART alignment, structures, and facilities for each segment of I-580 from west to east.

### (1) Horizontal Alignment

The BART ROW would be extended approximately 5.6 miles within the I-580 median, requiring the existing median to be widened both north and south of I-580 by up to 46 feet (similar to the standard BART ROW) along the majority of the extension. At the proposed Isabel Station, the BART ROW would be approximately 67 feet wide to accommodate the station platform. The BART ROW would be exclusively for BART use. A typical view of I-580 and the BART alignment within the I-580 median is shown in Figure 2-4.

## Typical New BART Train Cars


## Typical BRT Vehicles


Source: BART, 2016; Anthony Nachor, 2017.

BART to Livermore Extension Project EIR

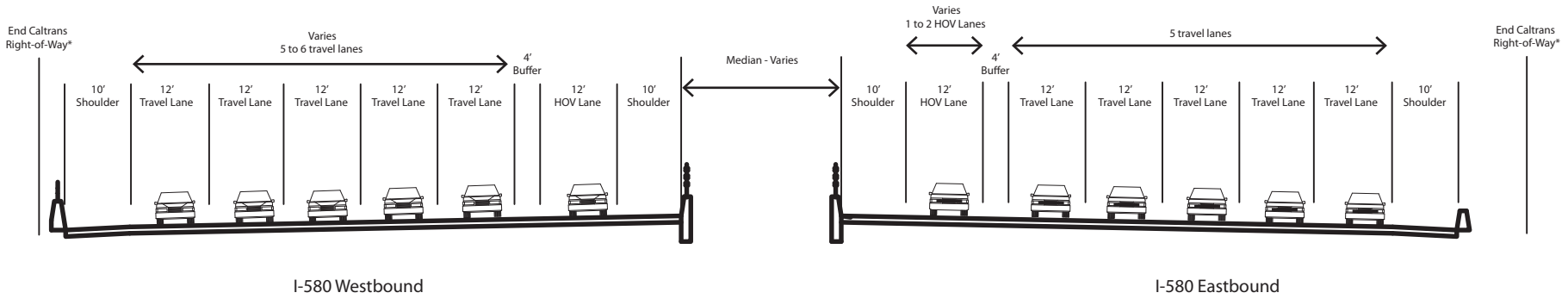
Figure 2-3
Conventional BART Project
Typical BART and BRT Vehicles

**TABLE 2-2 CONVENTIONAL BART PROJECT – ALIGNMENT, FACILITIES, AND STRUCTURES**

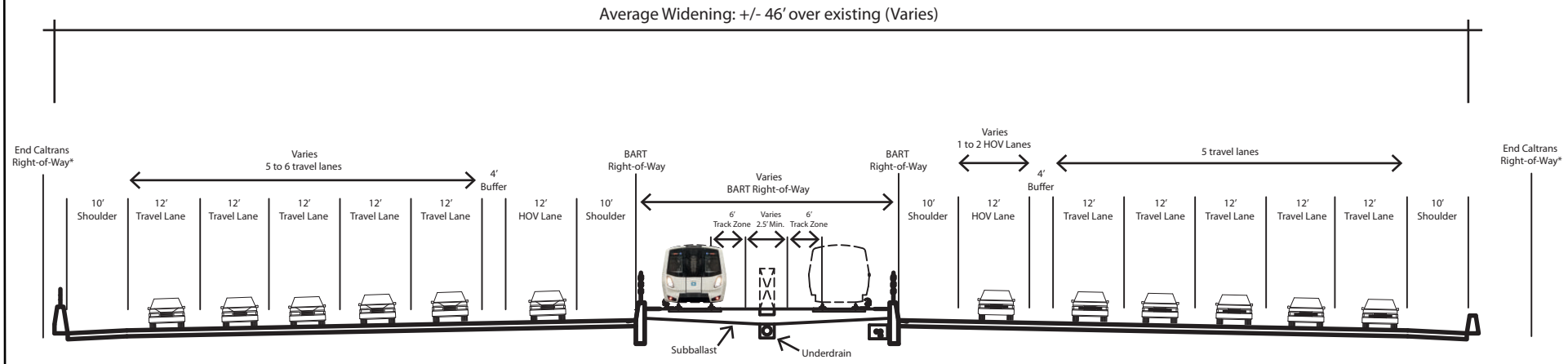
| From | To | BART Alignment/Structures | BART Facilities |
|---|---|---|---|
| Dougherty Road/ Hopyard Road | Hacienda Drive | ▪ Convert tail tracks to mainline tracks | -- |
| Hacienda Drive | Tassajara Road/ Santa Rita Road | ▪ New BART ROW in I-580 median<br>▪ New mainline tracks | -- |
| Tassajara Road/ Santa Rita Road | Fallon Road/ El Charro Road | ▪ New BART ROW in I-580 median<br>▪ New mainline tracks | -- |
| Fallon Road/ El Charro Road | Airway Boulevard | ▪ New BART ROW in I-580 median<br>▪ New mainline tracks | ▪ Wayside facility north of I-580 near Croak Road |
| Airway Boulevard | Isabel Avenue | ▪ New BART ROW in I-580 median<br>▪ New mainline tracks | ▪ Wayside facility south of I-580 near Kitty Hawk Road/Isabel Avenue |
| Isabel Avenue | Portola Avenue | ▪ New BART ROW in I-580 median<br>▪ New mainline tracks to Isabel Station<br>▪ Tail tracks to storage and maintenance facility via westbound I-580 underpass | ▪ Isabel Station in I-580 median and pedestrian overcrossings and touchdown structures (north and south of I-580)<br>▪ Two-story end-of-line BART operations building<br>▪ Isabel Station parking facilities – south of I-580<br>▪ Bus transfer facility – north of I-580 |
| Portola Avenue | North Livermore Avenue | ▪ Tail tracks to storage and maintenance facility<br>▪ Portola Avenue undercrossing<br>▪ Tail track bridges over Arroyo las Positas and Cayetano creeks<br>▪ Hillside tunnel for tail tracks | ▪ Storage and maintenance facility and new access road from Campus Hill Drive (with crossing over Isabel Creek) |

Note: -- = No change proposed.
Source: Arup and Anil Verma Associates, Inc., 2017b.

## Existing




## Proposed




Not to Scale

Source: Arup and Anil Verma Associates, Inc., 2017a.

**BART to Livermore Extension Project EIR**

Figure 2-4
Conventional BART Project
Typical I-580 and Rail Cross Section

The existing tail track east of the Dublin/Pleasanton Station, which is currently used to store BART trains at the end of the line, would be converted/realigned to mainline track. Along this segment of the alignment, which is approximately 0.7 mile long, the existing median would not require widening.

Double-track mainline, with one track in each direction, would be installed along the new BART ROW. The existing crossover east of the Dublin/Pleasanton Station would be retained to allow BART trains to switch tracks. In addition, three new crossovers would be constructed as follows: (1) along the BART mainline extension in the I-580 median, east of the interchange of I-580 with Fallon Road/El Charro Road; (2) along the BART mainline extension in the I-580 median, west of the Isabel Avenue/I-580 interchange; and (3) at the storage and maintenance facility.

#### (2) Vertical Alignment

Similar to the existing I-580 roadway, the BART alignment would cross below existing freeway overpasses and above natural features. The BART tracks would be constructed consistent with the existing grade of I-580 from the Dublin/Pleasanton Station to the Isabel Station, where the tracks would cross under westbound I-580 in an underpass, resurface north of I-580, cross under the Portola Avenue overcrossing, and then extend to the storage and maintenance facility west of Cayetano Creek.

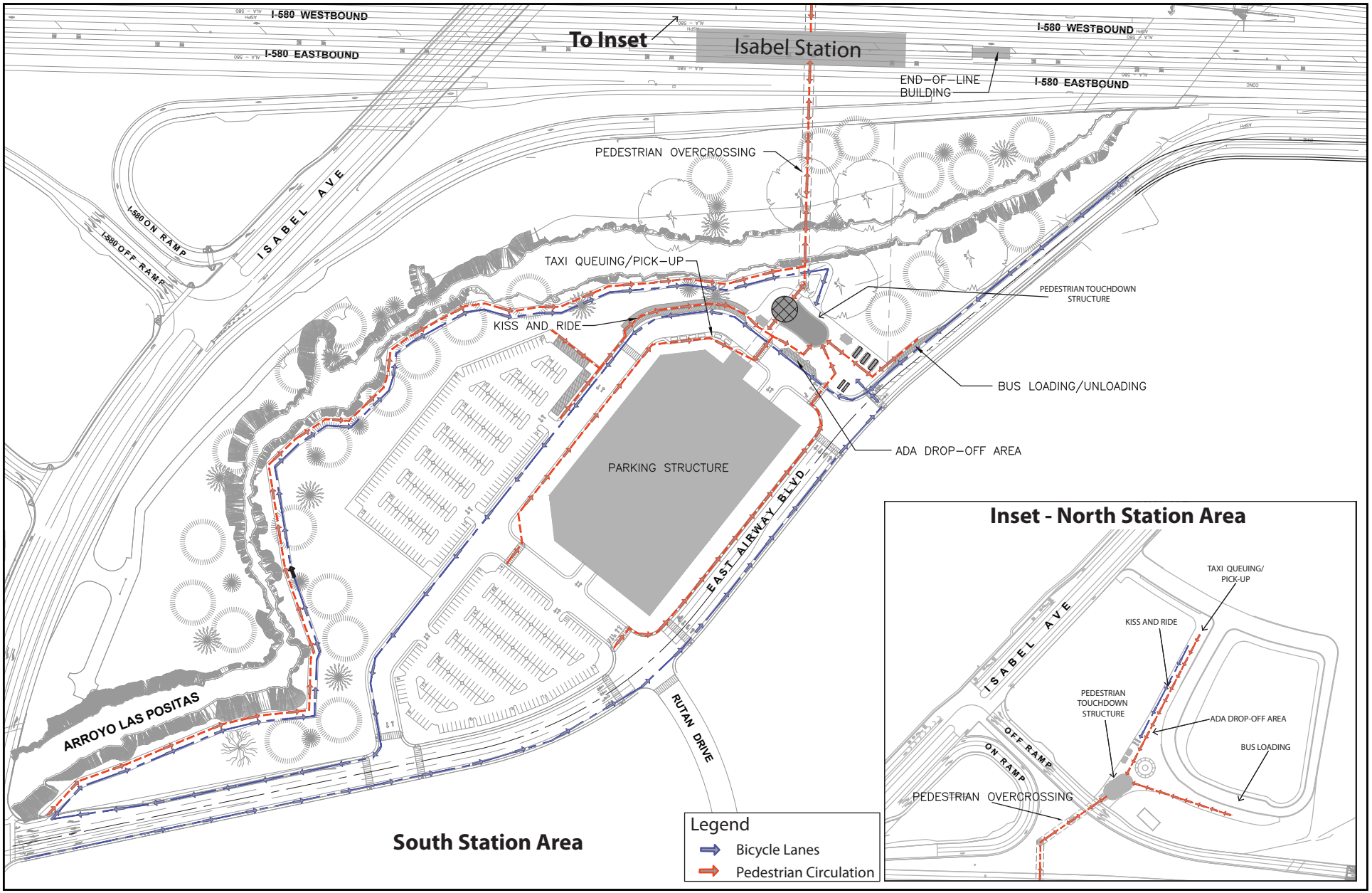
As shown in Table 2-2, new bridges and structures would be constructed along the following creeks for the tail tracks from Isabel Station to the storage and maintenance facility and the access road to the storage and maintenance facility:

- Arroyo las Positas (east of Portola Avenue)
- Cayetano Creek
- Isabel Creek

### c. New Isabel Station

The Proposed Project includes the construction of a new terminus station for the Dublin-Pleasanton Line, which would be located in the I-580 median just east of the Isabel Avenue/I-580 interchange in the city of Livermore. A plan view of the new Isabel Station and surrounding facilities is shown in Figure 2-5. A section view of the new station and BART facilities north and south of I-580 is presented in Figure 2-6.

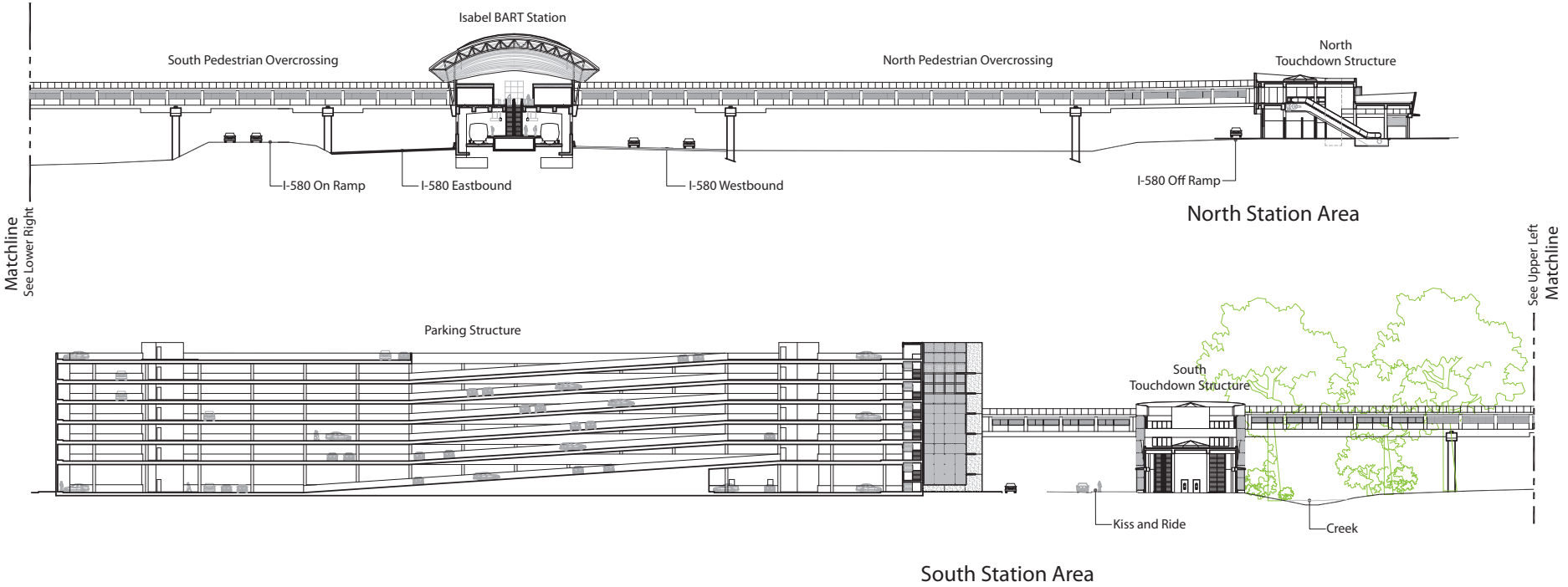
No modifications to the Dublin/Pleasanton Station are proposed under the Proposed Project. The existing BART end-of-line operations building would be vacated and a new end-of-line operations building would be constructed at the proposed Isabel Station, as described below. This would not require any change to the existing Dublin/Pleasanton Station.




Source: Arup and Anil Verma Associates, Inc., 2017a.



Figure 2-5
Conventional BART Project
Isabel Station and Parking – Site Plan




Source: Arup and Anil Verma Associates, Inc., 2017a.

**BART to Livermore Extension Project EIR**

Figure 2-6
Conventional BART Project
Isabel Station and Parking – Site Section

### (1) Design and Facilities

The proposed Isabel Station would be a partially enclosed station with an elevated concourse level above the BART platform, as shown in Figure 2-7. The station would be approximately 67 feet wide and approximately 700 feet long. It would have a canopy-type roof at a height approximately 62 feet above grade. Figure 2-8 shows a longitudinal section of the station and south elevation.

The station would include the following three types of areas: (1) free area, where the public congregates and that contains ticket vending machines; (2) paid area, which starts just beyond the fare gates and that includes the passenger boarding platform; and (3) ancillary areas, which are non-public areas required for station operation. Typical station amenities, including public restrooms and drinking fountains, would be provided for passengers in the paid area.

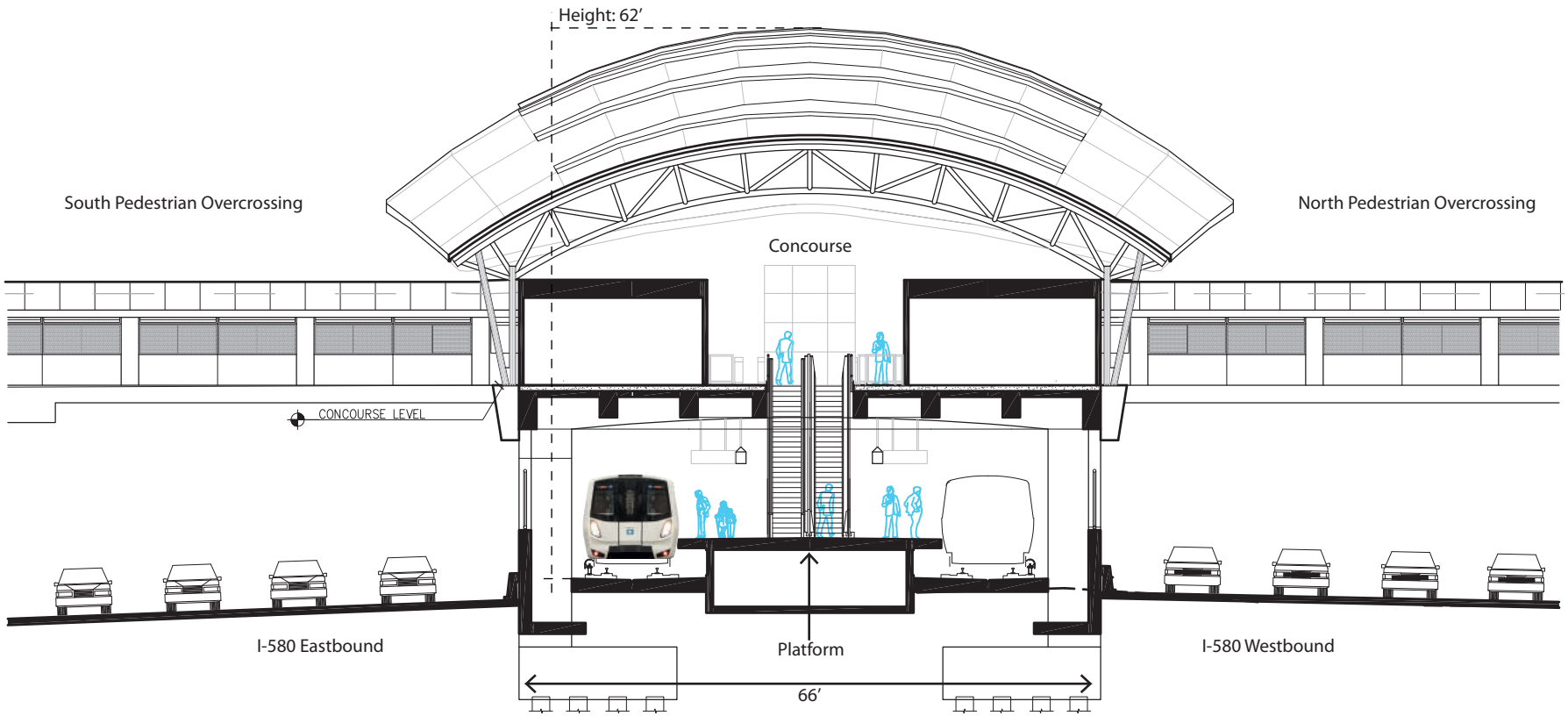
The concourse level (upper level) would be approximately 66 feet wide by approximately 424 feet long. The pedestrian overcrossings would connect at this level. The ticket booth, station agent gate, fare gates, train control room, electrical and mechanical rooms, police, staff break room, and other related uses would be located on this level. Escalators, elevators, and stairs would connect the concourse to the BART platform on the lower level. The BART platform would be approximately 30 feet wide by approximately 700 feet long, and would accommodate a standard 10-car BART train.

As shown in Figures 2-5 and 2-6 above, pedestrian overcrossings would extend north and south of the station, crossing I-580 and connecting the station concourse to the bus transfer facilities on the north and parking facilities on the south, via touchdown structures housing escalators and elevators. The pedestrian overcrossings would be approximately 20 feet wide. The overcrossing to the north would extend approximately 382 feet from the station to the touchdown structure, and the overcrossing to the south would extend approximately 485 feet to the touchdown structure.

The parking and transit facilities are described below in the Access and Connections subsection.

BART operations facilities within the Isabel Station would include the train control room, traction power substation, a 34.5-kilovolt (kV) switching station, and a 115/34.5-kV high-voltage substation. A permanent emergency generator would be located at the Isabel Station north pedestrian touchdown structure.

Landscaping would be installed at the north and south station areas, which are described below.

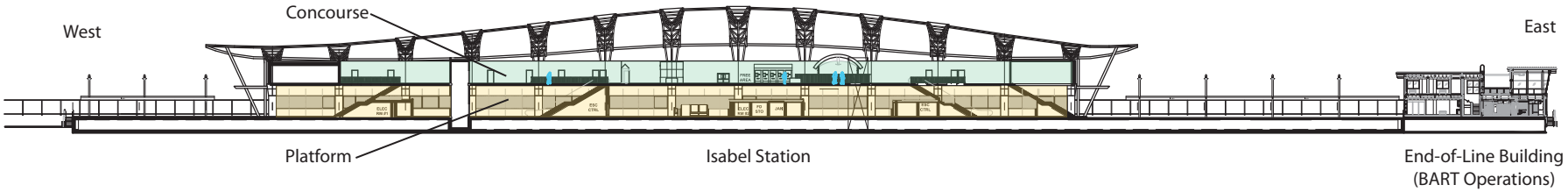



Source: Arup and Anil Verma Associates, Inc., 2017a.

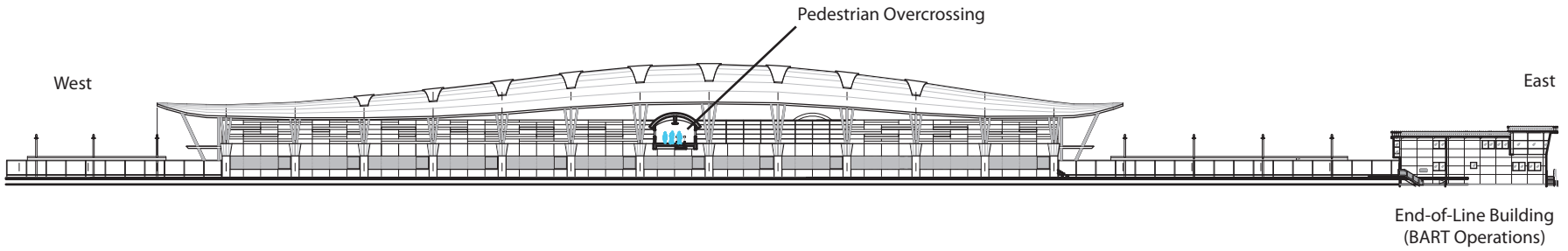


Figure 2 - 7
Conventional BART Project
Isabel Station Cross Section

## Longitudinal Section




## South Elevation




32' 0' 32' 64'
Graphic Scale

Source: Arup and Anil Verma Associates, Inc., 2017a.

BART to Livermore Extension Project EIR

Figure 2 - 8
Conventional BART Project
Longitudinal Section and South Elevation

### (2) Access and Connections

BART's Station Access Policy, adopted June 9, 2016, provides guidance on prioritizing access modes to BART stations, depending on station type.[8] The policy identifies six station types: urban; urban with parking; balanced intermodal; intermodal/automobile reliant; and automobile-dependent. When the Isabel Station would first be open for service, riders would rely primarily on automobiles for access to the station, making it an automobile-dependent station. Over time, development guided by the City of Livermore's proposed Isabel Neighborhood Plan (INP) is expected to increase the density of housing and jobs around Isabel Station, and to promote active transportation with a network of bicycle and pedestrian trails and pedestrian-scale streets with traffic calming devices. With these improvements, it is anticipated that the proposed Isabel Station would be considered a balanced intermodal station. For additional description of the INP, see Chapter 1, Introduction, and Section 3.A, Introduction to the Environmental Analysis.

For automobile-dependent stations, investments to provide access by walking, bicycle, transit, drop-off and pick-up, and automobile parking are all accommodated, with priority given to walking. For balanced intermodal stations, investments to provide access are limited to walking, bicycle, transit, and drop-off and pick-up, and not automobile parking.

The Isabel Station would be accessible from both the north and south, on either side of I-580. A bus transfer facility would be located at the north station area, providing bus and passenger access to the station, while the south station area would be primarily for passenger vehicle parking. Site circulation in the vicinity of the proposed station is shown in Figure 2-5.

#### (a) North Station Area – Bus Transfer Facility

A bus transfer facility at the north station area on the north side of I-580 would provide the primary transit connections to the station. A new loop road from Isabel Avenue would be constructed to provide access to the north station area. Passenger drop-off and pick-up, a taxi stand, and bus connections would be provided at the transfer facility. In addition, a combination of bicycle lockers and bicycle racks would be provided at the north station area. Approximately 300 bicycle lockers and racks would be provided at the Isabel Station, divided between the north and south sides of the station. The proportion of bicycle facilities allocated to the north and south sides of the station would be determined by demand as the patronage develops. Buses traveling westbound on I-580 would take the off-ramp at Isabel Avenue, turn right onto Isabel Avenue, and turn right to enter the north

[8] San Francisco Bay Area Rapid Transit District (BART), 2016. BART Station Access Policy. Available at: http://www.bart.gov/about/planning/access, accessed June 2017.

station area. The route for non-freeway buses would be similar to the route of freeway buses, except that non-freeway buses would approach the bus drop-off/pick-up facility from local roads rather than from the I-580 off-ramp. Buses would use the access loop road to drop off passengers at the transfer facility as close to the north pedestrian overcrossing as feasible.

BART would construct the access loop road from Isabel Avenue, as well as the bus transfer facility and the pedestrian overcrossing from the station in the I-580 median. The area around those elements of the project would be available for TOD consistent with Livermore's INP and would be integrated into the INP as it is developed. For additional description of the INP, see Chapter 1, Introduction, and Section 3.A, Introduction to the Environmental Analysis.

**(b) South Station Area – Parking**

As described above, the primary parking facility for BART would be provided south of I-580 along East Airway Boulevard, east of Isabel Avenue. Vehicular access would be from I-580 via Isabel Avenue or Portola Avenue to East Airway Boulevard.

Approximately 3,412 parking spaces would be provided as follows: a seven-level, approximately 87-foot-high parking structure would provide approximately 2,835 parking spaces, and two surface parking lots would provide 577 parking spaces. The number of spaces provided was based on the anticipated parking demand (see Section 3.B, Transportation, for additional information). An investment in parking at Isabel Station is consistent with the classification of the station as an automobile-dependent station under BART's Station Access Policy, as described above. Solar panels would be installed above the top parking level and would have a photovoltaic capacity of approximately 1,000 kilowatts (kW).

The south station area would be accessed by three driveways from East Airway Boulevard. The central driveway would be opposite Rutan Drive, with a second driveway to the east and a third to the west. The central driveway would be signalized with a protected phase provided for eastbound left-turning traffic (entering the station site from eastbound East Airway Boulevard). The other two driveways would be stop-controlled, with the westernmost driveway a right-turn-out-only driveway.

In addition to vehicle parking, a bicycle station with a combination of bicycle racks and lockers would be constructed. An area that accommodates a taxi stand, bus loading/unloading zone, and passenger drop-off/pick-up would also be provided within the south station facility. Although most buses would serve the bus transfer facility at the north station area, at least one bus line (LAVTA 12) would stop on Airway Boulevard near the parking facility and pedestrian overcrossing. Passengers would use the south pedestrian overcrossing to access the BART platform. Approximately 0.4 mile of East

Airway Boulevard would be widened from the existing two lanes to four lanes (two lanes in each direction), from Isabel Avenue to the eastern-most new access road at the south station area, and pedestrian and bicycle improvements would be constructed as described below.

While the quantity of station parking has been designed to accommodate the anticipated demand, unanticipated demand for parking could exceed supply. This could result in BART patrons parking on local streets. In the event that a local jurisdiction requests BART assistance with management of overflow parking by BART patrons, BART would work with the jurisdiction to implement BART's Parking Management Toolkit, which provides recommended strategies for addressing BART parking overflow onto city streets (a copy of the Parking Management Toolkit is provided in Appendix D). In addition, the station parking garage would be designed to accommodate the potential future construction of two additional levels of parking.

### (c) Pedestrian and Bicycle Access

Improvements for pedestrian and bicycle access to the proposed Isabel Station are described below.

- Standard-width sidewalks and crosswalks would be provided along the north station access loop road and bus transfer facility. Additionally, a 5-foot-wide sidewalk would be constructed along the north side of East Airway Boulevard along the Isabel parking facility (within the BART property).
- A high-visibility crosswalk, including striping and traffic signal modifications, would be installed at the intersection of Rutan Drive and East Airway Boulevard to provide safe pedestrian and bicycle crossing.
- A crosswalk, including striping and traffic signal modifications, would also be installed across the north leg of the Isabel Avenue and East Airway Boulevard intersection.
- Bicycle lanes (6 feet wide) would be constructed on East Airway Boulevard. These lanes would connect to the existing bicycle lanes on Isabel Avenue and Airway Boulevard to the west, to the existing trail along Sutter Street, and to the planned trail along Airway Boulevard east of the site.
- A service road would be constructed along the south side of Arroyo las Positas Creek, north of the parking facility. This road would also serve as a pedestrian pathway and bicycle trail. A connection to the service road would be installed from East Airway Boulevard. Separately, the City of Livermore may construct a pedestrian way/bicycle trail connection under I-580, along the Arroyo las Positas Creek undercrossing of I-580 that could connect the pedestrian and bicycle access at the Isabel Station with other pedestrian paths and bicycle trail planned for north of I-580 by the City of Livermore.

### d. Non-Station Facilities

Non-station facilities associated with the Proposed Project include the tail tracks and end-of-line operations building, storage and maintenance facility, and wayside system facilities. The wayside facilities provide power to the tracks and switches and communications to the trains.

#### (1) End-of-line Operations Building and Tail Tracks

The tail tracks east of the Dublin/Pleasanton Station would be converted to mainline tracks. Tail tracks differ primarily from mainline tracks in that they are used for train storage and logistics and not for revenue passenger transport. The new end-of-line building for BART operations at the Isabel Station (shown in Figure 2-8 above) would be a two-story structure east of the BART platform. The end-of-line building would house the train supervisory booth and associated staff facilities.

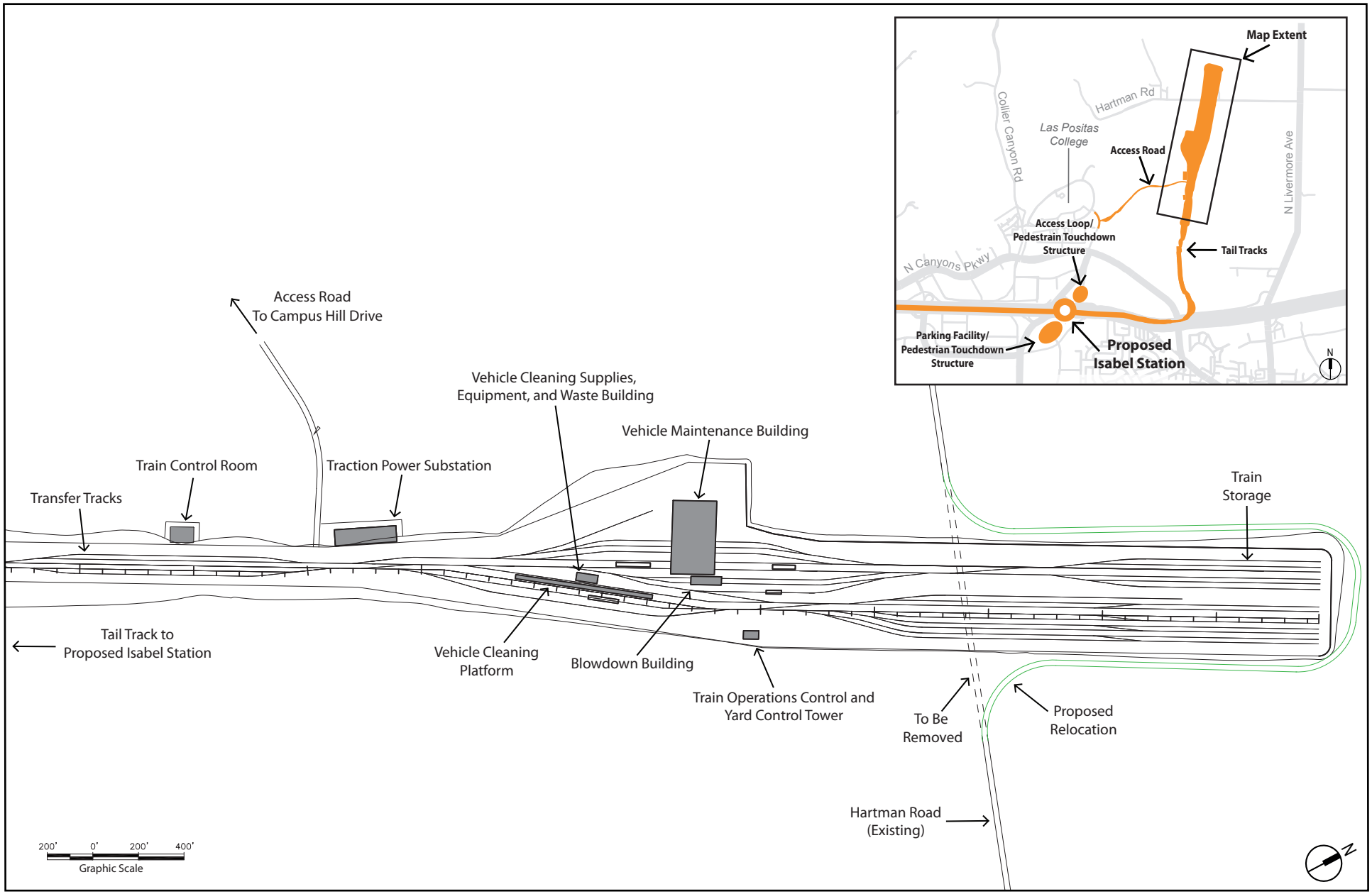
The tail tracks would extend approximately 1.9 miles from the Isabel Station to the storage and maintenance facility. The tail tracks would extend from the Isabel Station in the I-580 median, through an underpass to the north side of I-580, crossing Arroyo las Positas and Cayetano creeks on bridges, and extending through an approximately 450-foot hillside tunnel to the storage and maintenance facility.

The tail tracks would be designed with culverts or drainage ways at regular intervals under the track to disperse stormwater runoff evenly along the trackway and maintain drainage to Cayetano Creek and vernal pools in the area.

#### (2) Storage and Maintenance Facility

BART conducted an operations analysis to determine BART vehicle fleet and storage needs to effectively operate the Proposed Project. The analysis considered expected BART ridership on the Proposed Project as well as BART's operating plan for the Daly City-Dublin/Pleasanton Line in 2040. Based on the analysis, a storage yard providing storage space for approximately 172 BART cars would be required. As the Proposed Project evolved, a maintenance facility was added to the storage yard to meet the maintenance needs of a BART extension to Isabel Station as well as the Daly City-Dublin/Pleasanton Line.

Thus, an approximately 68-acre storage and maintenance facility, shown in Figure 2-9, would be constructed to store approximately 172 BART cars and conduct systemwide maintenance activities for BART cars. The storage and maintenance facility would contain approximately nine tracks to store BART trains. Fueling, vehicle cleaning, washing, and routine maintenance activities would be carried out at this facility. The main building, with




Source: Arup, 2017b; Arup and Anil Verma Associates, Inc., 2017a.

BART to Livermore Extension Project EIR

Figure 2-9
Conventional BART Project
Storage and Maintenance Facility

a footprint of approximately 71,337 square feet and a height of approximately 44 feet, would serve as the maintenance facility. Other support buildings would include a 50-foot-high train control tower; a train control room; a traction-power substation; a vehicle cleaning supplies, equipment, and waste building; a vehicle cleaning platform; and a blowdown building.[9] A permanent emergency generator would be installed at the facility. A surface parking lot with approximately 100 employee parking spaces would be constructed. The storage and maintenance facility would be enclosed with security fencing, and security lighting would be installed.

Vehicle access to the storage and maintenance facility would be provided by a new two-lane road that would extend approximately 0.7 mile from Campus Hill Drive.

### (3) Wayside System Facilities

As listed in Table 2-2 and shown in Figure 2-2 above, wayside facilities would be constructed along the proposed BART alignment to provide power and communications support for the project. The wayside facilities provide the ability to power different sections of track and switches via electrical substations that connect to the larger power grid. They also provide communications to trains in this segment of the system. Typical wayside facilities for the BART alignment include train control houses, traction power substations, train control rooms, gap breaker stations, switching stations, high-voltage substations, auxiliary substations, and signaling bungalows.[10]

Several wayside facilities would be constructed at the Isabel Station and the storage and maintenance facility, as described in the respective sections for those topics above. In addition, two stand-alone wayside facilities would be constructed, as follows:

- A train control house and traction power substation north of I-580, with access from Croak Road
- A train control house, traction power substation with Pacific Gas and Electric Company power switching station, and gap breaker on the south side of I-580 at the east off-ramp at Kitty Hawk Road and Isabel Avenue

Where the stand-alone facilities would be adjacent to public areas, an approximately 9-foot-high concrete masonry wall would be constructed around the perimeter of the facility. Where the facility is not publicly visible, an approximately 8-foot-high chain-link

[9] The waste building contains dumpsters for garbage that is removed from the trains. Within the blowdown building, high-powered fans blow down the outside and undercarriage of the BART cars prior to maintenance.

[10] Gap breaker stations control power to the third rail and allow sections of the rail to be turned on and off. Signaling bungalows allow control over trains on specific segments of track.

metal fence topped with barbed wire would surround the facility. Structures within the facility would range in length from approximately 32 feet to 110 feet and would be up to 17 feet high. Vehicular access would be from nearby roadways via a new two-lane access road. Figure 2-10 shows typical site plans and Figure 2-11 shows typical elevations for the wayside facilities.

The wayside facility near Croak Road would be approximately 70 feet by 410 feet. The facility would include a traction power substation with a 34.5-kV alternating current (AC) house, a 1,000-V DC house, transformers, and a train control house.

The wayside facility at Kitty Hawk Road and Isabel Avenue would be approximately 90 feet by 400 feet. The facility would include a traction power substation and high-voltage substation with a 34.5-kV AC house and a 1,000-V DC house and Pacific Gas and Electric Company switching station.

## 2. I-580 and Frontage Road Relocation

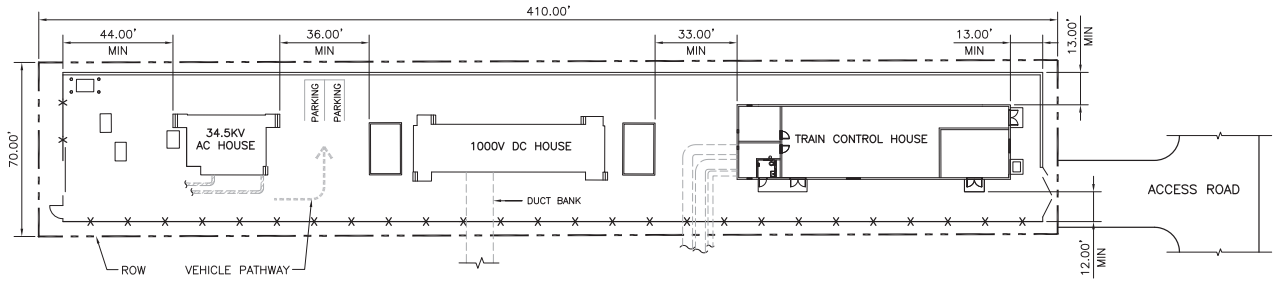
Approximately 5.6 miles of the Caltrans ROW and I-580, from east of the Hacienda Drive interchange to west of the Portola Avenue/I-580 overcrossing, would be relocated to accommodate the new BART ROW in the median. Existing freeway interchanges, on- and off-ramps, freeway structures such as overcrossings, and surface frontage roads would be reconfigured to accommodate the increased ROW width, as needed. The horizontal and vertical alignment of the I-580 relocation, as well as I-580 interchange and roadway reconfigurations, are described below and indicated in Figures 2-2 and 2-4 above. Table 2-3 shows the proposed I-580 relocation, interchange reconfiguration, roadway modifications, and structures for each segment of I-580, from west to east.

### a. I-580 Horizontal Alignment

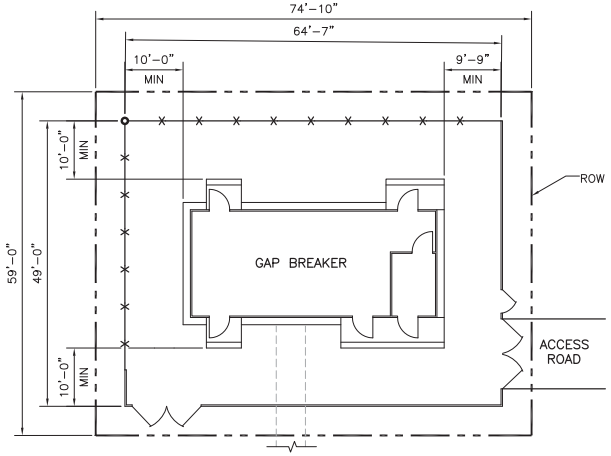
The Caltrans ROW would be widened generally by approximately 46 feet. In the vicinity of the proposed Isabel Station, east of the Isabel Avenue overcrossing, the Caltrans ROW would be widened by approximately 67 feet to accommodate the new station. The existing freeway lane configuration would be moved outward and relocated to Caltrans standards, and would have the same number of travel lanes and express lanes under the Proposed Project as currently exist.

### b. I-580 Vertical Alignment

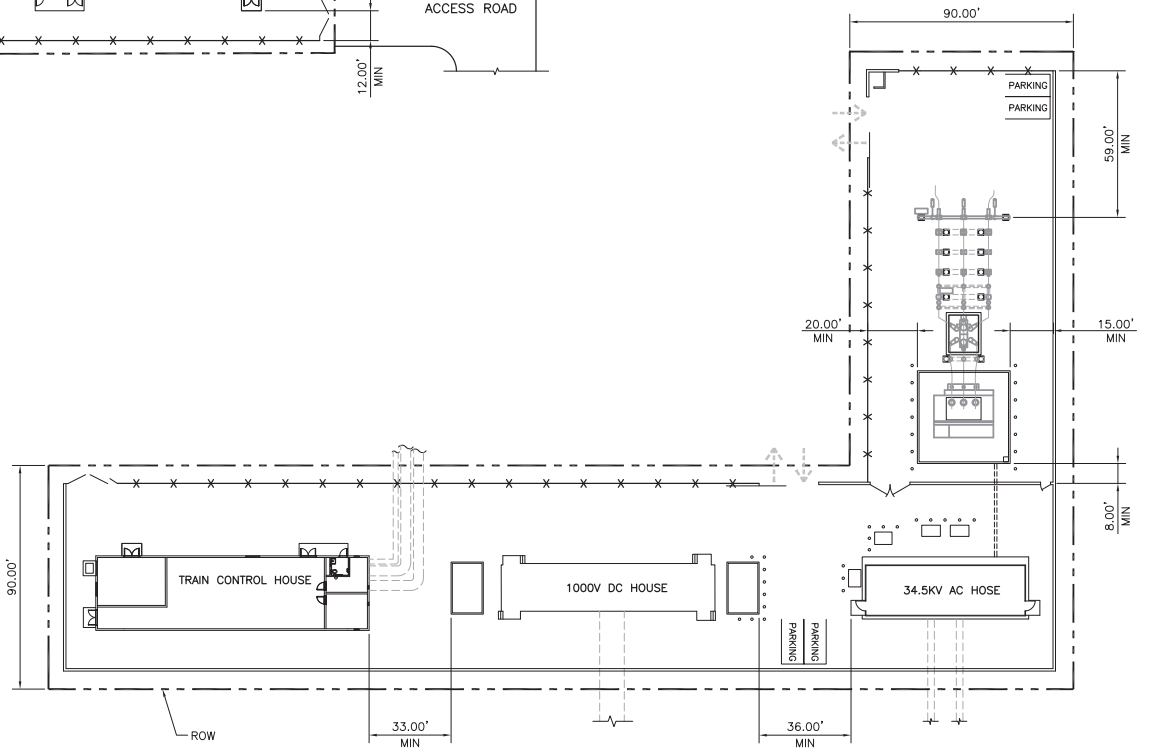
The vertical freeway alignment along I-580 would be generally similar to existing conditions. Where required by existing topography, new/realigned retaining walls would be required. Structures, including the existing I-580 bridges, would be widened to accommodate the wider ROW.




Traction Power Substation




Gap Breaker Station



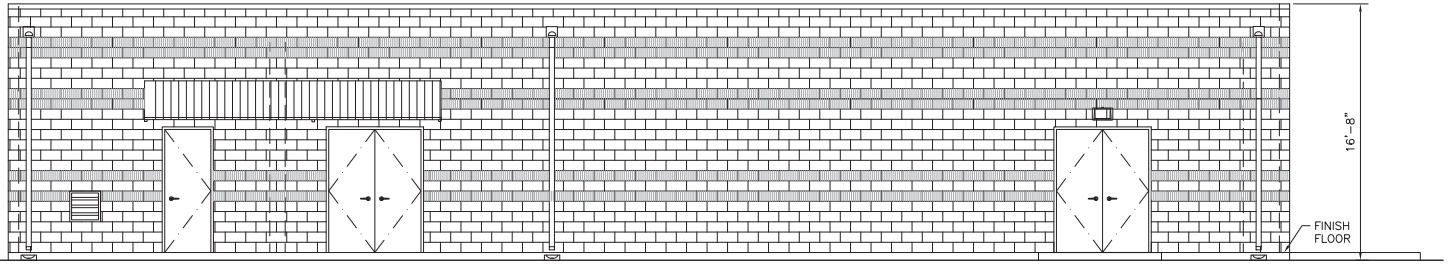

Traction Power Substation and High Voltage Substation

Not to Scale

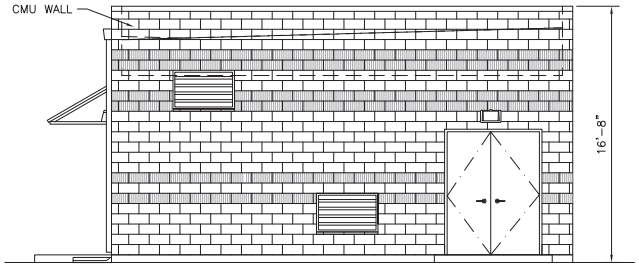
Source: Arup and Anil Verma Associates, Inc., 2017a.



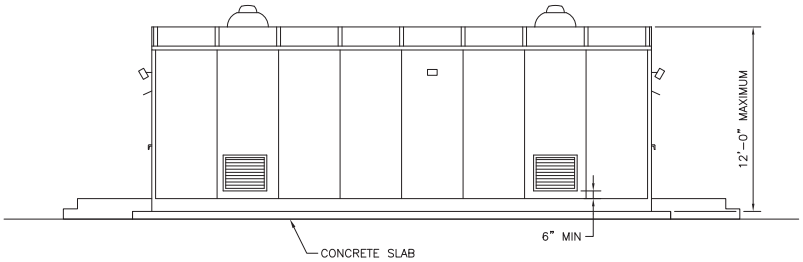
Figure 2-10
Conventional BART Project
Wayside Facilities – Typical Site Plans



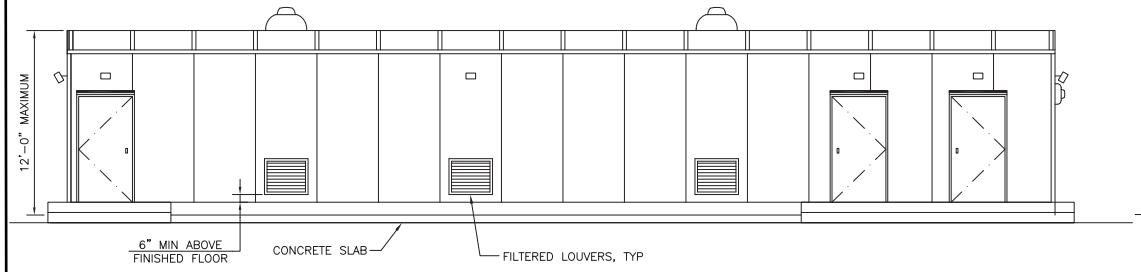

Train Control House Building Elevation



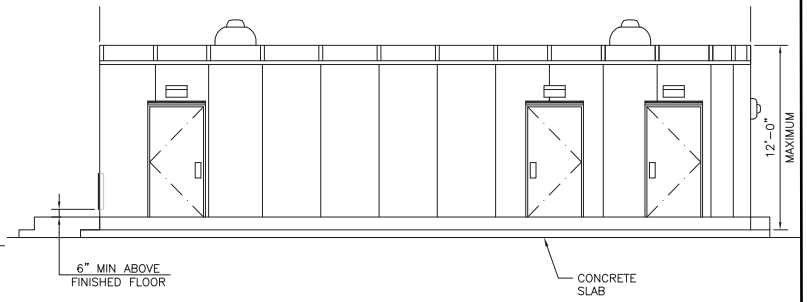

Train Control House Building Elevation




34.5 KV AC House Elevation




1000V DC House Elevation




Gap Breaker Station Elevation

Not to Scale

Source: Arup and Anil Verma Associates, Inc., 2017a.

**BART to Livermore Extension Project EIR**

Figure 2-11
Conventional BART Project
Wayside Facilities – Typical Elevations

**TABLE 2-3 CONVENTIONAL BART PROJECT – I-580 AND ROADWAY MODIFICATIONS**

| From | To | I-580 and On-ramps/ Off-ramps/Interchanges | Surface Road Realignment | Structures |
|---|---|---|---|---|
| Dougherty Road/ Hopyard Road | Hacienda Drive | -- | -- | -- |
| Hacienda Drive | Tassajara Road/ Santa Rita Road | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure EB on-ramp and WB off-ramp at Hacienda Drive | -- | ▪ Tassajara Creek bridge (widen bridge deck; new deck piles) |
| Tassajara Road/ Santa Rita Road | Fallon Road/ El Charro Road | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Tassajara Road/Santa Rita Road/ | ▪ Northside Drive, Brockton Drive, Pimlico Drive | ▪ Reconfigure retaining walls at Tassajara Road/Santa Rita Road |
| Fallon Road/ El Charro Road | Airway Boulevard | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Fallon Road/El Charro Road | ▪ Croak Road, Freisman Road, Collier Canyon, Road, Doolan Road | ▪ Reconfigure retaining walls at Fallon Road/El Charro Road<br>▪ Cottonwood Creek bridge (widen bridge deck; new piles and abutments) |
| Airway Boulevard | Isabel Avenue | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Airway Boulevard<br>▪ Demolish and reconstruct one (west) of the two bridge overcrossings | ▪ Constitution Drive, Independence Drive, Collier Canyon Road, Shea Center Drive, Kitty Hawk Road, Nissen Drive, Armstrong Street | ▪ Rebuild one of two Airway Boulevard overcrossings<br>▪ Reconfigure retaining walls Airway Boulevard overcrossing<br>▪ Collier Canyon Creek bridge (widen bridge deck; new piles and abutments) |
| Isabel Avenue | Portola Avenue | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Isabel Avenue | ▪ East Airway Boulevard, Hartman Road | ▪ Reconfigure retaining walls at Isabel Avenue/I-580<br>▪ Arroyo las Positas Creek bridge (widen bridge deck; new deck piles) |

Notes:
-- = No change proposed; EB = eastbound; WB = westbound.
Collier Canyon Road refers to the portion of the road that is west of Doolan Road.
Source: Arup and Anil Verma Associates, Inc., 2017a.

As shown in Table 2-3, the following existing bridges and structures would be widened to accommodate the new BART ROW within the I-580 median:

- Tassajara Creek
- Cottonwood Creek
- Collier Canyon Creek
- Arroyo las Positas (at Isabel Station)

#### c. Interchange and Roadway Reconfiguration

Modifications would be required at the interchanges and on- and off-ramps along this corridor, including tightening the radius of some ramps and reconstructing others. Reconfiguration/realignment of the I-580 interchanges in both the eastbound and westbound directions would be required at Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue. Retaining walls would be reconfigured for realigned roadways as required based on the existing topography. The west side of the Airway Boulevard bridge over I-580 would rebuilt.

In addition, adjacent surface frontage roads and structures would be realigned, as shown in Table 2-3. This includes portions of the following roads: Northside Drive; Brockton Drive; Pimlico Drive; Croak Road; Freisman Road; Collier Canyon Road; Doolan Road; Constitution Drive; Independence Drive; Shea Center Drive; Kitty Hawk Road; Nissen Drive; Armstrong Street; East Airway Boulevard; and Hartman Road. [11]

As part of a separate project, the City of Livermore plans to widen the Isabel Avenue overcrossing. To accommodate this future widening, BART would build the foundations and columns for the overcrossing concurrent with the Proposed Project to avoid potential future conflicts with the BART system operations. As part of this work, concrete columns approximately 6 feet in diameter and 18 feet high would be constructed within the I-580 median for the future Isabel Avenue widening.

### 3. Bus Routes and Improvements

As shown in Figure 2-1, new and modified feeder bus routes would be developed for the project, and new bus infrastructure would be installed to provide improved service.[12] These bus routes and infrastructure improvements are referred to in this EIR as feeder buses since they would carry riders to the Proposed Project. The bus technology, proposed route modifications, and bus infrastructure improvements for the project are described below.

[11] The portion of Collier Canyon Road west of Doolan Road.
[12] Arup, 2017a. BART to Livermore Extension Bus Operations Technical Memorandum. July.

As described above, this EIR describes and analyzes the bus routes and bus infrastructure improvements at a programmatic level. The routes are conceptual and were developed for the purpose of estimating the BART ridership and operating costs. Candidate locations for bus infrastructure improvements within existing street ROWs are described below to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.

### a. Bus Technology

LAVTA would provide the majority of the bus service to the Isabel Station using existing passenger buses. The LAVTA fleet currently consists of a mixed fleet of 40-foot and 29-foot diesel and hybrid fixed-route buses; buses contain passenger amenities such as restrooms and on-board information systems. There are currently 66 fixed-route standard buses. Forty of LAVTA's 40-foot diesel buses will be retired by 2017 and replaced with a mix of 35-foot and 40-foot hybrid electric and/or electric coaches. LAVTA is pursuing all-electric vehicles for much of the 2017 fleet replacement.[13]

BRT service characteristics would be used for some routes as described below. BRT refers to bus routes with one or more of the following elements, which provide reduced travel times: limited-stop service; transit priority elements, such as transit signal priority, queue-jump lanes and bus bulb-outs; and freeway-travel and use of express lanes, where possible. Figure 2-3 shows a typical BRT bus.

### b. New/Modified Bus Routes

For the Proposed Project, bus routes currently serving the Dublin/Pleasanton Station and areas to the east would be shortened, and routes that duplicate service provided by the Proposed Project would be removed.[14] Eastward bus connections at the Dublin/Pleasanton Station would be limited to two local routes: LAVTA's Route 10 to LLNL and Stoneridge Mall, and LAVTA's Route 12 to the Livermore Transit Center.

New/modified LAVTA routes (including local, Express, and Rapid routes) would serve the proposed Isabel Station, connecting the station with destinations in Livermore, including

[13] Livermore-Amador Valley Transportation Authority (LAVTA), 2016. LAVTA Short Range Transit Plan, Fiscal Year 2016 to 2025. April. Available at: http://www.wheelsbus.com/wp-content/uploads/2015/08/FINAL-SRTP.pdf.

[14] Six bus operators currently provide service connecting areas east of the BART system to the Dublin/Pleasanton Station: LAVTA Wheels bus service; Central Contra Costa Transit Authority; RTD; MAX; Amtrak California; and Stanislaus Regional Transit.

LLNL, the Downtown Livermore ACE station, the Vasco Road ACE Station, and Las Positas College.[15] The new/modified bus routes are listed in Table 2-4.

The bus routes for the connecting bus services for the Proposed Project (as well as those for the DMU Alternative), were developed to provide effective connections from key nodes of activity in Livermore to the BART system (Isabel Station), and thereby improve service for existing BART patrons and generate as many additional BART patrons as possible. Consistent with the objectives of the BART to Livermore Extension Project, this includes providing effective connections to inter-regional rail (i.e., ACE Downtown Livermore and Vasco Road stations) and PDAs in Livermore (i.e., Livermore Isabel Avenue BART Station PDA, Livermore Downtown PDA, and Livermore East Side PDA). Other key activity nodes connected by proposed bus services include LLNL, Sandia National Laboratories, Las Positas College, and the San Francisco Premium Outlets.

Bus services were developed to provide as fast and as direct a route as practical from these activity nodes to the Isabel station. To reduce travel time, routes were developed to make optimal use of the I-580 express lanes. In addition, transit priority elements such as transit signal priority, bus bulbs, and real-time information were deployed to improve travel times along bus route segments experiencing traffic congestion, intersection delay, interference from general traffic, and long dwell times due to high passenger boarding and alighting volumes at specific bus stops.

To provide a seamless connection with the BART system, the frequency of many of the bus routes was chosen to match the frequency of BART trains arriving at the Isabel Station during peak periods. Coordinated bus arrival and departure times with each BART train significantly improves a passenger's perception of reliability and experience of using bus service to connect to BART.

### c. Bus-Related Infrastructure Improvements

A series of transit priority infrastructure enhancements would also be implemented to increase the performance of the bus connections described above. Typical bus improvements are shown in Figure 2-12. These enhancements would be implemented on local bus corridors and arterials, and are discussed below.

[15] Rapid routes are routes that run with high frequency and provide service connecting key destinations. Express routes run during peak periods only, make limited stops, and serve major destinations. Both of these route types may feature transit priority elements along their respective route alignments, such as transit signal priority, bus bulbs, queue-jump lanes, and freeway-travel and use of express lanes.

TABLE 2-4 CONVENTIONAL BART PROJECT – NEW/MODIFIED BUS SERVICE

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|
| New | LAVTA | X-B | -- | -- | ▪ 12 min. (peak) | ▪ Weekday: 6:15 a.m. – 9:15 a.m. & 3:30 p.m. – 6:00 p.m.<br>▪ Weekend: No service | Isabel Station, LLNL, SNL | New service |
| New | LAVTA | R-B | -- | -- | ▪ 12 min. (peak)<br>▪ 20 min. (off-peak) | ▪ Weekday: 5:30 a.m. – 7:30 p.m.<br>▪ Weekend: No service | Isabel Station, Las Positas College, ACE Livermore, SNL | New service |
| Modified | LAVTA | 12 | 30 min. | ▪ Weekday: 6:00 a.m. – 10:40 p.m.<br>▪ Weekend: Sunday only, 6:00 a.m. – 10:40 p.m. | ▪ Weekday: 12 min.<br>▪ Weekend: 30 min. 9:00 a.m. – 9:00 p.m. & 40 min. 5:00 a.m. – 9:00 a.m. & 9:00 p.m. – 1:00 a.m. | | Livermore Transit Center to Stoneridge Mall via Isabel Station | Service times: Service span will be extended to 4:30/5:00 a.m. in the mornings and 1:00 a.m. in the evenings. Peak headways will be shortened.<br>Route: Similar to current route, with new stop at Isabel Station. |
| Modified | RTD | 150 | 60 min. | ▪ Weekday: 4:10 a.m. – 10:20 p.m.<br>▪ Weekend: No service | ▪ 45 min. | ▪ Weekday: 5:00 a.m. – 7:00 p.m.<br>▪ Weekend: No service | Stockton Downtown Transit Center, Stockton-Michigan Park & Ride, Lathrop: Save Mart, Tracy Transit Station, Isabel Station | Service times: Peak headways shortened from 60 to 45 min.<br>Routes: Truncated route to stop at Isabel Station instead of Dublin/Pleasanton Station. |
| Modified | MAX | BART Express | 60 min. (two roundtrips each in a.m. and | ▪ Weekday: 4:40 a.m. – 9:00 a.m. & 3:45 p.m. – 8:00 p.m.<br>▪ Weekend: | 60 min. (two roundtrips each in a.m. and p.m.) | ▪ Weekday: 4:40 a.m. – 9:00 a.m. & 3:45 p.m. – 8:00 p.m. | Modesto Downtown Transportation Center to Isabel Station Modesto Downtown Transportation Center, Sisk | Service times: No change.<br>Route: Truncated route to stop at Isabel Station instead of |

**TABLE 2-4 CONVENTIONAL BART PROJECT – NEW/MODIFIED BUS SERVICE**

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|
| | | | p.m.) | No service | | ▪ Weekend: No service | Road Orchard Supply Hardware Parking Lot (Modesto), Isabel Station | Dublin/Pleasanton Station. |
| Modified | LAVTA | 12X | 45 min. | ▪ Weekday: 6:00 a.m. – 9:15 p.m.<br>▪ Weekend: No service | None – Express route to be eliminated | -- | (Livermore Transit Center, Valley Care Livermore Campus, Airway Park and Ride, Las Positas College, Kitty Hawk/Armstrong, Dublin Blvd/Fallon intersection, East Dublin/Pleasanton Station) | Route to be eliminated |
| Modified | LAVTA | 20X | 45 min. | ▪ Weekday: 6:15 a.m. – 10:00 a.m. & 4:00 p.m. – 6:40 p.m.<br>▪ Weekend: No service | None – Express route to be eliminated | -- | (Dublin/Pleasanton Station, Greenville Road, LLNL/SNL, Livermore Transit Center) | Route to be eliminated |
| Modified | LAVTA | Rapid Route | 15 min. | ▪ Weekday: 5:30 a.m. – 8:00 p.m. | None – Express route to be eliminated | -- | Dublin/Pleasanton Station to Livermore Transit Center | Route to be eliminated |

Notes:
-- = Not Applicable; SNL = Sandia National Laboratories.
Peak periods are assumed to be 6:00 a.m. to 10:00 a.m. (AM peak) and 3:00 p.m. to 7:00 p.m. (PM peak).
Several components of the proposed bus routes are similar to Wheels Forward, a program of changes to the LAVTA transit system implemented in August 2016 to provide more frequent buses and new routes in Livermore, Dublin, and Pleasanton. The new, modified, or eliminated routes under the Proposed Project and Build Alternatives are described in relation to the previous bus route network. Elements shared by the Proposed Project and Build Alternatives and the Wheels Forward program include improved bus service from Downtown Livermore to BART, improved bus service to Las Positas College, and improved bus shelters to serve the new Express and Rapid routes. Other capital improvements, such as real-time arrival message boards at bus stations, expansion of transit signal priority to additional intersections, and installation of bus bulbs, are not included in the Wheels Forward program. In addition, the Proposed Project and Build Alternatives would include improved bus service to LLNL and the east side of Livermore.
Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid route serves most of the existing Route 12 stops on Dublin Boulevard as well as North Canyons Parkway and Las Positas College, and a restructured Route 14 serves the areas of Livermore previously served by Route 12. Therefore, these restructured routes would generally serve the areas previously served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA.
Source: Arup, 2017a.

## Typical Bus Shelters


## Typical Bus Bulbs


Source: lhefnerucodesign.wordpress.com, 2014; Streetsblog, 2007.



Figure 2-12
Conventional BART Project
Typical Bus-Related Infrastructure

- **Transit Signal Priority.** Transit signal priority allows for signal timings to be adjusted, reducing the wait times for buses at intersections. Typically, this is done with technology on transit vehicles that works with traffic signals to lengthen green time for buses approaching intersections and reduces red time for buses waiting at intersections. Under the Proposed Project, buses would be given priority at key intersections along two roadways on the R-B Route: Portola Avenue and Livermore Avenue.
- **Rapid/Express Route Amenities.** The following amenities/improvements would be implemented to serve new X-B and R-B routes at approximately 29 locations at existing bus stops, within existing street and sidewalk ROWs:
    - Bus shelters
    - Real-time information via digital messaging boards
    - Improved seating and surroundings near bus stops
    - Pre-paid ticketing with Clipper® within the LAVTA service area
- **Bus Bulbs.** Bus bulbs are curb extensions that serve a transit stop. Bus bulbs can improve transit performance by eliminating the need for transit vehicles to exit and re-enter the flow of traffic at each stop. They also facilitate accessible boarding, as the bus can align directly with the curb. Bus bulbs improve pedestrian conditions by providing extra space for waiting and passing pedestrians and to locate transit shelters out of the way of pedestrian flow. For the Proposed Project, bus bulbs would be installed at approximately six locations along the R-B route—at stops on Portola Avenue and North Livermore Avenue south of I-580 and north of East Avenue.

## 4. Operations

Operations—including the operating plan, fleet size, travel times, and fares and fare collection—are described below for the Proposed Project.

### a. Operating Plan

Current BART service to the Dublin/Pleasanton Station is provided by the Daly City-Dublin/Pleasanton Line, which operates between the Daly City BART Station and the Dublin/Pleasanton Station. BART service to the Dublin/Pleasanton Station is provided as follows:

- Weekdays: 4:00 a.m. to 12:00 a.m., with trains every 15 minutes
- Saturdays: 6:00 a.m. to 12:00 a.m., with trains every 20 minutes
- Sundays/Holidays: 8:00 a.m. to 12:00 a.m., with trains every 20 minutes

The operating plan for the Proposed Project would consist of a new end-of-line station (terminus) for the Daly City-Dublin/Pleasanton Line at the new Isabel Station, with the same hours of operation and train headways as the current BART service at the

Dublin/Pleasanton Station. The proposed operating plan is based on anticipated opening day ridership, which could be adjusted based on changes to subsequent demand. BART intends to have 12-minute headways (instead of 15-minute headways) at some time after 2025.

Hours of operation and bus headways are shown in Table 2-4 for the new/modified bus routes under the Proposed Project.

### b. Employees

By 2040, the Proposed Project would result in a total of approximately 119 additional full-time-equivalent staff systemwide, as follows: (1) 101 BART personnel to provide administration, operation, and maintenance of the BART system; and (2) 18 non-BART personnel for the additional bus service anticipated under the Proposed Project.

### c. Fleet Size

The Proposed Project would add riders to an already crowded BART core system during peak periods (as described in Section 3.B, Transportation). To assess the capacity needed to accommodate the additional riders within the core system as well as on the extension to Livermore, BART conducted an operations analysis to determine BART vehicle needs to effectively operate the Proposed Project. The analysis considered expected BART ridership on the Proposed Project as well as BART's operating plan for the Daly City-Dublin/Pleasanton Line in 2040. Based on the analysis, the Proposed Project would require an additional 36 BART cars to accommodate the anticipated increase in ridership and the longer route while maintaining a level of crowding similar to the BART systemwide average. No additional buses would be needed to serve the Proposed Project.

### d. Travel Times

The BART train running time would be 5.5 minutes from the Dublin/Pleasanton Station to the Isabel Station.

### e. Fares and Fare Collection

Fares for the Proposed Project would be consistent with BART's current distance-based fare policy. Fares would be collected from patrons at the Isabel Station using both paper tickets and the pre-paid Clipper® card system, which allows patrons to touch a card to tag in or tag out as they enter or leave the BART system. In addition, BART-specific or regional stored-value fare cards could be purchased in advance or from ticket machines within the Isabel Station.

Fares and collection for the LAVTA bus system would be consistent with LAVTA's current fares and collection. LAVTA currently accepts cash, Wheels tickets, Wheels passes, and the Clipper® card system for fare payment. Wheels tickets and passes can be purchased directly from LAVTA, a number of local retailers, or public facilities.[16] These forms of payment are presented as patrons enter the bus.

Transfers from buses to BART, and vice versa, would be done via the Clipper® card system. Transfers from BART to Wheels currently costs $1.

## D. DMU ALTERNATIVE/EMU OPTION

Similar to the Proposed Project, the DMU Alternative would extend transit service approximately 5.5 miles to the east, from the existing Dublin/Pleasanton Station to a new station at the Isabel Avenue/I-580 interchange in the city of Livermore. The DMU Alternative would have a similar alignment within the I-580 median as the Proposed Project and terminus at a new Isabel Station.[17, 18] However, the type of rail technology used under this alternative would differ from that of the Proposed Project. DMUs are self-propelled rail cars that use a diesel engine to generate their own power and run on a standard-gauge rail track—unlike BART trains, which use electricity and run on wide-gauge rail track. As part of this alternative, a BART-to-DMU transfer platform would be incorporated into the existing Dublin/Pleasanton Station, requiring widening of the BART ROW at the station, with corresponding relocation of I-580 and reconfiguration of adjacent roadways beyond that required for the Proposed Project. EMU rail vehicle technology also under consideration (hereinafter referred to as the EMU Option) is analyzed as a variant of the DMU Alternative. The EMU Option would generally be the same as the DMU Alternative, except that it is electricity-powered rather than diesel-powered, with an electric motor receiving power from an overhead wire or a third rail. Features of the EMU Option that differ from the DMU Alternative are described under EMU Option Facilities below.

Key components of the DMU Alternative include construction of the new rail alignment and related infrastructure, relocation of I-580 and associated frontage roadway reconfigurations to accommodate the proposed DMU alignment within the I-580 median,

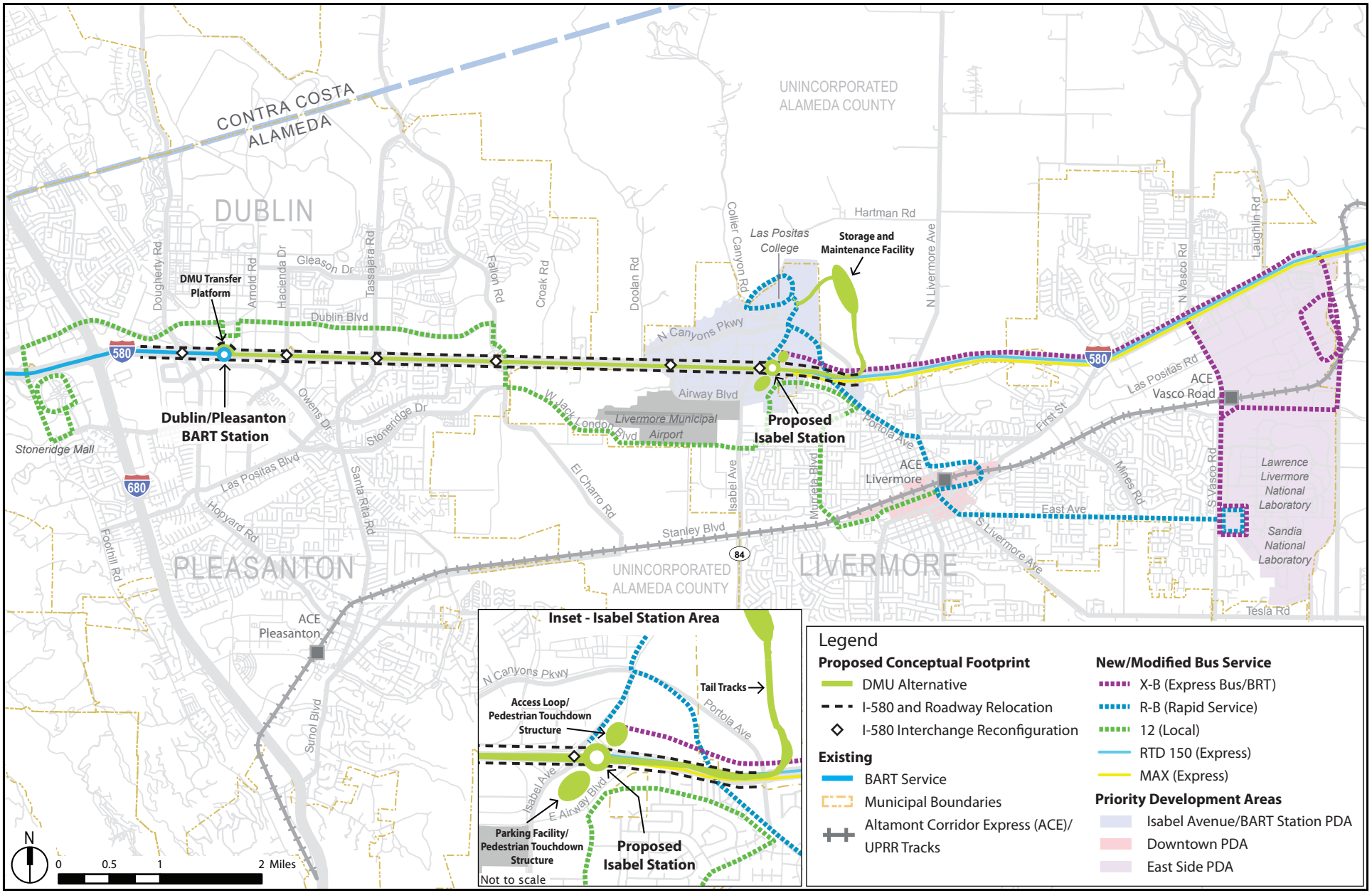
[16] Wheels is a public transportation system operated by LAVTA and serves Dublin, Pleasanton, Livermore, and the surrounding incorporated areas of Alameda County.

[17] Arup and Anil Verma Associates, Inc., 2017a. BART to Livermore Extension Contract Drawings, 10 Percent Preliminary Engineering (Draft). July.

[18] Arup and Anil Verma Associates, Inc., 2017b. 10 Percent Preliminary Engineering Design Basis Memoranda (Draft), Alternative 1: Conventional BART, Alternative 2: DMU/EMU to Isabel Station and Maintenance Facility, Alternative 3: Express Bus/BRT.

and new and modified bus services and facilities to improve transit access to the new Isabel Station. These components are listed below and the conceptual plan is shown in Figure 2-13. Features that would be similar to or the same as the Proposed Project are noted. A more detailed representation of the footprint of the DMU Alternative is shown in Appendix B.

- **BART System Improvements.** The DMU Alternative would entail the construction of new standard-gauge tracks, a new DMU transfer platform at the Dublin/Pleasanton Station, a new DMU station at Isabel Avenue, and a new storage and maintenance facility north of I-580. The alignment, facilities, and new station under the DMU Alternative would be similar to that for the Proposed Project, except that it would have a transfer platform at the Dublin/Pleasanton Station. In addition, the storage and maintenance facility would be for DMU vehicles only (instead of BART cars under the Proposed Project) and the existing BART car storage track at the Dublin/Pleasanton Station would be extended for storage of additional BART cars to accommodate the increased ridership under this alternative.
    - **DMU Track Extension.** Similar to the Proposed Project, the BART ROW would be extended approximately 5.5 miles within the I-580 median, requiring widening of the median. New standard-gauge tracks would be constructed from the Dublin/Pleasanton Station to the proposed Isabel Station. The design of the DMU Alternative does not preclude or prevent a future extension of the rail alignment to the east, either in the I-580 median or to Downtown Livermore, although it does preclude the use of technology other than DMU (such as conventional BART technology).
    - **New DMU Transfer Platform at the Dublin/Pleasanton Station.** A DMU transfer platform would be constructed on the north side of the Dublin/Pleasanton Station to allow passengers to connect from the BART trains to the DMU trains. The existing concourse (lower level) would be widened and the new transfer platform would be constructed above the widened concourse. This alternative would require I-580 to be relocated to the north to accommodate the platform and the new DMU single track at the station.
    - **BART Car Storage at the Dublin/Pleasanton Station.** The DMU Alternative would require an additional 24 BART cars for the anticipated increase in ridership. In addition to the relocation of I-580 for the DMU transfer platform described above, I-580 would also be relocated to the south to accommodate a new 0.3-mile tail track for storage of approximately 20 BART cars to the west of the station. The remaining additional four BART cars required under this alternative would be stored elsewhere in the BART system.




Source: Arup, 2017a,b.



Figure 2-13
DMU Alternative Overview

- **New DMU Isabel Station.** The proposed Isabel Station would be constructed just east of Isabel Avenue, in the same location and with a similar site plan to the Proposed Project; the station platform would be approximately half the length of the platform required for the Proposed Project (approximately 355 feet rather than 700 feet). The station would be constructed in the I-580 median and would connect to parking and multi-modal transit facilities by pedestrian overcrossings that would cross I-580 to the north and south. The main parking facility, with approximately 2,428 parking spaces, would be located south of I-580 and accessible from East Airway Boulevard. The main bus transfer facility would be north of I-580, accessible from Isabel Avenue. A new end-of-line building for BART Operations would be constructed at the east end of the Isabel Station platform.
- **New DMU Storage and Maintenance Facility.** BART evaluated four locations for a DMU storage and maintenance facility. A location north of I-580 and parallel to Cayetano Creek was selected as the preferred location (see the Alternatives Considered but Withdrawn subsection [Section 2.K], below for a discussion of the other locations). The new 32-acre DMU storage and maintenance facility would be provide storage space and maintenance for approximately 12 DMU vehicles (six married pairs of two vehicles each). Similar to the Proposed Project, tail tracks would extend east from the Isabel Station, cross under westbound I-580 in an underpass structure, cross under Portola Avenue, and then extend north parallel to and west of Cayetano Creek, approximately 1.8 miles from the station to the facility.

- **I-580 and Frontage Road Relocation.** To accommodate the median widening, approximately 7.1 miles of I-580 would be relocated on both the north and south, typically by up to 46 feet, from just west of Dougherty Road/Hopyard Road to the Portola Avenue/I-580 overcrossing. At the Hacienda Drive interchange, the westbound I-580 on-ramps would be relocated up to 140 feet, and I-580 would be relocated by approximately 67 feet at the proposed Isabel Station.

  Compared to the Proposed Project, this alternative would require the relocation of an additional 1.5 miles of I-580 in the vicinity of the Dublin/Pleasanton Station. Similar to the Proposed Project, the existing lane configuration would be relocated and constructed to Caltrans standards and would have the same number of travel lanes, including express lanes, as currently exist. Freeway interchanges and on- and off-ramps along the corridor would be reconfigured to accommodate the freeway relocation and some surface frontage roads, and adjacent features would be widened or relocated. Similar to the Proposed Project, the following four interchanges would be reconfigured: Tassajara Road/Santa Rita Road; Fallon Road/El Charro; Airway Boulevard; and Isabel Avenue. In addition, portions of the Dougherty Road/Hopyard Road and Hacienda Drive interchanges would also be reconfigured under this alternative.

- **New/Modified Bus Routes and Improvements.** New and modified bus routes and infrastructure enhancements would be the same as those described above for the Proposed Project in the Conventional BART subsection.

## 1. Rail System Improvements

The improvements for the BART system are described below for the DMU Alternative; these improvements include train technology, track alignment, station facilities, and non-station facilities, as shown in Figure 2-14.

### a. DMU Technology

The DMU train technology is similar to the rail technology currently being used by BART in constructing the new rail service between the Pittsburg/Bay Point BART station and a new station in Antioch; this new rail service is referred to as eBART.

#### (1) Description

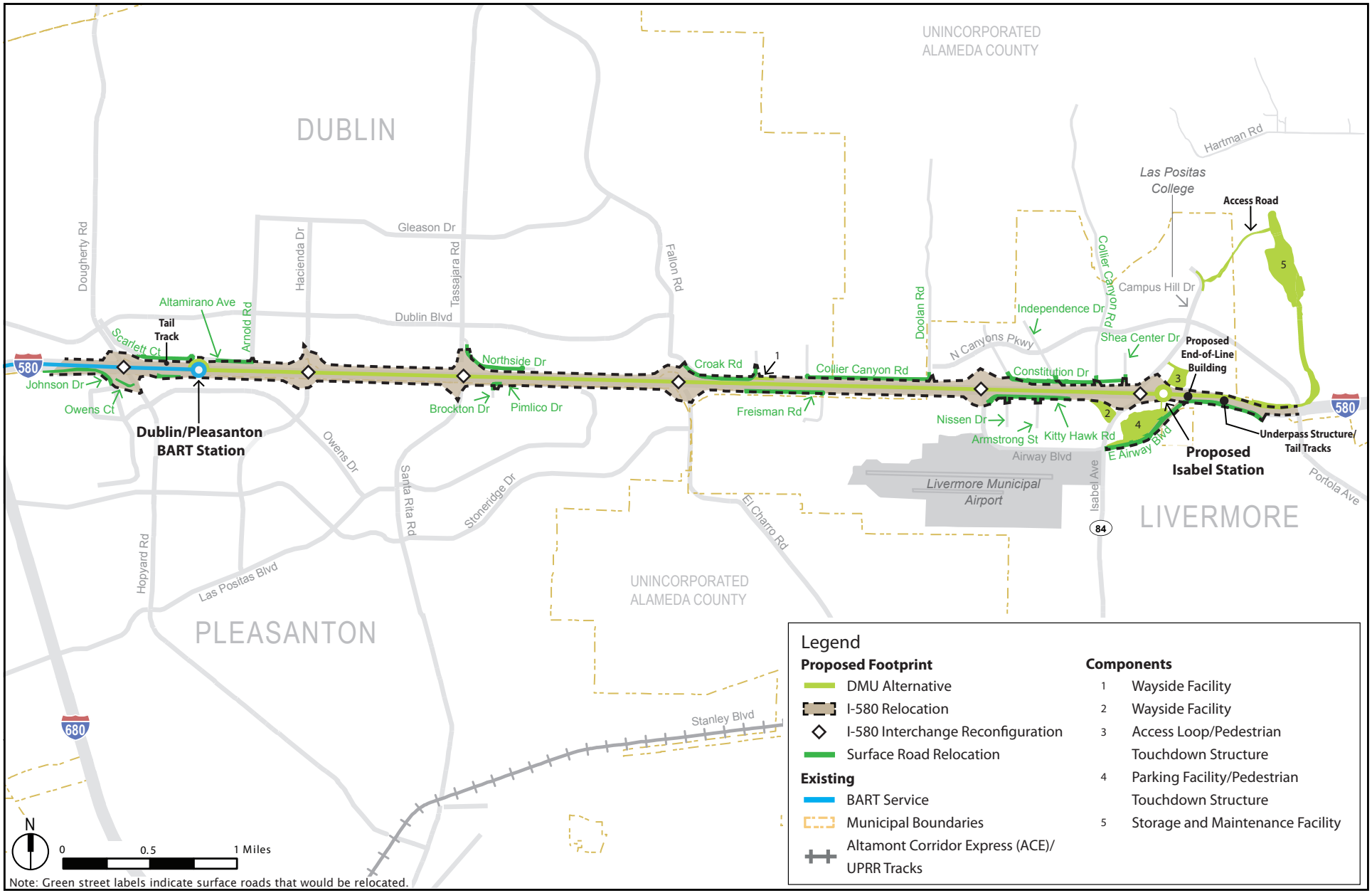
The amenities and operating characteristics of the DMU and EMU rail cars resemble those of existing BART vehicles; however, they differ in that they generate their own power and run on standard-gauge (4-foot, 8.5-inch) rail track. Both DMUs and EMUs are self-propelled rail cars that can be coupled to form trains. Both DMU and EMU technology are used widely in public transportation systems. See EMU Option Facilities below, for additional information on the components specific to the EMU Option.

#### (2) Propulsion

Some DMUs are powered by diesel engines, which drive an axle through a hydraulic torque converter, and some DMUs use direct mechanical or electrical transmissions. DMUs configured to use diesel engines to generate electricity, which in turn power electric propulsion motors, are also common. The DMU diesel engines would burn low-sulfur diesel fuel and meet both State of California (State) and federal air quality standards.

#### (3) Vehicles

An example of a DMU train is shown in Figure 2-15. DMU vehicles are operated in married pairs (i.e., each married pair consists of two permanently coupled vehicles). Married pairs are connected to form a train, and the propulsion systems are controlled from the single operator's station or cab. Under the DMU Alternative, there would be a control cab at each end of the train, removing the need to turn the trains at terminal stations. Distribution of the propulsion among the married pairs results in a system that is less vulnerable to single-point-of-failure outages. For the DMU Alternative, four-vehicle trains (two married




Note: Green street labels indicate surface roads that would be relocated.

Source: Arup, 2017b; Arup and Anil Verma Associates, Inc., 2017a.



Figure 2-14
DMU Alternative
Detail

## Typical DMU Train

## Typical EMU Train


Source: Mark Duferene, 2016; Wikimedia Commons, 2017.



Figure 2-15
DMU Alternative
Typical DMU and EMU Vehicles

pairs) would be operated during peak period operations. Two-vehicle trains (one married pair) would be provided on weekends or during periods of lighter passenger demand. DMU infrastructure would be designed and built to allow expansion to six-vehicle trains (three married pairs), should future demand warrant. A specific supplier and precise vehicle specifications have not been identified at this time for the DMU Alternative. BART would need to procure the vehicles for this alternative. BART would equip DMU (or EMU) vehicles with BART-style transit horns.

In addition, approximately 24 BART cars would be purchased to accommodate the additional ridership under this alternative.

### b. DMU Alignment

Similar to the Proposed Project, the DMU Alternative would extend rail service approximately 5.5 miles east of the existing Dublin/Pleasanton Station to a new station near the Isabel Avenue/I-580 interchange. The standard-gauge tracks would be constructed in the I-580 median. East of the Isabel Station, approximately 1.8 miles of tail track would extend to a new storage and maintenance facility, described in the DMU Storage and Maintenance Facility subsection below. Table 2-5 lists the proposed DMU alignment, structures, and facilities for each segment of I-580 from west to east.

#### (1) Horizontal Alignment

Single track (standard gauge) would be installed in the I-580 median north of the Dublin/Pleasanton Station, from the station to approximately 0.8 mile east of the station, past the existing BART tail tracks. A DMU passing loop would be constructed east of the station to allow trains to pass each other along this single-track segment, as shown in Figure 2-16. East of the BART tail tracks, standard-gauge double track would be extended to the proposed Isabel Station. This segment would be similar to the Proposed Project, as described below.

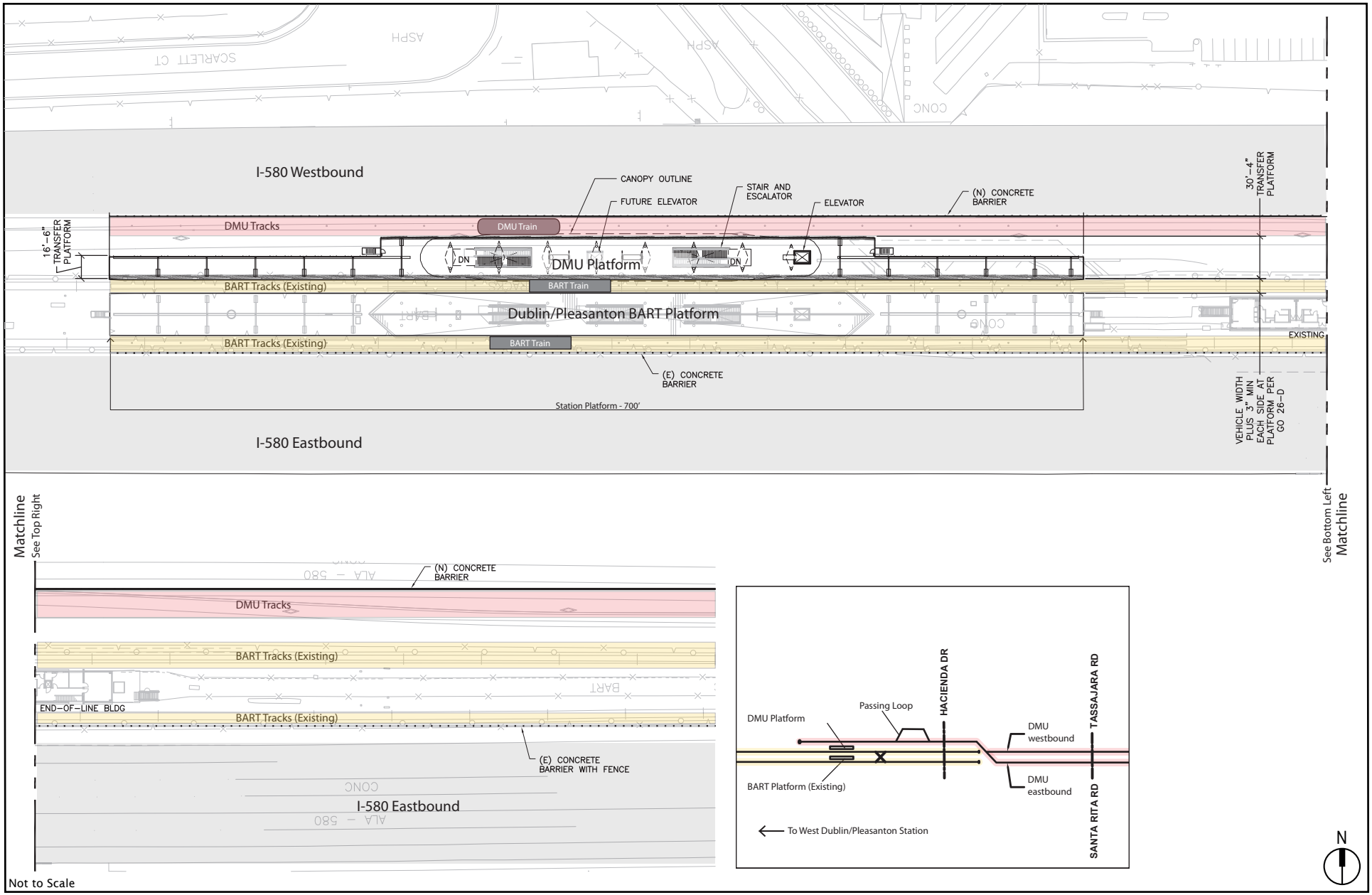
The ROW for the DMU Alternative would be extended approximately 5.5 miles within the I-580 median, requiring widening of the existing median along both the north and south sides by up to a total of 46 feet along the majority of the extension. Therefore, the DMU ROW would be the same as the standard BART ROW. At the new Isabel Station, the BART ROW would be approximately 67 feet wide, to accommodate the station platform. The BART ROW would be exclusively for BART use. See Figure 2-4 above for a typical view of the cross-section along the alignment.

Similar to the Proposed Project, a tail track would be extended approximately 1.8 miles from the Isabel Station to a storage and maintenance facility north of I-580.

**TABLE 2-5 DMU ALTERNATIVE – ALIGNMENT, FACILITIES, AND STRUCTURES**

| From | To | DMU Alignment/Structures | DMU Facilities |
|---|---|---|---|
| West of Dougherty Road | Dougherty Road/ Hopyard Road | ▪ New ROW in I-580 median<br>▪ New tail track for additional BART car storage | -- |
| Dougherty Road/ Hopyard Road | Hacienda Drive | ▪ New ROW in I-580 median<br>▪ New tail track for additional BART car storage west of the Dublin/Pleasanton Station<br>▪ New DMU tracks along north side of the Dublin/ Pleasanton Station | ▪ DMU transfer platform at the Dublin/Pleasanton Station |
| Hacienda Drive | Tassajara Road/Santa Rita Road | ▪ New ROW in I-580 median<br>▪ New DMU tracks | -- |
| Tassajara Road/ Santa Rita Road | Fallon Road/El Charro Road | ▪ New ROW in I-580 median<br>▪ New DMU tracks | -- |
| Fallon Road/ El Charro Road | Airway Boulevard | ▪ New ROW in I-580 median<br>▪ New DMU tracks | ▪ Wayside facility north of I-580 near Croak Road |
| Airway Boulevard | Isabel Avenue | ▪ New ROW in I-580 median<br>▪ New DMU tracks | ▪ Wayside facility south of I-580 near Kitty Hawk Road/Isabel Avenue |
| Isabel Avenue | Portola Avenue | ▪ New ROW in I-580 median<br>▪ New DMU tracks to Isabel Station<br>▪ Tail track to storage and maintenance facility via westbound I-580 underpass | ▪ Isabel Station in I-580 median and pedestrian overcrossings and touchdown structures (north and south of I-580)<br>▪ Two-story end-of-line DMU operations building<br>▪ Isabel parking facility-south of I-580<br>▪ Bus transfer facility-north of I-580 |
| Portola Avenue | North Livermore Avenue | ▪ Tail tracks to storage and maintenance facility<br>▪ Portola Avenue underpass<br>▪ Tail track bridges over Arroyo las Positas and Cayetano creeks<br>▪ Hillside tunnel for tail tracks | ▪ Storage and maintenance facility and new access road from Campus Hill Drive (with crossing over Isabel Creek) |

Note: -- = No change proposed.
Source: Arup and Anil Verma Associates, Inc., 2017b.




Source: Arup and Anil Verma Associates, Inc., 2017a.

**BART to Livermore Extension Project EIR**

Figure 2-16
DMU Alternative
DMU Transfer Platform at Dublin/Pleasanton Station

The existing BART crossover east of the Dublin/Pleasanton Station would be maintained to allow BART trains to switch tracks. In addition, six new crossovers would be constructed as follows: (1) along the DMU extension in the I-580 median, west of the Hacienda Drive/I-580 overcrossing; (2) along the DMU extension in the I-580 median, east of the Hacienda Drive/I-580 overcrossing; (3) along the DMU extension in the I-580 median, east of the interchange of I-580 with Fallon Road/El Charro Road; (4) along the DMU extension in the I-580 median, west of the Isabel Avenue/I-580 interchange; (5) along the DMU extension in the I-580 median, east of the Isabel Avenue/I-580 interchange; and (6) at the storage and maintenance facility.

#### (2) Vertical Alignment

Similar to the Proposed Project, the DMU alignment would consistent with the existing grade of I-580 from the Dublin/Pleasanton Station to the Isabel Station, at which point the tracks would cross under westbound I-580 in an underpass, resurface north of I-580, cross under Portola Avenue, and then extend to the storage and maintenance facility west of Cayetano Creek.

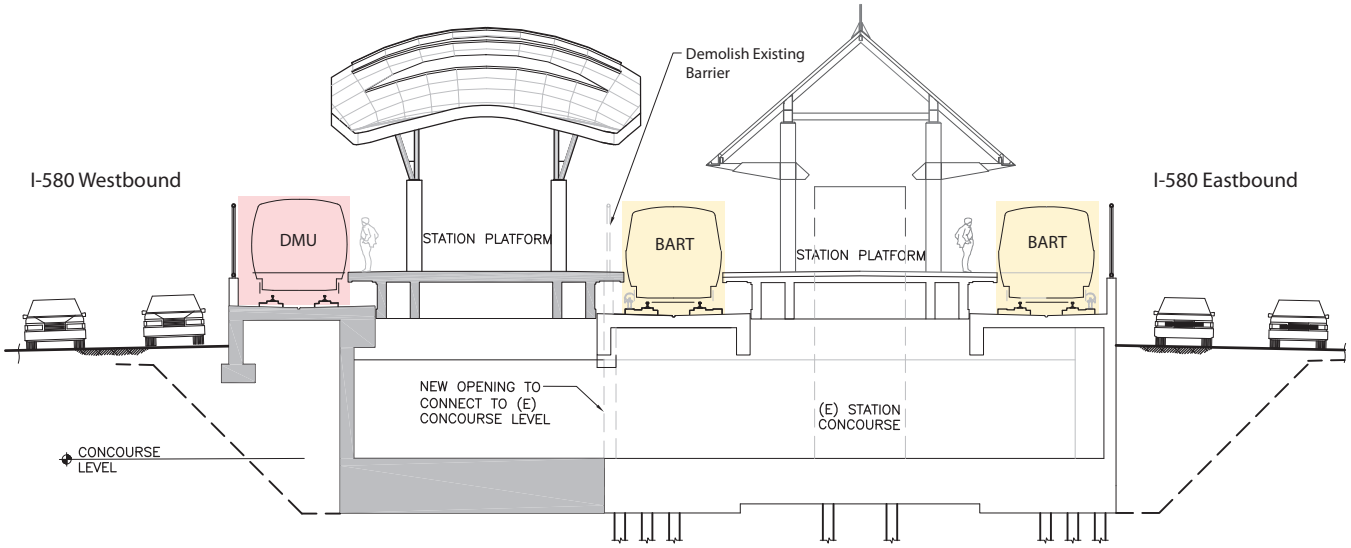
As shown in Table 2-5, new bridges and structures would be constructed along the following creeks for the tail tracks from Isabel Station to the storage and maintenance facility and the access road to the storage and maintenance facility:

- Arroyo las Positas Creek (east of Portola Avenue)
- Cayetano Creek
- Isabel Creek

### c. DMU Transfer Platform at the Dublin/Pleasanton Station

A DMU transfer platform would be constructed on the north side of the Dublin/Pleasanton Station to allow passengers to connect from the BART trains to the DMU trains, as shown in Figures 2-16 and 2-17. The concourse level (lower level), which houses the passenger entry area and ticket area, would be widened by approximately 29 feet for a length of approximately 300 feet. This would require excavation along the north wall of the existing concourse level. Portions of the northern wall of the existing station concourse would be removed to allow connections between the existing and proposed station area. As shown in Figure 2-17, a new DMU platform would be constructed above the concourse north of the existing platform. The new platform would range in width from 16 to 30 feet and would extend for the length of the existing BART platform (700 feet). A canopy would cover a portion of the platform; the canopy would be approximately 27 feet high, similar to the existing canopy on the BART platform.

## Cross Section - BART Platform and Proposed DMU Platform
View East




## Conceptual Cross Section
View West


Not to Scale

Source: Arup and Anil Verma Associates, Inc., 2017a; BART, 2008.



Figure 2-17
DMU Alternative
DMU Transfer Platform Cross Section

Access to the station would not change from existing conditions (passenger entrance from the sidewalk and access road under I-580). Elevators and escalators connect the lower concourse to the upper platform level.

### d. BART Car Storage at the Dublin/Pleasanton Station

To accommodate the storage of approximately 20 of the 24 additional BART cars needed to meet projected service requirements at the Dublin/Pleasanton Station, approximately 0.3 mile of new tail tracks would be constructed between the existing BART tracks, to the west of the station. I-580 would be relocated to the south to accommodate the additional storage track. The remaining four BART cars would be stored elsewhere in the BART system.

### e. New Isabel Station

The DMU Alternative would include construction of the proposed Isabel Station located in the I-580 median, just east of the Isabel Avenue/I-580 interchange in the city of Livermore, similar to the Proposed Project. The site plan for the station and surrounding facilities and section view are shown in Figure 2-5.

#### (1) Design and Facilities

Overall, the design and facilities of the proposed Isabel Station under the DMU Alternative would be similar to those for the Proposed Project, as shown in Figures 2-6, 2-7, and 2-8. The concourse and platform would be the same width as the station for the Proposed Project, but it would be shorter.

The station would be approximately 67 feet wide and approximately 355 feet long. The concourse level (upper level) would be approximately 66 feet wide by approximately 315 feet long, and the platform (lower level) would be approximately 30 feet wide by approximately 355 feet long, which would accommodate DMU trains of up to three married pairs (six vehicles).

Under the DMU Alternative, facilities within the Isabel Station would include the train control room. A permanent emergency generator would be located at the Isabel Station north pedestrian touchdown structure.

#### (2) Access and Connections

The Isabel Station would be accessible from both the north and south, on either side of I-580, similar to the Proposed Project. A bus transfer facility would be constructed at the north station area, providing transit and vehicular access to the station, while the south station area would be primarily for passenger vehicle parking. Site circulation in the

vicinity, including for pedestrian and bicycles, vehicles, and buses, would be the same as for the Proposed Project, as shown in Figure 2-5.

At the south station area, the parking facilities would be similar to the Proposed Project, except that the parking structure would consist of six levels rather than seven and would have fewer parking spaces (approximately 2,428 spaces). Fewer parking spaces are required for the DMU Alternative because ridership demand would be less than under the Proposed Project, as described in Section 3.B, Transportation. As with the Proposed Project, an investment in parking at Isabel Station is consistent with its identification as an automobile dependent station under BART's Station Access Policy. Similar to the Proposed Project, solar panels with a photovoltaic capacity of approximately 1,000 kW would be installed above the top parking level.

Unlike the Proposed Project, the DMU Alternative would not include surface parking lots; parking would be concentrated in a structure, potentially allowing the remainder of the site to be developed in the future.

While the quantity of station parking has been designed to accommodate the anticipated demand (see Section 3.B, Transportation, for additional information), unanticipated demand for parking could exceed supply in the future. This could result in BART patrons parking on local streets. In the event that a local jurisdiction requests BART assistance with management of overflow parking by BART patrons, BART would work with the jurisdiction to implement BART's Parking Management Toolkit, which addresses BART parking overflow onto city streets (a copy of the Parking Management Toolkit is provided in Appendix D). In addition, the parking garage would be designed to accommodate the potential future construction of two additional levels of parking.

### f. Non-Station Facilities

Non-station facilities associated with the DMU Alternative include the tail tracks and end-of-line facility, storage and maintenance facility, and wayside system facilities.

#### (1) DMU End-of-line Operations Building and Tail Tracks

Tail tracks and a new end-of-line operations building for DMU operations would be constructed east of the Isabel Station, similar to the Proposed Project, as shown on Figure 2-8, above. The proposed end-of-line building for DMU operations would be a two-story building east of the Isabel Station. The end-of-line operations building would house the train supervisory booth and associated staff facilities.

The DMU tail track would extend approximately 1.8 miles from the Isabel Station to the storage and maintenance facility. Similar to the Proposed Project, the tail tracks would extend from the Isabel Station in the I-580 median, through an underpass to the north

side of I-580, then cross Arroyo las Positas and Cayetano creeks on bridges, and extend through an approximately 450-foot hillside tunnel to the storage and maintenance facility.

Similar to the Proposed Project, the tail tracks would be designed with culverts or drainage ways at regular intervals under the track to disperse stormwater runoff evenly along the trackway and maintain drainage to Cayetano Creek and vernal pools in the area.

### (2) DMU Storage and Maintenance Facility

An approximately 32-acre storage and maintenance facility would be designed to accommodate the servicing and periodic maintenance of the DMU vehicles. Fueling, vehicle cleaning, washing, and routine light vehicle maintenance activities would be carried out at this facility. An approximately 51,255-square-foot maintenance building, approximately 44 feet high, would be constructed, as well as a surface parking lot with approximately 67 employee parking spaces, as shown in Figure 2-18.

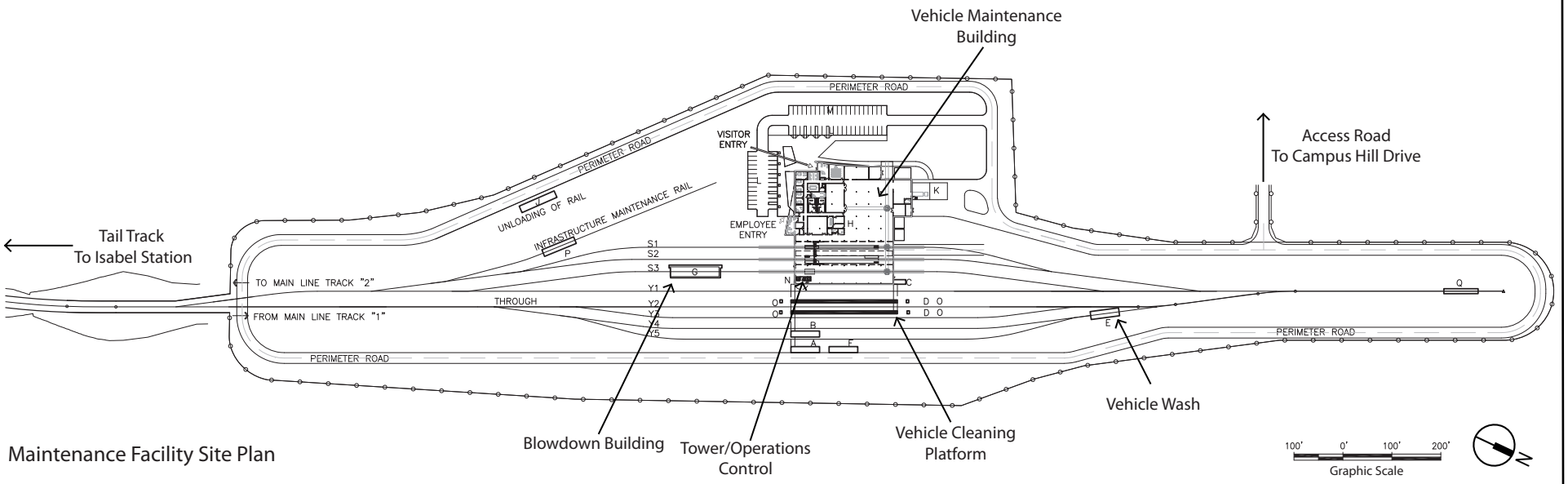
In addition, storage tracks at the facility would accommodate the storage of approximately 12 DMU vehicles (six married pairs). Other support buildings would include a 44-foot-high train control tower; a vehicle cleaning platform; and a blowdown building. A permanent emergency generator and an auxiliary power substation would be installed at the facility. The storage and maintenance facility and connecting tail tracks would be enclosed with security fencing and security lighting would be installed.

Vehicular access to the storage and maintenance facility would be provided by a new two-lane road from Campus Hill Drive to the facility, similar to the Proposed Project.

### (3) DMU Wayside System Facilities

As listed in Table 2-5 and shown in Figure 2-14 above, wayside facilities would be constructed along the proposed DMU alignment to provide power and communications support for the alternative. Similar to the Proposed Project, several wayside facilities would be constructed at the Isabel Station and the storage and maintenance facility, as described in the respective sections for those topics above. In addition, two standalone signaling bungalows would be required along the alignment: one near Croak Road and one near the eastbound off-ramp at Kitty Hawk Road and Isabel Avenue.

The wayside facilities for the DMU would not require the traction power system used by the Proposed Project, and the facilities would be smaller. The signaling bungalows would be approximately 35 feet long by 25 feet wide, and the facility enclosure would be approximately 77 feet long by 45 feet wide. These structures would be modular type. See the description of the signaling bungalows for the Proposed Project above.




Maintenance Facility Site Plan

Conceptual View of Maintenance Building

Aerial View

Source: Arup and Anil Verma Associates, Inc., 2017a.

BART to Livermore Extension Project EIR

Figure 2-18
DMU Alternative
Storage and Maintenance Facility

### g. EMU Option Facilities

This section describes the key differences between the DMU Alternative and the EMU Option. Except as described below, the EMU Option would be similar to the DMU Alternative.

#### (1) EMU Technology – Propulsion

The key difference between DMUs and EMUs is the source of power. EMUs are powered by electricity drawn from an electrified infrastructure, usually a third rail or overhead (catenary) system, whereas DMUs are powered by an on-board diesel engine. EMUs are driven by electric motors (typically 750 V). The current then passes to an inverter where it is converted to AC, which then drives traction motors mounted on the trains. The torque generated by these motors is transmitted via gear wheels to the driving wheels. Electric traction motors are incorporated within one or more of the train carriages.

Emissions associated with the operation of EMUs occur only where the power is generated, not along the alignment, which is where emissions occur for DMUs. EMUs are generally quieter than DMUs because little noise is associated with their motors.

#### (2) EMU Wayside Facilities

To support the EMU technology, the EMU Option would require wayside facilities similar to the Proposed Project. These facilities are described below, ordered from west to east along the alignment.

- A train control house and traction power substation would be constructed north of I-580 near Croak Road, and a train control house, traction power substation, and gap breaker would be constructed at Kitty Hawk Road and Isabel Avenue, similar to the Proposed Project.
- EMU operations facilities within the Isabel Station area would include a train control room, a traction power substation, a 34.5-kV switching station, and a high-voltage substation, similar to the Proposed Project. A permanent emergency generator would be installed at the Isabel Station north pedestrian touchdown structure.
- At the storage and maintenance facility, the EMU Option would require a traction power substation, in addition to the facilities required for the DMU Alternative.

## 2. I-580 and Frontage Road Relocation

Under the DMU Alternative, approximately 7.1 miles of the Caltrans ROW and I-580, from west of the Dougherty Road/Hopyard Road interchange to west of Portola Avenue, would be widened to accommodate the new BART ROW in the median. This alternative would

require an additional approximately 1.5 miles of median widening, in the vicinity of Dougherty Road/Hopyard Road and Hacienda Drive, compared to the Proposed Project. Existing freeway interchanges, on- and off-ramps, freeway structures such as overcrossings, and some surface frontage roads would be reconfigured to accommodate the increased ROW. The horizontal and vertical alignment of the I-580 relocation, as well as I-580 interchange and roadway reconfigurations, are described below and shown in Figure 2-14, above. Table 2-6 shows the proposed I-580 relocation, interchange reconfiguration, roadway modifications, and structures for each segment of I-580, ordered from west to east.

### a. I-580 Horizontal Alignment

Under the DMU Alternative, the Caltrans ROW would be generally widened by approximately 46 feet. The freeway would be relocated to the north along the westbound direction to accommodate the new DMU transfer platform at the north side of the Dublin/Pleasanton Station, as well as the related facilities. The freeway relocation also would take place west of the Dublin/Pleasanton station to provide space in the median for an additional storage track for BART car storage.

In the vicinity of the proposed Isabel Station, east of the Isabel Avenue overcrossing, the Caltrans ROW would be widened by approximately 67 feet to accommodate the new station. At the end of the existing BART tail tracks beyond the Dublin/Pleasanton Station, the DMU tracks would be constructed in the center of the median and the I-580 relocation would then be similar to that for the Proposed Project. The existing freeway lane configuration would be relocated to Caltrans standards and would have the same number of travel lanes and express lanes as currently exist.

### a. I-580 Vertical Alignment

Under the DMU Alternative and similar to the Proposed Project, the vertical alignment for I-580 would be generally similar to existing conditions. Where required by existing topography, some new or realigned retaining walls would be required. Structures, including the existing I-580 bridges, would have to be widened to accommodate the wider ROW.

As shown in Table 2-6, existing bridges and structures over the following creeks would be widened to accommodate the new DMU alignment within the I-580 median:

- Line G-1-1
- Chabot Canal and Hewlett Canal/Line G-2
- Tassajara Creek
- Cottonwood Creek
- Collier Canyon Creek
- Arroyo las Positas Creek (at Isabel Station)

**TABLE 2-6 DMU ALTERNATIVE – I-580 AND ROADWAY MODIFICATIONS**

| From | To | I-580 and On-ramps/Off-ramps/ Interchanges | Surface Road Realignment | Structures |
|---|---|---|---|---|
| West of Dougherty Road | Dougherty Road/ Hopyard Road | ▪ Relocate I-580 in WB direction | ▪ Johnson Drive | ▪ Extension of the existing concrete culvert for Line G-1-1 |
| Dougherty Road/ Hopyard Road | Hacienda Drive | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure EB and WB off-ramps at Dougherty Road/Hopyard Road | ▪ Scarlett Drive, Altamirano Avenue, Owens Court | ▪ Extension of existing concrete culvert for Chabot Canal/Line G-2<br>▪ Iron Horse Regional Trail underpass |
| Hacienda Drive | Tassajara Road/Santa Rita Road | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure WB off-ramp at Hacienda Drive | -- | ▪ Hacienda Drive westbound on-ramp underpass Tassajara Creek bridge (widen bridge deck; new deck piles) |
| Tassajara Road/Santa Rita Road | Fallon Road/El Charro Road | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Tassajara Road/Santa Rita Road | ▪ Northside Drive, Brockton Drive, Pimlico Drive | ▪ Reconfigure retaining walls at Tassajara Road/Santa Rita Road |
| Fallon Road/El Charro Road | Airway Boulevard | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Fallon Road/El Charro Road | ▪ Croak Road, Freisman Road, Collier Canyon Road, Doolan Road | ▪ Reconfigure retaining walls at Fallon Road/El Charro Road<br>▪ Cottonwood Creek bridge (widen bridge deck; new piles and abutments) |
| Airway Boulevard | Isabel Avenue | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Airway Boulevard<br>▪ Demolish and rebuild one (west) of the two Airway Boulevard bridges | ▪ Constitution Drive, Independence Drive, Shea Center Drive, Kitty Hawk Road, Nissen Drive, Armstrong Street | ▪ Rebuild one of two Airway Boulevard overcrossings<br>▪ Reconfigure retaining walls Airway Boulevard overcrossing<br>▪ Collier Canyon Creek bridge (widen bridge deck; new piles and abutments) |
| Isabel Avenue | Portola Avenue | ▪ Relocate I-580 in both directions (EB and WB)<br>▪ Reconfigure all on-/off-ramps at Isabel Avenue | ▪ East Airway Boulevard | ▪ Reconfigure Isabel Avenue/I-580 separation retaining wall<br>▪ Arroyo las Positas Creek bridge (widen bridge deck; new deck piles) |

Notes: --= No change proposed; EB = eastbound; WB = westbound.
Collier Canyon Road refers to the portion of the road that is west of Doolan Road.
Source: Arup and Anil Verma Associates, Inc., 2017b.

### b. Interchange and Roadway Reconfiguration

Under the DMU Alternative and similar to the Proposed Project, modifications would be required at the interchanges and on- and off-ramps along this corridor, including the tightening of the radius of some ramps and reconstruction of others. Relocation of the I-580 interchanges in both the eastbound and westbound directions would be required at the same interchanges as that for the Proposed Project (Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue). At Hacienda Drive, the westbound on-ramps to I-580 from both northbound and southbound Hacienda Drive would be rebuilt north of their existing locations. The on-ramp from northbound Hacienda Drive currently passes under Hacienda Drive just in front of (i.e., south of) the Hacienda Drive overcrossing abutment. This on-ramp would be rebuilt so it passes under Hacienda Drive just behind (i.e., north of) the abutment. Relocation of the northbound on-ramp would require the relocation of the southbound on-ramp. To provide room to reconfigure both on-ramps, the Caltrans I-580 ROW would need to be widened, up to a maximum of approximately 140 feet west of Hacienda Drive. In addition, the west side of the Airway Boulevard bridge over I-580 would be rebuilt.

Some adjacent surface frontage roads and structures would be realigned, as shown in Table 2-6. Similar to the Proposed Project, segments of the following surface frontage roads would be realigned: Northside Drive; Brockton Drive; Pimlico Drive; Croak Road; Freisman Road; Collier Canyon Road[19]; Doolan Road; Constitution Drive; Independence Drive; Shea Center Drive; Kitty Hawk Road; Nissen Drive; Armstrong Street; and East Airway Boulevard. In addition, portions of Scarlett Drive and Altamirano Avenue would be relocated. Reconfigured retaining walls would be constructed for realigned roadways, principally at interchange ramps, where needed based on the existing topography.

As described above for the Proposed Project, BART would build the foundations and columns for the anticipated future widening of the Isabel Avenue overcrossing.

## 3. Bus Routes and Improvements

Under the DMU Alternative, bus routes, shown in Figure 2-13, and bus improvement would be the same as for the Proposed Project, described above in the Conventional BART subsection.

[19] The portion of Collier Canyon Road west of Doolan Road.

## 4. Operations

Operations—including the operating plan, fleet size, travel times, and fares and fare collection—are described below for the DMU Alternative.

### a. Operating Plan

As described above, current BART service to the Dublin/Pleasanton Station is provided by the Daly City-Dublin/Pleasanton Line, which operates between the Daly City BART Station and the Dublin/Pleasanton Station. BART service to the Dublin/Pleasanton Station is provided as follows:

- Weekdays: 4:00 a.m. to 12:00 a.m., with trains every 15 minutes
- Saturdays: 6:00 a.m. to 12:00 a.m., with trains every 20 minutes
- Sundays/Holidays: 8:00 a.m. to 12:00 a.m., with trains every 20 minutes

The operating plan for the DMU Alternative would consist of a new transfer platform at the existing Dublin/Pleasanton Station and a new end-of-line station (terminus) at the proposed Isabel Station, with the same hours of operation and train headways as current BART service at the Dublin/Pleasanton Station. The proposed operating plan is based on anticipated opening day ridership, which could be adjusted based on changes to subsequent demand. BART intends to have 12-minute headways (instead of 15-minute headways) at some time after 2025.

Hours of operation and bus headways for the new/modified bus routes would be the same as under the Proposed Project (see Table 2-4).

### b. Employees

By 2040, the DMU Alternative would result in a total of approximately 135 additional full-time-equivalent staff systemwide, as follows: (1) 15 BART personnel to provide administration, operation, and maintenance of the BART system; (2) 102 BART personnel to provide operation and maintenance of the DMU service; and (3) 18 non-BART personnel for the additional bus service anticipated under the DMU Alternative.

### c. Fleet Size

On weekdays during peak periods, a total of 2 four-vehicle DMU trains (two married pairs) would be required for service. Peak periods typically are early morning and evening service. During off-peak periods, including Saturday and Sunday all-day service, 2 two-vehicle DMU trains (one married pair) would be required. Therefore, the total DMU fleet size needed for operation of the alternative is approximately 12 DMU vehicles (six

married pairs), which would allow for 2 spare two-vehicle DMU trains in addition to the 2 four-vehicle peak period trains.

The DMU Alternative would add riders to an already crowded BART core system during peak periods (see Section 3.B, Transportation). To assess the capacity needed to accommodate the additional riders within the core system, BART conducted an operations analysis to determine BART vehicle fleet needs to effectively operate the DMU Alternative. The analysis considered expected BART ridership under the DMU Alternative as well as BART's operating plan for the Daly City-Dublin/Pleasanton Line in 2040. Based on the analysis, the DMU Alternative would require an additional 24 BART cars to accommodate the anticipated increase in ridership while maintaining a level of crowding similar to the BART systemwide average. No additional buses would be needed to serve the DMU Alternative.

#### d. Travel Times

The DMU running time would be 6 minutes from the Dublin/Pleasanton Station DMU transfer platform to the proposed Isabel Station.

#### e. Fares and Fare Collection

Fares for the DMU Alternative are assumed to be consistent with BART's current fare policy and fare collection, as described above for the Proposed Project.

## E. EXPRESS BUS/BRT ALTERNATIVE

This alternative would implement Express bus service to the Dublin/Pleasanton Station with improvements that would provide for more seamless bus-to-BART transfers. Unlike the Proposed Project and the DMU Alternative, the Express Bus/BRT Alternative would not extend rail service from the Dublin/Pleasanton Station. While this alternative would not include an extension of BART rail service or the development of a new BART rail station, it does not preclude or prevent implementation of an extension of BART rail service from Dublin/Pleasanton Station to the east.

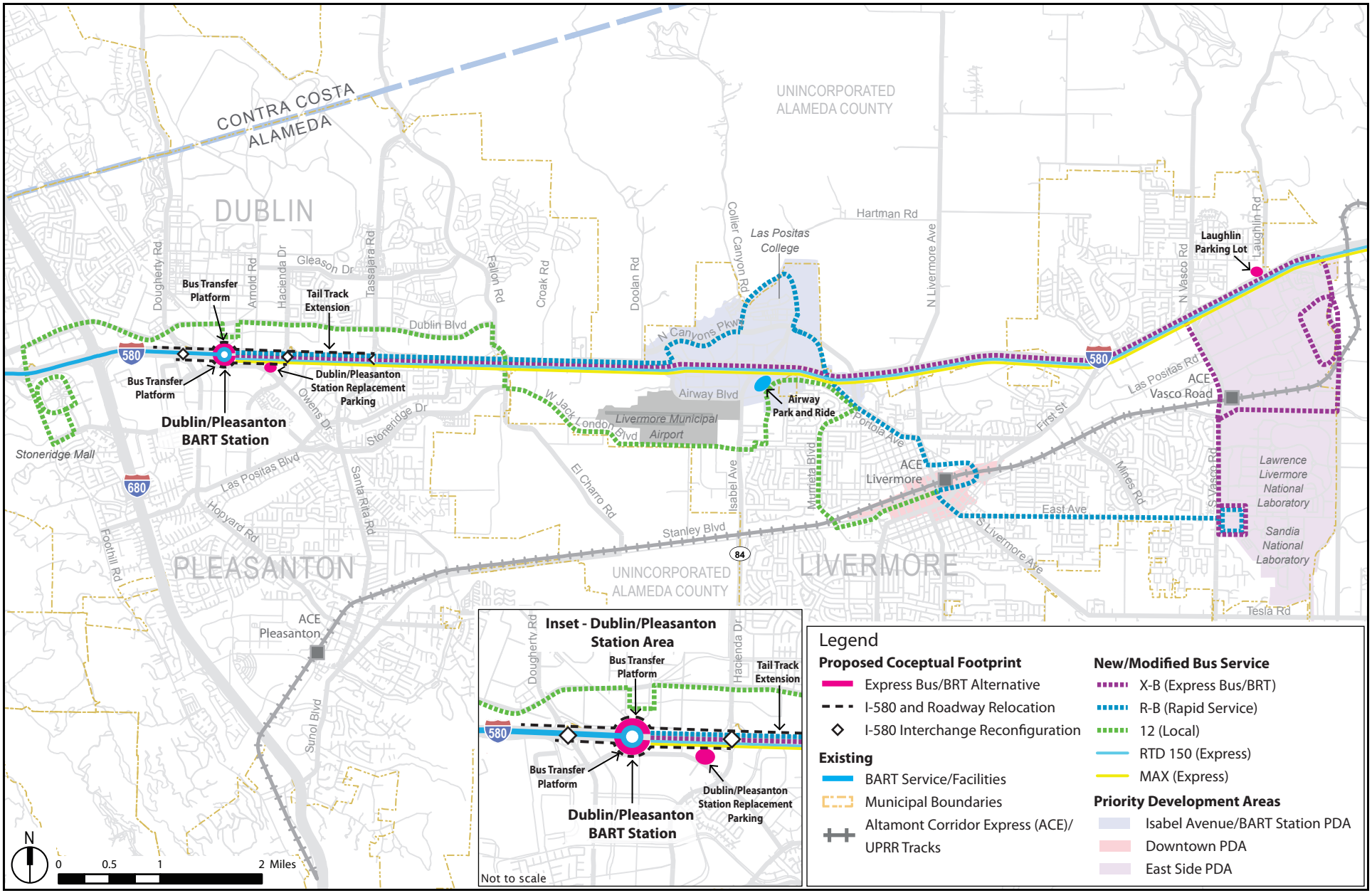
Instead, this alternative is intended to achieve the project objectives using BRT only. This alternative would include new bus transfer platforms at the Dublin/Pleasanton Station; the bus platforms would be located to the outside of the existing BART station platforms. New bus ramps from the I-580 express lanes would be constructed for buses to enter and connect directly to the bus transfer platforms, allowing passengers to transfer from bus to BART without leaving the station.

Key components of the Express Bus/BRT Alternative include construction of the new bus ramps, bus transfer platforms at the Dublin/Pleasanton Station, relocation of I-580 and associated surface frontage road reconfigurations to accommodate new bus platforms within the I-580 median, and new and modified bus services and facilities to improve transit service.[20, 21] A replacement parking lot or garage would be constructed at the Dublin/Pleasanton Station south of I-580, and a new remote parking lot would be constructed at Laughlin Road. These components are listed below and the conceptual plan is shown in Figure 2-19. Features that would be similar to or the same as the Proposed Project are noted. A more detailed representation of the footprint of the Express Bus/BRT Alternative is shown in Appendix B.

- **BART System Improvements.** The Express Bus/BRT Alternative would entail the construction of bus transfer platforms at the Dublin/Pleasanton Station, replacement parking at the Dublin/Pleasanton Station, and a new parking lot at Laughlin Road.
    - **Bus Transfer Platforms at the Dublin/Pleasanton Station.** The new bus transfer platforms at the existing Dublin/Pleasanton Station would be integrated into the station to support BART-to-bus and bus-to-BART connections. New bus-only on- and off-ramps from the I-580 express lanes would be constructed for buses from both the westbound and eastbound directions to connect directly to the bus transfer platforms, allowing passengers to transfer within the station.
    - **Dublin/Pleasanton Station Additional BART Car Storage.** The Express Bus/BRT Alternative would require an additional 12 BART cars for the anticipated increase in ridership. Approximately 0.10 mile of tail track would be constructed to the east of the Dublin/Pleasanton Station to accommodate the storage of approximately 10 additional BART cars needed for the station. The remaining two BART cars required under this alternative would be stored elsewhere in the BART system.
    - **Dublin/Pleasanton Station Replacement Parking.** Widening for the proposed bus transfer platforms and I-580 relocation would result in the loss of approximately 210 parking spaces at the Dublin/Pleasanton Station. To replace these spaces, a new surface lot or garage would be constructed south of I-580. If adjacent land can be acquired by BART, a new surface parking lot with approximately 210 parking spaces would be constructed. If the land is not available, BART would construct a three-level parking garage on a portion of the existing BART parking lot south of I-580.

[20] Arup and Anil Verma Associates, Inc., 2017a. BART to Livermore Extension Contract Drawings, 10 Percent Preliminary Engineering (Draft). July.

[21] Arup and Anil Verma Associates, Inc., 2017b. 10 Percent Preliminary Engineering Design Basis Memoranda (Draft), Alternative 1: Conventional BART, Alternative 2: DMU/EMU to Isabel Station and Maintenance Facility, Alternative 3: Express Bus/BRT.




Source: Arup, 2017a,b.

**BART to Livermore Extension Project EIR**

Figure 2-19
Express Bus/BRT Alternative Overview

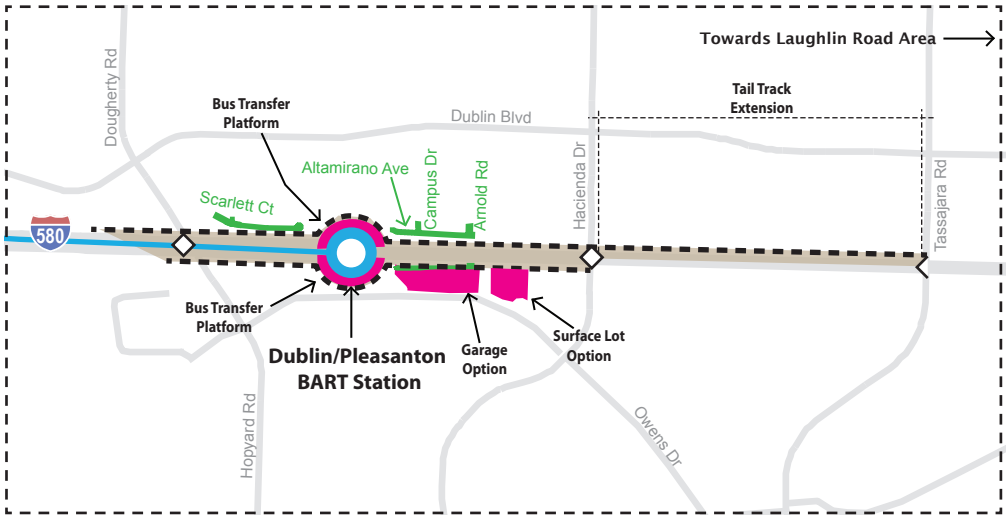
- **Laughlin Parking Lot.** A new remote surface parking lot would be constructed at Laughlin Road to provide parking for transit users. This lot would have approximately 230 parking spaces and would include regular bus service to the Dublin/Pleasanton Station during peak hours.

- **I-580 and Frontage Road Relocation.** The widening of the I-580 median for the bus transfer platforms would require the relocation of approximately 2.2 miles of I-580, from just west of Dougherty Road/Hopyard Road to Tassajara Road/Santa Rita Road. Similar to the Proposed Project, the existing lane configuration would be relocated to Caltrans standards and would have the same number of travel lanes, including express lanes, as currently exist. New direct bus ramps would connect the freeway to the Dublin/Pleasanton Station. The Dougherty Road/Hopyard Road interchange and the Hacienda Drive on- and off-ramps would be reconfigured to accommodate the freeway relocation, and some surface frontage roads and adjacent features would be widened or relocated.
- **New/Modified Bus Routes and Improvements.** New and modified bus routes and infrastructure enhancements would be similar to those described for the Proposed Project, except that the modified routes would serve the Dublin/Pleasanton Station rather than the Isabel Station. The bus connections for the Express Bus/BRT Alternative would be designed to maximize usage of the I-580 express lanes, increase the speed of transit journeys via direct bus-to-BART transfers, provide parking for San Joaquin County commuters at the Laughlin Road parking lot, provide Express service in areas with the greatest ridership potential, and serve PDAs and transit-supportive areas. Bus infrastructure improvements would also be constructed along the new bus routes. The feeder bus routes and infrastructure are described and analyzed at a programmatic level. However, the Express Bus/BRT Alternative improvements discussed above are analyzed at the project level.

## 1. BART System Improvements

The BART system improvements under the Express Bus/BRT Alternative are described below. The improvements include bus transfer platforms at the Dublin/Pleasanton Station, extension of tail track at the Dublin/Pleasanton Station for additional BART car storage, replacement parking at the Dublin/Pleasanton Station, and a parking lot at Laughlin Road, as shown in Figure 2-20 and listed in Table 2-7.


Overview




Inset 1


Inset 2

Legend

**Proposed Footprint**

- Express Bus/BRT Alternative
- I-580 and Roadway Relocation
- I-580 Interchange Reconfiguration
- Surface Road Relocation

**Existing**

- BART Service
- Altamont Corridor Express (ACE)/ UPRR Tracks

Not to Scale
Note: Green street labels indicate surface roads that would be relocated.

Source: Arup, 2017b; Arup and Anil Verma Associates, Inc., 2017a.



Figure 2-20
Express Bus/BRT Alternative Detail

TABLE 2-7 EXPRESS BUS/BRT ALTERNATIVE – ALIGNMENT, FACILITIES, AND STRUCTURES

| From | To | Alignment/Structures | Facilities |
|---|---|---|---|
| Dougherty Road/ Hopyard Road | Hacienda Drive | ▪ New ROW in I-580 median | ▪ Bus transfer platforms at Dublin/Pleasanton Station<br>▪ Replacement parking lot or garage at Dublin/ Pleasanton Station |
| Hacienda Drive | Tassajara Road/ Santa Rita Road | ▪ New ROW in I-580 median<br>▪ New 0.1-mile tail track for additional BART car storage east of Dublin/Pleasanton Station | -- |
| North Vasco Road | Greenville Road | -- | ▪ Laughlin surface parking lot |

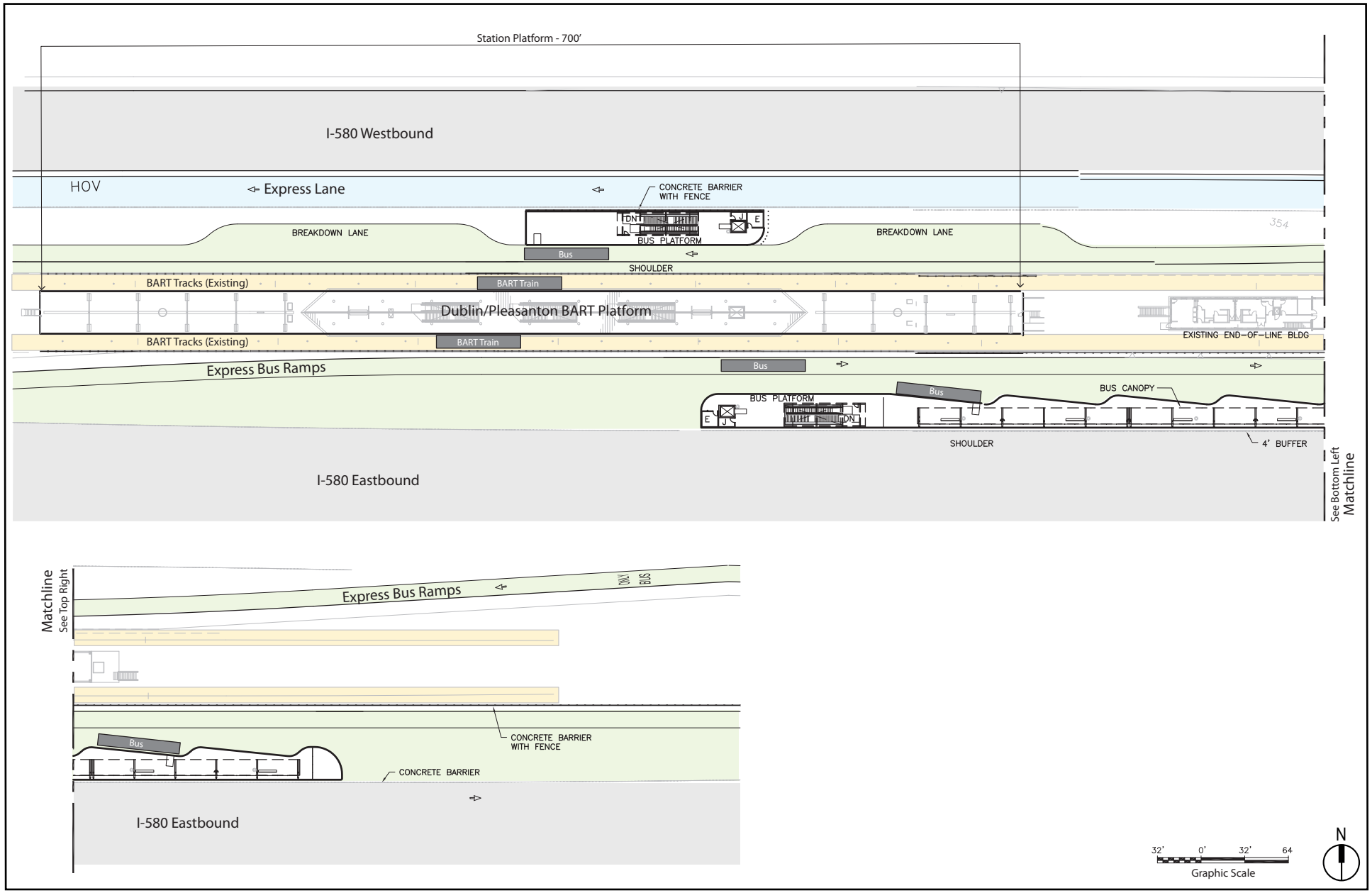
Note: -- = No change proposed.
Source: Arup and Anil Verma Associates, Inc., 2017b.

### a. Bus Transfer Platforms at the Dublin/Pleasanton Station

As shown in Figures 2-21 and 2-22, the new bus transfer platforms at the existing Dublin/Pleasanton Station would be integrated into the station to support direct BART-to-bus connections. New bus ramps from the I-580 express lanes would be constructed for both westbound and eastbound buses to connect directly to the bus transfer platforms, allowing passengers to transfer to BART within the station.

The concourse level (lower level), which houses the passenger entry area and ticket area, would be widened by approximately 44 feet to the north and by approximately 50 feet to the south. This would require excavation along both the north and south side of the existing concourse to provide the necessary room for expansion. Portions of the existing concourse wall would be removed to allow connections between the existing and proposed station areas. New bus transfer platforms would be constructed above the concourse, both north and south of the existing BART platform, beyond the BART train ROW. The new platforms would be at grade with the bus lanes, and would be approximately 24 feet wide by 180 feet long on the north of the station and 24 feet wide by 640 feet long on the south. The bus platforms would be protected from the freeway by concrete safety barriers, and a windscreen would be constructed over the platforms.

Passenger access to the station would not change from existing conditions; passengers currently enter the station concourse from the sidewalk and access road under I-580. Elevators and escalators connect the concourse level to the bus and BART platforms.

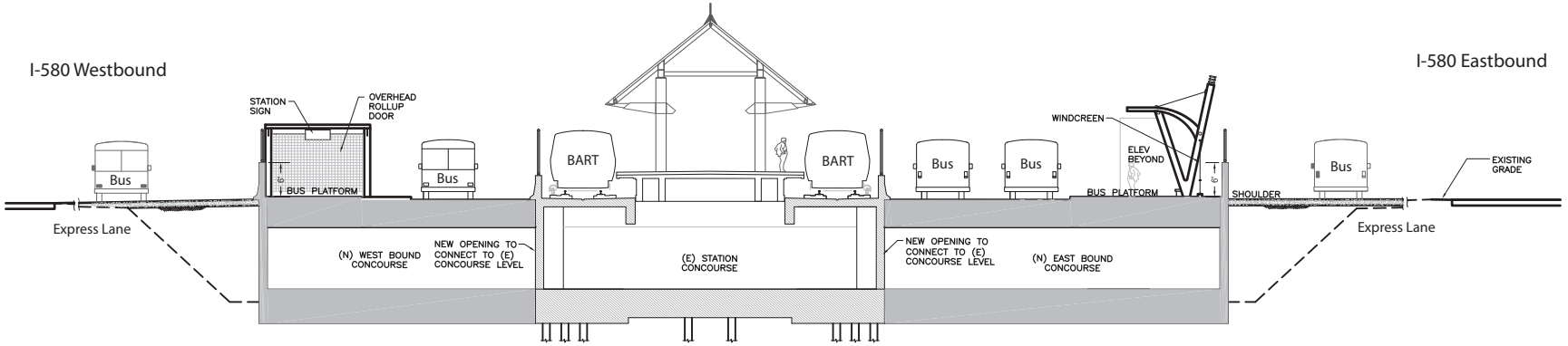



Source: Arup and Anil Verma Associates, Inc., 2017a.

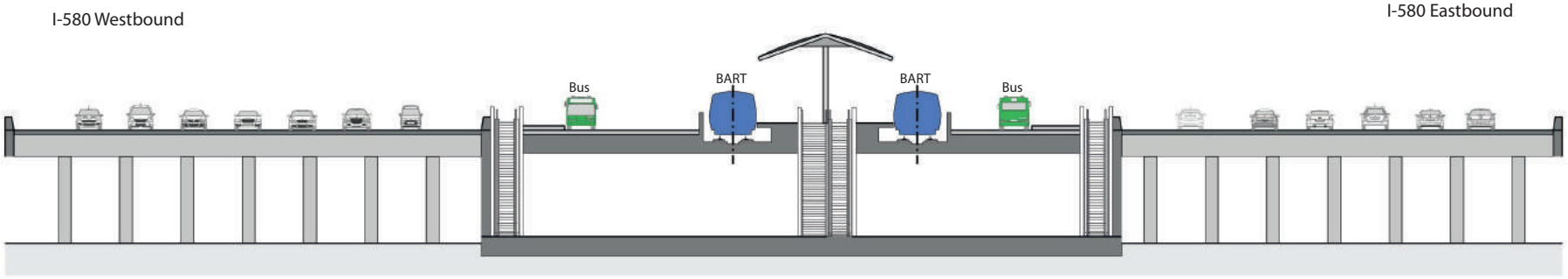
**BART to Livermore Extension Project EIR**

Figure 2-21
Express Bus/BRT Alternative
Bus Ramps and Bus Transfer Platforms at Dublin/Pleasanton Station

## Cross Section - BART Platform and Proposed Bus Transfer Platforms
## View East




## Conceptual Cross Section
## View East




Not to Scale

Source: Arup and Anil Verma Associates, Inc., 2017a.

BART to Livermore Extension Project EIR

Figure 2-22
Express Bus/BRT Alternative
Bus Ramps and Bus Transfer Platforms Cross Section

No bus bays would be located at the bus transfer facility in the westbound direction because the Dublin/Pleasanton Station would be the terminal stop for all westbound buses using the facility (i.e., no passenger boarding in the westbound direction). If a future bus route were to continue along to stops west of the Dublin/Pleasanton Station (e.g., Hacienda Business Park), the bus would have a designated stop at the western-most end of the platform. A pull-out shoulder area would be located both before and after the bus platform for emergencies and vehicle breakdowns.

In the eastbound direction, a passing lane for buses is required because each route using the facility would have a designated bay for passenger boarding. Six sawtooth bays would be provided. Buses using the direct Express Bus ramps would likely lay over in the eastbound bus bays.

At the existing bus stop outside the BART station, approximately 14 of the existing 17 bus bays would have to be retained to accommodate existing routes that would continue to travel to the station via local roads.

The relocation of the I-580 median to accommodate the bus transfer platform would require the relocation of approximately 1,400 feet of the existing Line G-2 canal that extends along the southern edge of I-580 in the vicinity of the Dublin/Pleasanton Station. The canal would be relocated approximately 50 to 70 feet to the south to accommodate the relocation of the freeway lanes.

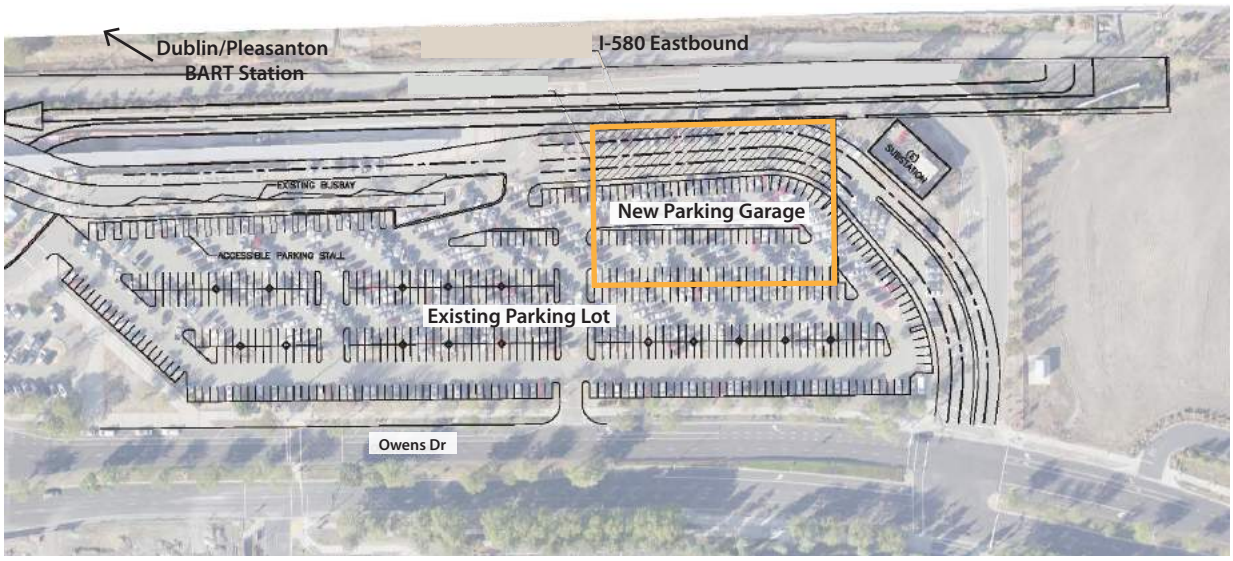
### b. Dublin/Pleasanton Station BART Car Storage

Approximately 12 BART cars would be purchased to accommodate the additional ridership projected under this alternative. To accommodate the storage of approximately 10 additional BART cars at the Dublin/Pleasanton Station, the tail tracks would be extended to the east of the station by approximately 0.1 mile. The remaining two BART cars required under this alternative would be stored elsewhere in the BART system.

### c. Dublin/Pleasanton Station Replacement Parking

The relocation of the I-580 median to accommodate the bus transfer platform would result in the loss of approximately 210 parking spaces on the south side of the station. To replace these spaces, a new surface lot or garage would be constructed south of I-580. A new surface parking lot with approximately 210 parking spaces would be constructed adjacent to and east of the existing BART parking lot if BART could acquire the adjacent land. However, if the land is not available, BART would construct a three-level parking garage up to approximately 35 feet high, with approximately 210 parking spaces on a portion of the existing BART parking lot south of I-580. See Figure 2-23 for the proposed locations for replacement parking.


Dublin/Pleasanton Station Parking (Surface Lot Option)




Dublin/Pleasanton Station Parking (Garage Option)


Laughlin Parking Lot

Source: Arup and Anil Verma Associates, Inc., 2017a.



Figure 2-23
Express Bus/BRT Alternative
Parking Facilities

### d. Laughlin Parking Lot

A new surface parking lot would be constructed at Laughlin Road to provide additional parking for transit users, as shown in Figure 2-23; the lot would contain approximately 230 parking spaces. Regular bus service to the Dublin/Pleasanton Station would be provided by a new X-B bus route, which would run on 12- to 15-minute headways during the peak periods (6:15 to 9:15 a.m. and 3:30 to 6:00 p.m., as shown in Table 2-9).

## 2. I-580 and Frontage Road Relocation

Under the Express Bus/BRT Alternative, approximately 2.2 miles of I-580, from west of Dougherty Road/Hopyard Road to Tassajara Road/Santa Rita Road, would be relocated to accommodate the bus ramps and bus platforms in the median. This alternative would require approximately 3.4 fewer miles of widening that would the Proposed Project. Existing freeway interchanges, on- and off-ramps, freeway structures such as overcrossings, and some surface frontage roads would be reconfigured to accommodate the increased ROW. The horizontal and vertical alignment of the I-580 relocation, as well as the I-580 interchange and roadway reconfigurations, are described below and shown in Figure 2-20, above.

Table 2-8 shows the proposed I-580 relocation, interchange reconfiguration, roadway modifications, and structures for each segment of I-580, from west to east.

### a. I-580 Horizontal Alignment

Under the Express Bus/BRT Alternative, I-580 would be relocated to accommodate the bus platforms at the Dublin-Pleasanton Station (in the I-580 median). The freeway relocation would be greatest at the Dublin/Pleasanton Station, with total relocation up to approximately 100 feet, and would decrease toward the west and east of the station—to the west of Dougherty Road and east of Tassajara Road/Santa Rita Road—where the freeway would return to its existing configuration. The typical freeway widening would be approximately 88 feet along the alignment. The existing freeway lane configuration would be relocated to Caltrans standards and would have the same number of travel lanes and express lanes as currently exist.

TABLE 2-8 EXPRESS BUS/BRT ALTERNATIVE – I-580 AND ROADWAY MODIFICATIONS

| From | To | I-580 and On-ramps/ Off-ramps/Interchanges | Surface Road Realignment | Structures |
|---|---|---|---|---|
| West of Dougherty Road | Dougherty Road/ Hopyard Road | ▪ Relocate I-580 in WB direction | -- | ▪ At Line G-1-1, modify existing I-580 bridge (widen bridge deck) |
| Dougherty Road/ Hopyard Road | Hacienda Drive | ▪ Relocate I-580 both directions (EB and WB)<br>▪ Reconfigure WB off-ramp at Hacienda Drive<br>▪ Reconfigure WB off-ramp at Dougherty Road<br>▪ Reconfigure EB on-ramp at Hopyard Road | ▪ Scarlett Court, Scarlett Drive, Altamirano Avenue, Campus Drive, Arnold Road | ▪ Iron Horse Regional Trail underpass<br>▪ Cantilever over Chabot Canal/Line G-2 (west of Iron Horse Trail)<br>▪ Relocate approximately 1,400 feet of Line G-2 (east of Iron Horse Trail) |
| Hacienda Drive | Tassajara Road/ Santa Rita Road | ▪ Relocate I-580 in WB direction | -- | ▪ Tassajara Creek bridge (widen bridge deck; new deck piles) |

Notes: -- = No change proposed; EB = eastbound; WB = westbound.
Source: Arup and Anil Verma Associates, Inc., 2017b.

West of the Iron Horse Regional Trail, a cantilever structure along the south side of I-580 would support the freeway above the Chabot canal/Line G-2. The cantilever would be approximately 800 feet long and would extend over the canal by 5 to 15 feet. The existing access road along the north side of the canal would be removed; however, vehicle access along the south side of the canal would be maintained and would be widened to a minimum of 12 feet to accommodate maintenance vehicles. In addition, east of the Iron Horse Regional Trail, where Line G-2 extends adjacent to the BART parking lot, approximately 1,400 feet of the canal would be relocated to the south by approximately 50 to 70 feet.

### b. I-580 Vertical Alignment

Under the Express Bus/BRT Alternative, the vertical alignment for I-580 would be the same as existing conditions. The bridge over the Iron Horse Regional Trail would be widened on the north and south to accommodate the relocated I-580 and widened BART ROW at the Dublin/Pleasanton Station.

In addition to the relocation of a portion of Line G-2 described above, existing bridges and structures over the following creeks would be widened to accommodate the new bus

transfer platforms and extended tail tracks for BART car storage within the I-580 median, as shown in Table 2-8:

- Line G-1-1
- Tassajara Creek

#### c. Interchange and Roadway Reconfiguration

Under the Express Bus/BRT Alternative, modifications would be required at the interchanges and on- and off-ramps, including the tightening of the radius of some ramps and reconstruction of others. The on- and off-ramps at Dougherty Road/Hopyard Road and Hacienda Drive would be realigned. In addition, the adjacent surface roads and structures would be realigned, including Scarlett Court, Scarlett Drive, Altamirano Avenue, Campus Drive, and Arnold Road.

### 3. Bus Routes and Improvements

Under the Express Bus/BRT Alternative, new or modified LAVTA routes—including local, Express, and Rapid routes—would serve the Dublin/Pleasanton Station, connecting the station with destinations in Livermore (including LLNL, the Downtown Livermore ACE station, the Vasco Road ACE Station, and Las Positas College).[22] The bus technology, proposed route modifications, and bus infrastructure improvements for this alternative are described below.[23]

This EIR describes and analyzes the bus routes and bus infrastructure improvements at a programmatic level. The routes are conceptual and were developed for the purpose of estimating BART ridership and operational cost. Candidate locations for bus infrastructure improvements, anticipated to be constructed within existing street ROWs, are described to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.

[22] Rapid routes are routes that run with high frequency and provide service that connects key destinations. Express routes are routes that run during peak periods only, make limited stops, and serve major destinations. Both of these route types may feature transit priority elements along their respective route alignments—such as transit signal priority, bus bulbs, queue-jump lanes, and freeway-travel—and the use of express lanes.

[23] Arup, 2017a. BART to Livermore Extension Bus Operations Technical Memorandum. July.

### a. Bus Technology

The bus technology for the Express Bus/BRT Alternative would be the same as for the Proposed Project, described above in the Conventional BART subsection. The existing LAVTA passenger buses would be used. The fleet consists of standard 29-foot to 40-foot passenger buses and paratransit vehicles.

BRT service characteristics would be used for some routes as described below. For purposes of this EIR, BRT refers to bus routes with one or more of the following elements, which provide reduced travel times: limited-stop service; transit priority elements, such as transit signal priority, queue-jump lanes and bus bulb-outs; and freeway-travel and use of express lanes, where possible.

While many BRT systems and projects include the use of special BRT buses, the BART to Livermore Extension Project would not use special BRT buses. The bus infrastructure included in the Express Bus/BRT Alternative such as the transfer platforms at Dublin/Pleasanton Station and the bus ramps from the I-580 express lanes are designed to be maximally flexible so any bus can use them (i.e., they are not designed to be useable only by special BRT buses). This flexible design allows existing bus operators such as LAVTA, RTD, MAX, Stanislaus Regional Transit, and County Connection to use the facility without purchasing special buses.

### b. New/Modified Bus Routes

The bus routes for the Express Bus/BRT Alternative would include new/modified routes, as shown in Table 2-9. The bus routes for the Enhanced Bus Alternative were developed to provide effective connections from key nodes of activity in the city of Livermore to the BART system (Dublin/Pleasanton Station), and thereby improve service for existing BART patrons and generate as many additional BART patrons as possible. Consistent with the objectives of the BART to Livermore Extension Project, this includes providing effective connections to inter-regional rail (i.e., ACE Downtown Livermore and Vasco Road stations) and PDAs in Livermore (i.e., Livermore Isabel Avenue BART Station PDA, Livermore Downtown PDA, and Livermore East Side PDA). Other key activity nodes connected by proposed bus services include LLNL, Sandia National Laboratories, Las Positas College, and the San Francisco Premium Outlets. In addition, the Express Bus/BRT Alternative includes express bus service from a remote parking lot at Laughlin Road to the Dublin/Pleasanton Station to enable a direct connection from the park and ride facility to the BART station.

**TABLE 2-9 EXPRESS BUS/BRT ALTERNATIVE – NEW/MODIFIED BUS SERVICE**

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|
| New | LAVTA | X-B | -- | -- | ▪ 12–15 min. (peak) | ▪ Weekday: 6:15 a.m. – 9:15 a.m. & 3:30 p.m. – 6:00 p.m.<br>▪ Weekend: No service | Livermore East Side PDA, Laughlin Parking Lot, Dublin/Pleasanton Station, ACE, LLNL, SNL | New service |
| New | LAVTA | R-B | -- | -- | ▪ 12–15 min. (peak)<br>▪ 20 min. (off-peak) | ▪ Weekday: 5:30 a.m. – 7:30 p.m.<br>▪ Weekend: No service | Dublin/Pleasanton Station, Las Positas College, ACE Livermore, SNL | New service |
| Modified | LAVTA | 12 | 30 min. | ▪ Weekday: 6:00 a.m. – 10:40 a.m.<br>▪ Weekend: Sunday only, 6:00 a.m. – 10:40 a.m. | ▪ Weekday: 12–15 min.<br>▪ Weekend: 20 min. | ▪ Weekday: 6:30 a.m. – 10:30 p.m.<br>▪ Weekend: 9:00 a.m. – 10:00 p.m. | Livermore Transit Center to Stoneridge Mall via Isabel Station | Peak headways shortened; minor changes to service span. |
| Modified | LAVTA | 20X | 45 min. | ▪ Weekday: 6:15 a.m. – 10:00 a.m. & 4:00 p.m. – 6:40 p.m.<br>▪ Weekend: No service | ▪ None – Express route to be eliminated | -- | Dublin/Pleasanton Station, Greenville Road, LLNL/SNL, Livermore Transit Center | Route to be eliminated |

**TABLE 2-9 EXPRESS BUS/BRT ALTERNATIVE – NEW/MODIFIED BUS SERVICE**

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|
| Modified | LAVTA | Rapid Route | 15 min. | ▪ Weekday: 5:30 a.m. – 8:00 p.m. | ▪ None – Express route to be eliminated | -- | Dublin/Pleasanton Station to Livermore Transit Center | Route to be eliminated |

Notes:
-- = Not applicable; R-B = Rapid service; X-B = Express service (peak period); SNL = Sandia National Laboratories.
Peak periods are assumed to be 6:00 a.m. to 10:00 a.m. (AM peak) and 3:00 p.m. to 7:00 p.m. (PM peak).
Several components of the proposed bus routes are similar to Wheels Forward, a program of changes to the LAVTA transit system implemented in August 2016 to provide more frequent buses and new routes in Livermore, Dublin, and Pleasanton. The new, modified, or eliminated routes under the Proposed Project and Build Alternatives are described in relation to the previous bus route network. Elements shared by the Proposed Project and Build Alternatives and the Wheels Forward program include improved bus service from Downtown Livermore to BART, improved bus service to Las Positas College, and improved bus shelters to serve the new Express and Rapid routes. Other capital improvements, such as real-time arrival message boards at bus stations, expansion of transit signal priority to additional intersections, and installation of bus bulbs, are not included in the Wheels Forward program. In addition, the Proposed Project and Build Alternatives would include improved bus service to LLNL and the east side of Livermore.
Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid route serves most of the existing Route 12 stops on Dublin Boulevard as well as North Canyons Parkway and Las Positas College, and a restructured Route 14 serves areas of Livermore previously served by Route 12. Therefore, these restructured routes would generally serve the areas previously served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA.
Source: Arup, 2017a.

Bus services were developed to provide as fast and as direct a route as practical from these activity nodes to the Dublin/Pleasanton Station. To reduce travel time, routes were developed to make optimal use of the I-580 express lanes. In addition, transit priority elements such as transit signal priority, bus bulbs, and real-time information were deployed to improve travel times along bus route segments experiencing traffic congestion, intersection delay, interference from general traffic, and long dwell times due to high passenger boarding and alighting volumes at specific bus stops.

To provide a seamless connection with the BART system, the frequency of many of the bus routes was chosen to match the frequency of BART trains arriving at Dublin/Pleasanton Station during peak periods. Coordinated bus arrival and departure times with each BART train significantly improves a passenger's perception of reliability and experience of using bus service to connect to BART.

### c. Bus-Related Infrastructure Improvements

Similar to the other alternatives, a series of transit priority infrastructure enhancements would also be implemented under this alternative to increase the performance of the above bus connections. Typical bus improvements are shown in Figure 2-12. These enhancements would be implemented on local bus corridors and arterials, and include the following:

- **Transit Signal Priority**. Under the Express Bus/BRT Alternative, buses would be given priority at approximately four locations, as follows:
  - For the 12 and 12X routes, on East Jack London Boulevard at Isabel Avenue and Murrieta Boulevard
  - For the R-B Route, at key intersections along Portola Avenue and Livermore Avenue that would be on the route
- **Rapid/ Express Route Amenities**. Bus shelters, real-time information via digital messaging boards, improved seating and surroundings near bus stops, and pre-paid ticketing with Clipper® would be implemented for the R-B, X-B, 12, and 12X routes at approximately 29 locations at existing bus stops, within existing street and sidewalk ROWs.
- **Bus Bulbs**. Under the Express Bus/BRT Alternative, bus bulbs would be installed at approximately 10 locations, as follows:
  - For the R-B Route, at stops on Portola Avenue and North Livermore Avenue, between I-580 and East Avenue, and at stops on North Canyons Parkway
  - For the 12 and 12X routes, along Railroad Avenue between Murrieta Boulevard and Livermore Avenue

## 4. Operations

Operations—including the operating plan, fleet size, travel times, and fares and fare collection—are described below for the Express Bus/BRT Alternative.

### a. Operating Plan

Hours of operation and bus headways are shown in Table 2-9 for the new/modified bus routes under the Express Bus/BRT Alternative.

The BART operating plan for the Express Bus/BRT Alternative would remain as current BART operations. The hours of operation and train headways would be the same as the current BART service at the Dublin/Pleasanton Station. The proposed operating plan is based on anticipated opening day ridership, which could be adjusted based on changes to subsequent demand. BART intends to have 12-minute headways (instead of 15-minute headways) at some time after 2025. As described above, current BART service to the Dublin/Pleasanton Station is provided by the Daly City-Dublin/Pleasanton Line, which operates between the Daly City BART Station and the Dublin/Pleasanton Station. BART service to the Dublin/Pleasanton Station is provided as follows:

- Weekdays: 4:00 a.m. to 12:00 a.m., with trains every 15 minutes
- Saturdays: 6:00 a.m. to 12:00 a.m., with trains every 20 minutes
- Sundays/Holidays: 8:00 a.m. to 12:00 a.m., with trains every 20 minutes

### b. Employees

By 2040, the Express Bus/BRT Alternative would result in a total of approximately 23 additional full-time-equivalent staff systemwide, as follows: (1) 6 BART personnel to provide administration, operation, and maintenance of the BART system; and (2) 17 non-BART personnel for the additional bus service anticipated under the Express Bus/BRT Alternative.

### c. Fleet Size

Approximately 7 to 13 additional buses would be needed to serve the Express Bus/BRT Alternative.

The Express Bus/BRT Alternative would add riders to an already crowded BART core system during peak periods (see Section 3.B, Transportation). To assess the capacity needed to accommodate the additional riders within the core system, BART conducted an operations analysis to determine BART vehicle fleet needs to effectively operate the Express Bus/BRT Alternative. The analysis considered expected BART ridership under the Express Bus/BRT Alternative as well as BART's operating plan for the Daly

City-Dublin/Pleasanton Line in 2040. Based on the analysis, the Express Bus/BRT Alternative would require an additional 12 BART cars to accommodate the increased ridership anticipated while maintaining a level of crowding similar to the BART systemwide average.

### d. Fares and Fare Collection

Fares and fare collection for the buses would be consistent with LAVTA's current fare policy and fare collection, also described above for the Proposed Project.

BART fares and fare collection would remain as currently exists at the Dublin/Pleasanton Station (described under Proposed Project above) with new fare gates for passengers transferring from the proposed bus transfer platforms to the BART system.

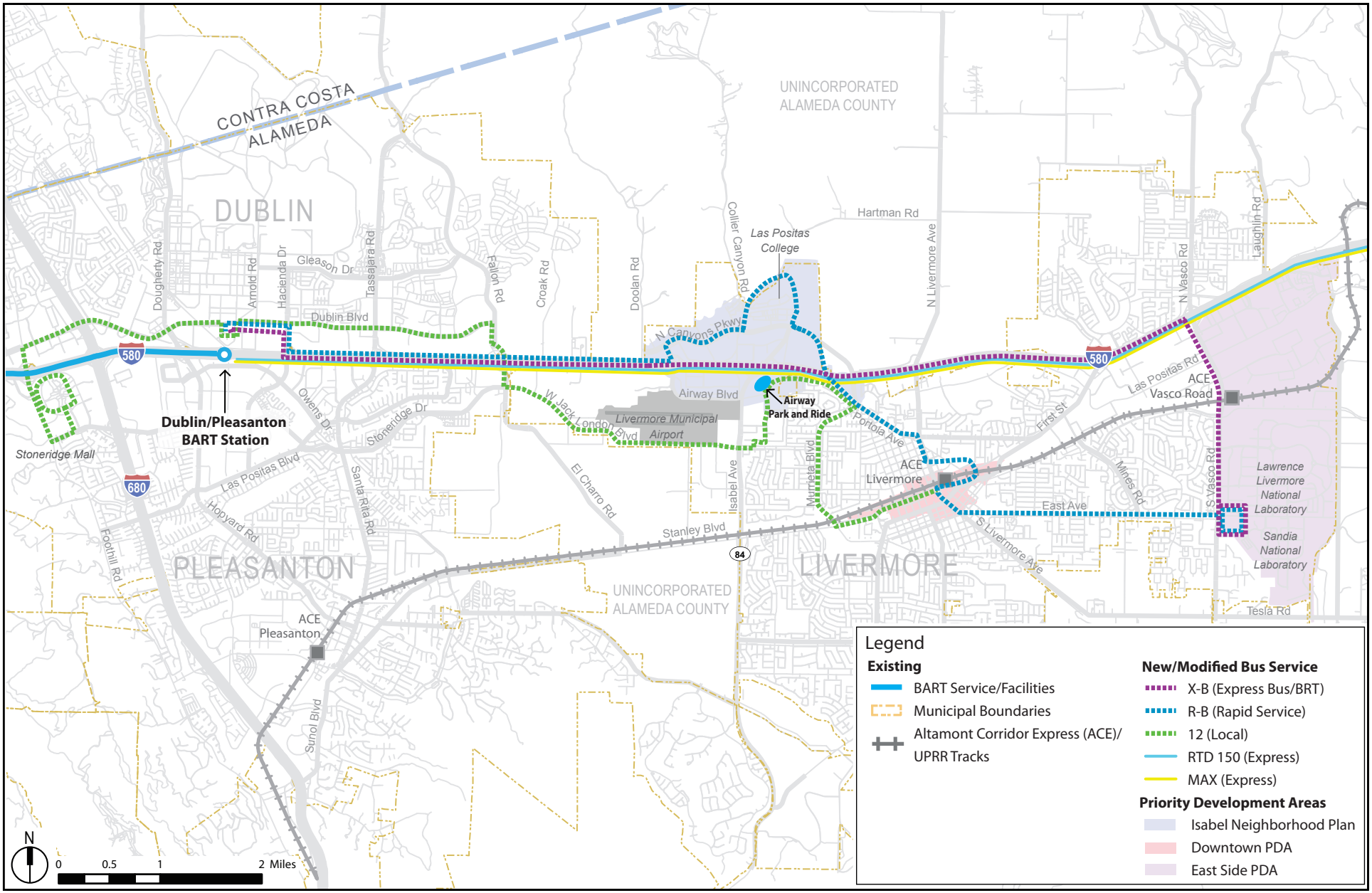
## F. ENHANCED BUS ALTERNATIVE

The Enhanced Bus Alternative seeks to achieve project objectives via bus-related technology only. Similar to the Express Bus/BRT Alternative, the Enhanced Bus Alternative would not include an extension of BART rail service or the development of a new BART station. However, unlike the Express Bus/BRT Alternative, this alternative would not include any major capital improvements, such as the development of new bus transfer platforms. This alternative entails lower-cost bus service improvements to improve transit access to the Dublin/Pleasanton Station. Similar to the Proposed Project and the other alternatives, this alternative includes a bus operations plan designed to enhance direct connections to the Dublin/Pleasanton Station from Las Positas College, Downtown Livermore, and the ACE stations, as well as to serve existing and future PDAs.

While this alternative would not include an extension of BART rail service or the development of a new rail station, it does not preclude or prevent the future extension of rail service from Dublin/Pleasanton Station to the east.

Key components of the Enhanced Bus Alternative include new and modified bus services and facilities to improve transit to the Dublin/Pleasanton Station. These components are listed below and shown in Figure 2-24. Features that would be similar to or the same as the Proposed Project are noted.

The bus routes for the Enhanced Bus Alternative were developed to provide effective connections from key nodes of activity in the city of Livermore to the BART system (Dublin/Pleasanton Station), and thereby improve service for existing BART patrons and generate as many additional BART patrons as possible. Consistent with the objectives of the BART to Livermore Extension Project, this includes providing effective connections to inter-regional rail (i.e., ACE Downtown Livermore and Vasco Road stations) and PDAs in




Source: Arup, 2017a,b.

BART to Livermore Extension Project EIR

Figure 2-24
Enhanced Bus Alternative
Overview

Livermore (i.e., Livermore Isabel Avenue BART Station PDA, Livermore Downtown PDA, and Livermore East Side PDA). Other key activity nodes connected by proposed bus services include LLNL, Sandia National Laboratories, Las Positas College, and the San Francisco Premium Outlets.

Bus services were developed to provide as fast and as direct a route as practical from these activity nodes to the Dublin/Pleasanton Station. To reduce travel time, routes were developed to make optimal use of the I-580 express lanes. In addition, transit priority elements such as transit signal priority, bus bulbs, and real-time information were deployed to improve travel times along bus route segments experiencing traffic congestion, intersection delay, interference from general traffic, and long dwell times due to high passenger boarding and alighting volumes at specific bus stops.

To provide a seamless connection with the BART system, the frequency of many of the bus routes was chosen to match the frequency of BART trains arriving at Dublin/Pleasanton Station during peak periods. Coordinated bus arrival and departure times with each BART train significantly improves a passenger's perception of reliability and experience of using bus service to connect to BART.

- **New/Modified Bus Routes and Improvements.** The proposed bus operations plan for this alternative would include an additional Rapid route (R-B) and one Express route (X-A). The existing local Route 12 would be modified and the existing Rapid route and 20X route would be eliminated to avoid redundancy and ensure an efficient spread of transit service to all key areas. This bus operations plan assumes that the service provided by RTD and MAX Express routes would remain identical to today's service. Bus infrastructure improvements such as bus bulbs, bus shelters, and signage would also be constructed along the new bus routes. The bus routes and infrastructure are described and analyzed at a programmatic level.

## 1. Bus Routes and Improvements

The bus technology, proposed route modifications, and bus infrastructure improvements for the Enhanced Bus Alternative are listed below.

As described above, this EIR describes and analyzes the bus routes and bus infrastructure improvements at a programmatic level. The routes are conceptual and were developed for the purpose of estimating BART ridership and operating costs. Candidate locations for bus infrastructure improvements, anticipated to be constructed within existing street ROWs, are described to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.

### a. Bus Technology

The bus technology for the Enhanced Bus Alternative would be the same as for the Proposed Project and Express Bus/BRT Alternative, described above.

### b. New/Modified Bus Routes

Under the Enhanced Bus Alternative, new/modified bus routes—including local, Express, and Rapid routes—would serve the Dublin/Pleasanton Station, connecting the station with destinations in Livermore (including LLNL, the Downtown Livermore ACE station, and Las Positas College).[24, 25] The new/modified bus routes are listed in Table 2-10.

### c. Bus-Related Infrastructure Improvements

A series of transit priority infrastructure enhancements would also be implemented under this alternative, to increase the performance of the bus connections. Typical bus improvements are shown in Figure 2-12. These enhancements would be implemented on local bus corridors and arterials, and include the following:

- **Transit Signal Priority**. Under the Enhanced Bus Alternative, buses would be given priority at approximately six locations as follows:
  - For the X-A Route, at the I-580 westbound ramps at Vasco Road and at key intersections along Hacienda Drive and Owens Drive that would be on the route
  - For the 12 and 12X routes, on East Jack London Boulevard at Isabel Avenue
  - For the R-B, Portola Avenue and Livermore Avenue
- **Rapid/Express Route Amenities**. Bus shelters, real-time information via digital messaging boards, improved seating and surroundings near bus stops, and pre-paid ticketing with Clipper® would be implemented for the R-B, X-A, and 12X routes at approximately 29 locations at existing bus stops within existing street and sidewalk ROWs.

[24] Rapid routes are routes that run with high frequency and provide service connecting key destinations. Express routes are routes that run during peak periods only, make limited stops, and serve major destinations. Both of these route types may feature transit priority elements along their respective route alignments—such as transit signal priority, bus bulbs, queue-jump lanes, and freeway-travel—and use of express lanes.

[25] Arup, 2017a. BART to Livermore Extension Bus Operations Technical Memorandum. July.

**TABLE 2-10 ENHANCED BUS ALTERNATIVE – NEW/MODIFIED BUS SERVICE**

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|
| New | LAVTA | X-A | -- | -- | ▪ 15 min. (peak) | ▪ Weekday: 6:15 a.m. – 9:15 a.m. & 3:30 p.m. – 6:00 p.m.<br>▪ Weekend: No service | Dublin/Pleasanton Station to SNL | New service |
| New | LAVTA | R-B | -- | -- | ▪ 12–15 min. (peak)<br>▪ 30 min. (off-peak) | ▪ Weekday: 5:30 a.m. – 7:30 p.m.<br>▪ Weekend: No service | Dublin/Pleasanton Station, Las Positas College, ACE Livermore, SNL | New service |
| Modified | LAVTA | 12 | 30 min | ▪ Weekday: 6:00 a.m. – 10:40 p.m.<br>▪ Weekend: Sunday only, 6:00 a.m. – 10:40 p.m. | ▪ Weekday: 12–15 min.<br>▪ Weekend: 20 min. | ▪ Weekday: 6:30 a.m. – 10:30 p.m.<br>▪ Weekend: 9:00 a.m. –10:00 p.m. | Livermore Transit Center to Stoneridge Mall via Isabel Station | Peak headways shortened; minor changes to service span. |
| Modified | LAVTA | Rapid Route | 15 min | ▪ Weekday: 5:30 a.m. – 8:00 p.m. | None – Express route to be eliminated | -- | Dublin/Pleasanton Station to Livermore Transit Center | Route to be eliminated |
| Modified | LAVTA | 20X | 45 min | ▪ Weekday: 6:15 a.m. – 10:00 a.m. & 4:00 p.m. – 6:40 p.m. | None – Express route to be eliminated | -- | Dublin/Pleasanton Station, Greenville Road, LLNL/SNL, Livermore Transit Center | Route to be eliminated |

Notes:
-- = Not applicable; R-B = Rapid service; X-B, X-A = Express service (peak period); MAX = Modesto Area Express; SNL = Sandia National Laboratories.
Peak periods are assumed to be 6:00 a.m. to 10:00 a.m. (AM peak) and 3:00 p.m. to 7:00 p.m. (PM peak).
Several components of the proposed bus routes are similar to Wheels Forward, a program of changes to the LAVTA transit system implemented in August 2016 to provide more frequent buses and new routes in Livermore, Dublin, and Pleasanton. The new, modified, or eliminated routes under the Proposed Project and Build Alternatives are described in relation to the previous bus route network. Elements shared by the Proposed Project and Build Alternatives and the Wheels Forward program include improved bus service from Downtown Livermore to BART, improved bus service to Las Positas College, and improved bus shelters to serve the new Express and Rapid routes. Other capital improvements, such as real-time arrival message boards at bus stations, expansion of transit signal priority to additional intersections, and installation of bus bulbs, are not included in the Wheels Forward program. In addition, the Proposed Project and Build Alternatives would include improved bus service to LLNL and the east side of Livermore.
Although LAVTA eliminated Route 12 and 12X service in August 2016, a restructured Rapid route serves most of the existing Route 12 stops on Dublin Boulevard as well as

**TABLE 2-10 ENHANCED BUS ALTERNATIVE – NEW/MODIFIED BUS SERVICE**

| New/ Modified Route | Operator | Route | Existing Peak Headway | Existing Service Span | Proposed Peak Headway | Proposed Service Span | Proposed Route Overview (Existing Route to be Eliminated) | Summary of Changes |
|---|---|---|---|---|---|---|---|---|

North Canyons Parkway, and Las Positas College and a restructured Route 14 serves areas of Livermore previously served by Route 12. Therefore, these restructured routes would generally serve the areas previously served by the 12 and 12X, and the existing routes analyzed in this EIR remain as previously operated by LAVTA.
Source: Arup, 2017a.

- **Bus Bulbs**. Under the Enhanced Bus Alternative, bus bulbs would be installed at approximately 10 locations as follows:
  - For the R-B Route, at stops on Portola Avenue and North Livermore Avenue between I-580 and East Avenue, and at stops on North Canyons Parkway
  - For the 12 and 12X routes, along Railroad Avenue between Murrieta Boulevard and Livermore Avenue

## 2. Operations

Operations—including the operating plan, fleet size, travel times, and fares and fare collection—are described below for the Enhanced Bus Alternative.

### a. Operating Plan

The operating plan for the Enhanced Bus Alternative would consist of adding/modifying bus routes. Hours of operation and bus headways are shown in Table 2-10 for the new/modified bus routes under the Express Bus/BRT Alternative.

The current hours of operation and headways for BART service along the Daly City-Dublin/Pleasanton Line would not change. As described above, current BART service to the Dublin/Pleasanton Station is provided by the Daly City-Dublin/Pleasanton Line, which operates between the Daly City BART Station and the Dublin/Pleasanton Station. BART service to the Dublin/Pleasanton Station is provided as follows:

- Weekdays: 4:00 a.m. to 12:00 a.m., with trains every 15 minutes
- Saturdays: 6:00 a.m. to 12:00 a.m., with trains every 20 minutes
- Sundays/Holidays: 8:00 a.m. to 12:00 a.m., with trains every 20 minutes

As described above, BART intends to have 12-minute headways (instead of 15-minute headways) at some time after 2025.

### b. Employees

By 2040, the Enhanced Bus Alternative would result in a total of approximately 20 additional full-time-equivalent staff associated with the provision of bus services. No additional staff would be required for the BART service.

### c. Fleet Size

Approximately 6 to 10 additional buses would be needed to serve the Enhanced Bus Alternative. No additional BART vehicles would be required for the Daly City-Dublin/Pleasanton Line as a result of the Express Bus/BRT Alternative.

### d. Fares and Fare Collection

Fares and fare collection for the buses would be consistent with LAVTA's current fare policy and fare collection, as described above for the Proposed Project.

## G. CONSTRUCTION

This section describes the construction schedule and activities for the Proposed Project and Build Alternatives, as follows:

- Construction schedule
- Construction phases and activities
- Construction staging areas and haul routes
- Excavation, equipment, materials, and haul trips
- Project workforce
- Utilities relocation
- Coordination with Caltrans

Information specific to an alternative is provided for topics where the alternative differs from the Proposed Project.

### 1. Construction Schedule

Construction of the Proposed Project is anticipated to begin in 2021 and last approximately 5 years through 2026. Construction activities would occur in phases at various locations along the project corridor. During peak construction periods, work could be underway at several locations, resulting in overlapping construction of various project elements.[26] The construction phases and the approximate duration of construction associated with the phases are shown in Table 2-11, presented generally west to east. Construction durations are shown for each construction phase that is applicable to the Proposed Project or Build Alternatives. The anticipated order of construction activities is described below under Construction Phases and Activities.

[26] While the entire construction duration would occur over approximately 5 years and include start-up and testing, the majority of the construction activities resulting in emissions would occur over approximately 4 years (48 months) for the Proposed Project and DMU Alternative and over approximately 4.25 years (52 months) for the Express Bus/BRT Alternative. Construction of the Enhanced Bus Alternative, as well as bus infrastructure improvements under the Proposed Project and other Build Alternatives, is anticipated to occur over approximately 2 months.

**TABLE 2-11 CONSTRUCTION SEGMENTS AND DURATION**

| | Conventional BART Project | DMU Alternative | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|
| **Dublin/Pleasanton Station Area** | | | | |
| Relocate I-580 and surface roads | | 18 months | 18 months | |
| Construct DMU transfer platform (north of I-580) | | 30 months | | |
| Construct BART car storage (west of station) | | 18 months | | |
| Install replacement parking lot (south of I-580) | | | 9 months | |
| Relocate bus drop-off facility and Line G-2 canal (south of I-580) | | | 12 months | |
| Install bus transfer platforms (north and south of I-580) | | | 21 months | |
| Construct BART car storage (east of station) | | | 12 months | |
| **Between Dublin/Pleasanton Station and Isabel Station** | | | | |
| Relocate I-580 and surface roads | 24 months | 24 months | | |
| **Isabel Station Area to Storage and Maintenance Facility** | | | | |
| Relocate I-580 and surface roads | 18 months | 18 months | | |
| Construct Isabel Station | 30 months | 30 months | | |
| Construct Isabel Station – north station area improvements, and south station area improvements and parking facility | 18 months | 18 months | | |
| Install westbound I-580 BART underpass for tail tracks | 21 months | 21 months | | |
| Install tail tracks and construct storage and maintenance facility | 30 months | 30 months | | |
| **Other Areas or Project-wide** | | | | |
| Construct Laughlin parking lot | | | 6 months | |
| Install bus improvements | 2 months | 2 months | 2 months | 2 months |
| Install track and system equipment | 21 months | 21 months | | |
| Test and service start-up | 6 months | 6 months | | |
| **Total** | | | | |
| | 5 years | 5 years | 5 years | 2 months |

Notes:
Segments are listed from west to east along the project corridor and are not shown in chronological order.
Several segments of construction would occur concurrently; therefore, durations for each segment are not sequential.
The anticipated order of construction activities is described in the text.

Working hours would vary depending on the activities being performed. In general, construction activities would occur primarily during weekdays, typically between 7:00 a.m. and 7:00 p.m. However, many activities associated with relocation of I-580—including lane relocation, surface frontage road relocation, and the westbound I-580 BART underpass for the tail tracks—would occur at night (10:00 p.m. to 7:00 a.m.) to reduce impacts on traffic. Once the freeway lanes are relocated, work would be conducted during the day for the BART extension and station facilities. Weekend work could be required, although the extent of such work is not currently known.

## 2. Construction Phases and Activities

### a. Overview

Construction of the Proposed Project and Build Alternatives would entail various types of activities, as described below, and would occur in several overlapping or concurrent phases in segments along the project corridor. The construction segments are shown in Table 2-11.

For the Proposed Project, the first phase of construction would be the relocation of I-580 in the vicinity of Isabel Station to create adequate space in the median for the station and tail tracks. The remainder of the I-580 relocation from Isabel Avenue west toward Dublin/Pleasanton Station would then occur. Once the I-580 median is widened at the Isabel Station area, construction of the BART system facilities would commence, including the following: Isabel Station; the north station area improvements; the south station area improvements and parking facility; construction of the westbound I-580 underpass for the tail tracks; and construction of the tail tracks and storage and maintenance facility. The remainder of the BART system improvements along I-580, including the installation of the new mainline track connecting the Dublin/Pleasanton Station to the Isabel Station would be constructed. Along the entire project corridor, BART track and system equipment would be installed and tested.

Construction activities for the alternatives would be as follows:

- **DMU Alternative.** In addition to activities similar to those described above for the Proposed Project, activities would include construction of the DMU transfer platform at the Dublin/Pleasanton Station. Construction at the Dublin/Pleasanton Station area would likely begin simultaneously with construction at the Isabel Station area. To construct the transfer platform, I-580 and surface frontage roads would be relocated in the vicinity of the station. This would be followed by construction of the DMU transfer platform on the north side of I-580. Overall, construction would occur along the I-580 corridor from west of Dougherty Road to North Livermore Avenue, with I-580 modifications occurring from west of Dougherty Road to the Portola Avenue overcrossing.

- **Express Bus/BRT Alternative.** Unlike the Proposed Project, the relocation of I-580 would occur at the Dublin/Pleasanton Station area and would include construction of the bus transfer platforms at the station and ramps from I-580 express lanes to the bus platforms. West of the Iron Horse Regional Trail, a cantilever structure along the south side of I-580 would support the freeway above the Chabot canal/Line G-2, and a portion of Line G-2 canal would also be relocated, and a replacement parking lot or garage at the Dublin/Pleasanton Station and a new parking lot at Laughlin Road would also be constructed. Overall, construction would occur along the I-580 corridor from Dougherty Road/Hopyard Road to Tassajara Road/Santa Rita Road, and at Laughlin Road and Northfront Road.
- **Enhanced Bus Alternative.** Construction activities would consist only of bus infrastructure improvements in the public ROW, which would be similar to the bus improvements for the Proposed Project.

### b. Construction Activities

This subsection describes specific construction activities for the Proposed Project and Build Alternatives. Project initiation would be followed by several phases of construction and then testing and service start-up. Construction activities are described below for the Proposed Project, followed by a description of activities specific to the alternatives.

During project initiation, BART would undertake ROW acquisition and preconstruction activities such as developing a construction and staging plan; confirming staging and casting/precasting concrete preparation areas; creating temporary spoils storage; conducting workshops; and providing temporary storage for delivered construction materials. Contractors would mobilize equipment and materials at various locations along the alignment before construction begins, and would then proceed with site preparation, demolition, clearing, grubbing, and grading, and relocating and/or protecting utilities.

#### (1) Relocate I-580 and Surface Frontage Roads

To accommodate the new, approximately 46-foot-wide BART ROW in the I-580 median, the westbound and eastbound freeway lanes would be shifted to the north and south. As shown in Table 2-11, the construction activities described below are anticipated to take place over approximately 24 months from Hacienda Drive to the Isabel Interchange, and over an 18-month period from the Isabel Interchange to Portola Avenue.

To relocate the Caltrans ROW, some frontage roads (listed in Table 2-3 above) would be realigned and property access would be reconfigured. The relocated lanes would be constructed at the same grade as the existing freeway. Where the freeway is at grade, construction would possibly entail excavation to approximately 2 feet below grade. The area would then be backfilled with aggregate and paved. In cases where the freeway

crosses a bridge, the bridge would be extended north and south to accommodate the widening. Interchanges would be reconfigured, including on- and off-ramp modifications and installation of retaining walls where necessary.

In the area of the Isabel Station along the project corridor from Isabel Avenue to Portola Avenue, both westbound and eastbound freeway lanes, including on- and off-ramps, would be relocated outward to the north and south, respectively. In addition, East Airway Boulevard would be widened slightly to the south to accommodate the additional lanes needed for the south station area parking facility. The freeway bridge over Arroyo las Positas Creek would be widened.

For the relocation of I-580 along the remainder of the project corridor, from Isabel Avenue to Hacienda Drive, retaining walls and on- and off-ramps would be modified in both the eastbound and westbound directions of I-580 at Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue. The existing bridges over Tassajara Creek, Cottonwood Creek, and Collier Creek would be extended for the relocated I-580 lanes. Frontage roads would be relocated.

As described above for the Proposed Project and DMU Alternative, BART would build the foundations and columns for the anticipated future widening of the Isabel Avenue overcrossing, which is a separate project by the City of Livermore. As part of this work, two concrete columns, approximately 6 feet in diameter and 18 feet high, would be constructed within the I-580 median for the future Isabel Avenue widening. Driven or continuous flight auger piles would be extended to a depth of approximately 70 feet and a steel case foundation would be constructed.

### (2) Construct Isabel Station, North Station Area Improvements, and South Station Area Improvements and Parking Facility

Construction of the Isabel Station and parking facility would include installation of foundations and structural framing for the new station and parking structure, construction of new platforms, and connection of the structure to utilities on the site, followed by finishes and interior improvements. Construction of the Isabel Station is anticipated to require approximately 30 months and construction of the south station area parking facility is anticipated to require approximately 18 months.

As part of this work, improvements at the north station area would be constructed; these include the pedestrian touchdown structure, roadway access loop from Isabel Avenue, bus loading/unloading, taxi, kiss-and-ride, bicycle facilities, and Americans with Disabilities Act-compliant drop-off. South station area improvements would include the construction of the parking garage, surface parking lots and roadways, the pedestrian touchdown structure, bicycle facilities, and bus loading/unloading.

Construction of the Isabel Station and parking facility would involve the use of cast-in-place concrete and steel.[27] The platform and building would be constructed of standard building materials such as concrete, steel, aluminum, and heavy plastic.

The pedestrian overcrossings from the station to the touchdown structures north and south of I-580 would be constructed during this phase. Bridge construction for the pedestrian overcrossings would entail the installation of piles,[28] generally long steel or concrete poles that are driven into the ground. Cast-in-drilled-hole[29] piles, which do not require driving, could also be used. Bridges spanning roadways would have to be designed with sufficient clearance.

**(3) Install Westbound I-580 BART Underpass For Tail Tracks**

The BART underpass structure would connect the tail track east of the station to the storage and maintenance facility north of I-580. Construction of the underpass is anticipated to occur over approximately 21 months. The underpass is anticipated to be constructed in segments and could entail cut-and-cover construction techniques.

**(4) Install Tail Tracks and Construct Storage and Maintenance Facility**

Construction activities for the installation of the tail track from east of the Isabel Station to the storage and maintenance facility would include installation of the tail tracks, construction of bridges over Arroyo las Positas and Cayetano creeks, grading of the hillside for tail tracks, and installation of a hillside tunnel via cut and cover construction.

Construction of the storage and maintenance facility would include installation of storage tracks, and construction of the building itself; these activities are anticipated to occur over approximately 30 months.

A City of Livermore trail is planned along Arroyo las Positas Creek just west of the Portola Avenue overcrossing and would be constructed by the time of project implementation. The trail would need to be relocated to accommodate the proposed tail track alignment. The Proposed Project would relocate approximately 750 feet of the trail from the south side to the north side of Arroyo las Positas Creek, and relocate the bridge to the east of the Portola Avenue overcrossing.

[27] Cast-in-place concrete is transported in an unhardened state, commonly referred to as ready-mix cement. The concrete is then poured in wooden forms and allowed to cure on site.
[28] Piles are deep foundations typically used to support large structures.
[29] Involves digging a deep hole (shaft), placing the pile into the hole, and then filling the remainder with concrete.

### (5) Install Track and System Equipment

Along the project corridor, track and system equipment would be installed. The existing tail tracks east of the Dublin/Pleasanton Station would be removed; the old ballast and ties would be replaced; new mainline track would be installed; and the subgrade, drainage, duct banks, traffic barriers, and fence would be retained. For areas east of the existing tail tracks, where soil improvement would be required, the existing soil would be excavated to approximately 5 feet below grade. A subterranean drainage system and buried ductbank for electrical, communication, and train controls would be installed. Sub-ballast and ballast would be placed first, followed by precast concrete ties and rails.[30] Freeway barriers would be constructed using cast-in-place concrete to build 3-foot-high traffic barriers and top-mounted security fencing. Installation of track and system equipment is anticipated to occur over an approximately 21-month period.

### (6) Test and Service Start-up

The last phase of construction would entail testing and start-up of the BART extension; this phase would last approximately 6 months.

### (7) Install Bus Improvements

Bus infrastructure improvements would include installation of transit signal priority timing, bus shelters, improved seating at bus stops, digital messaging boards, and bus bulb-outs. Construction activities would primarily entail installation of the bus shelters, installation of new signal poles, and conversion of existing roadway to bus bulb-outs. Construction of foundations for bus shelters, signal poles, and curb and sidewalk modifications could require excavation up to approximately 2 feet below grade. Construction of bus bulbs would entail removal of existing asphalt, installation of new curbs and drainage, and replacement of the sidewalk. Construction of a bus bulb-out would typically occur over one week, and the bus system improvements would be installed over approximately 2 months.

### (8) Specific Construction Activities for Alternatives

Construction activities for the alternatives are described below and shown in Table 2-11.

[30]Ballast and sub-ballast refer to the crushed angular rocks that are packed below, between, and around rail ties. The use of ballast facilitates drainage and bearing the weight of the trains.

### (a) DMU Alternative

Construction activities would be similar to those described above for the Proposed Project; the differences from the Proposed Project are outlined below.

#### Relocate I-580 and Surface Frontage Roads

This phase of construction would be similar to that for the Proposed Project as described above. To accommodate the new BART storage tracks west of the Dublin/Pleasanton Station, the eastbound freeway lanes would be shifted to the south and Owens Court and Johnson Drive would be relocated to the south. To accommodate the new DMU transfer platform, the westbound freeway lanes would be shifted to the north at the Dublin/Pleasanton Station. The existing bridges over Line G-1-1 and Chabot Canal would be extended. Scarlett Court and Arnold Road, which are frontage roads, would be relocated to the north; then, the westbound lanes of I-580 would be relocated outward to the north. As shown in Table 2-11, the relocation of I-580 and surface frontage roads in the vicinity of the station from Dougherty Road/Hopyard Road to Hacienda Drive would take place over approximately 18 months.

#### Construct DMU Transfer Platform at the Dublin/Pleasanton Station

The DMU transfer platform would be constructed on the north side of the existing westbound BART platform. During construction of the transfer platform, the existing BART service at the station would operate with limited interruption. Cast-in-place concrete and steel would be used to construct the DMU transfer platform. The platform would be constructed of standard building materials such as concrete, steel, aluminum, and heavy plastic. As shown in Table 2-11, construction of the transfer platform is anticipated to take place over approximately 30 months.

#### Construct Dublin/Pleasanton Station BART Car Storage

This phase would construct 0.3 mile of BART car storage track west of the Dublin/Pleasanton Station. The tail track would be constructed at grade between the BART mainline tracks. Construction materials would include ballast, ties, and rails. Construction is expected to occur over approximately 18 months.

#### Install Tail Track and Construct Storage and Maintenance Facility

This phase of construction would be similar to the Proposed Project as described above. The construction of the facility would entail placing the structure foundation, framing, and finishing of the building, anticipated to require approximately 30 months. As noted above for the Proposed Project, ballast and sub-ballast would be installed prior to installation of

ties and rails. Ballast would be utilized instead of a concrete guideway, to facilitate drainage and reduce noise.

### EMU Option Facilities

This section describes the key construction differences between the DMU Alternative and the EMU Option (a variation of the DMU Alternative). Except as described below, construction of the EMU Option would be similar to the DMU Alternative.

Under the EMU Option, a third rail or overhead (catenary) system would be installed along the EMU alignment, from Dublin/Pleasanton Station to the proposed Isabel Station, and along the tail track to the storage and maintenance facility. In addition, wayside facilities, as described above, would be similar to those described for the Proposed Project's wayside facilities—near Croak Road, at Kitty Hawk Road and Isabel Avenue, at the proposed Isabel Station, and at the storage and maintenance facility.

## (b) Express Bus/BRT Alternative

Construction activities would entail the construction of the bus transfer platforms and replacement parking lot as described below. In addition, the existing tail tracks would be extended by approximately 0.1 mile, to the east of the station. This alternative would include construction of the Laughlin Parking Lot, as described below. Construction activities would be similar to the bus improvements described above for the Proposed Project.

### Relocate I-580 and Surface Frontage Roads

To expand the BART ROW in the center of the freeway for the construction of the bus transfer platforms, I-580 would be relocated to both the north and the south.

To relocate westbound I-580 on the north, Scarlett Court, Scarlett Drive, Altamirano Avenue, Campus Drive, and Arnold Road would be relocated and property access would have to be reconfigured. To relocate eastbound I-580 on the south, construction of a cantilever structure would be required to support the highway where it extends adjacent to Chabot Canal/Line G-2 and a portion of Line G-2 that extends adjacent to the Dublin/Pleasanton Station BART parking lot would be relocated to the south. The relocated freeway lanes would be constructed at the same grade as the existing freeway. The Hacienda interchange would be reconfigured, including on- and off-ramp modifications and installation of retaining walls. To accommodate the new BART tail tracks east of the Dublin/Pleasanton Station, the westbound freeway lanes would be shifted to the north. The existing bridges over Line G-1-1 and Tassajara Creek would be extended for the relocated I-580 lanes. As shown in Table 2-11, the construction activities

described below are anticipated to take place over approximately 18 months for the work from west of Dougherty Road/Hopyard Road to Tassajara Road/Santa Rita Road.

**Construct Bus Transfer Platforms and Other Improvements at the Dublin/Pleasanton Station**

Construction of the bus transfer platforms on the north and south sides of the existing Dublin/Pleasanton Station would involve cast-in-place concrete to construct slightly elevated platforms, as well as bus ramps leading from the express lanes to the platforms. The platforms would be constructed of standard building materials such as concrete, steel, aluminum, and heavy plastic. In addition, portions of the existing concourse wall (lower level) at the Dublin/Pleasanton Station would be removed and the concourse would be expanded. As shown in Table 2-11, construction of the platforms is anticipated to require approximately 21 months. During construction, the existing BART service at the station would operate with limited interruption.

The replacement parking lot or garage would be constructed south of I-580. The area would be graded and leveled to prepare the subbase for paving of the parking areas. The existing parking lot on the south side of the Dublin/Pleasanton Station would also be restriped to reflect a different parking layout. As shown in Table 2-11, the construction of a replacement parking lot would occur over approximately 9 months. In addition, the existing bus drop-off facility and Line G-2 canal at the Dublin/Pleasanton Station, south of I-580 and east of the Iron Horse Regional Trail, would be relocated to the south to accommodate the relocated I-580. As shown in Table 2-11, this would occur over approximately 12 months.

**Construct Dublin/Pleasanton Station BART Car Storage**

The existing tail track at the Dublin/Pleasanton Station would be extended approximately 0.1 mile to the east for BART car storage. Construction materials would include ballast, ties, and rails. Construction is estimated to occur over 12 months.

**Construct Laughlin Parking Lot**

The Laughlin parking lot area would be graded and leveled to prepare the subbase for the paving of the parking areas. Once paved, the parking stalls would be striped and the bus shelter and lighting would be installed. As shown in Table 2-11, the construction of the parking lot would occur over approximately 6 months.

**(c) Enhanced Bus Alternative**

Construction activities would be similar to those described above for the Proposed Project under Install Bus Improvements.

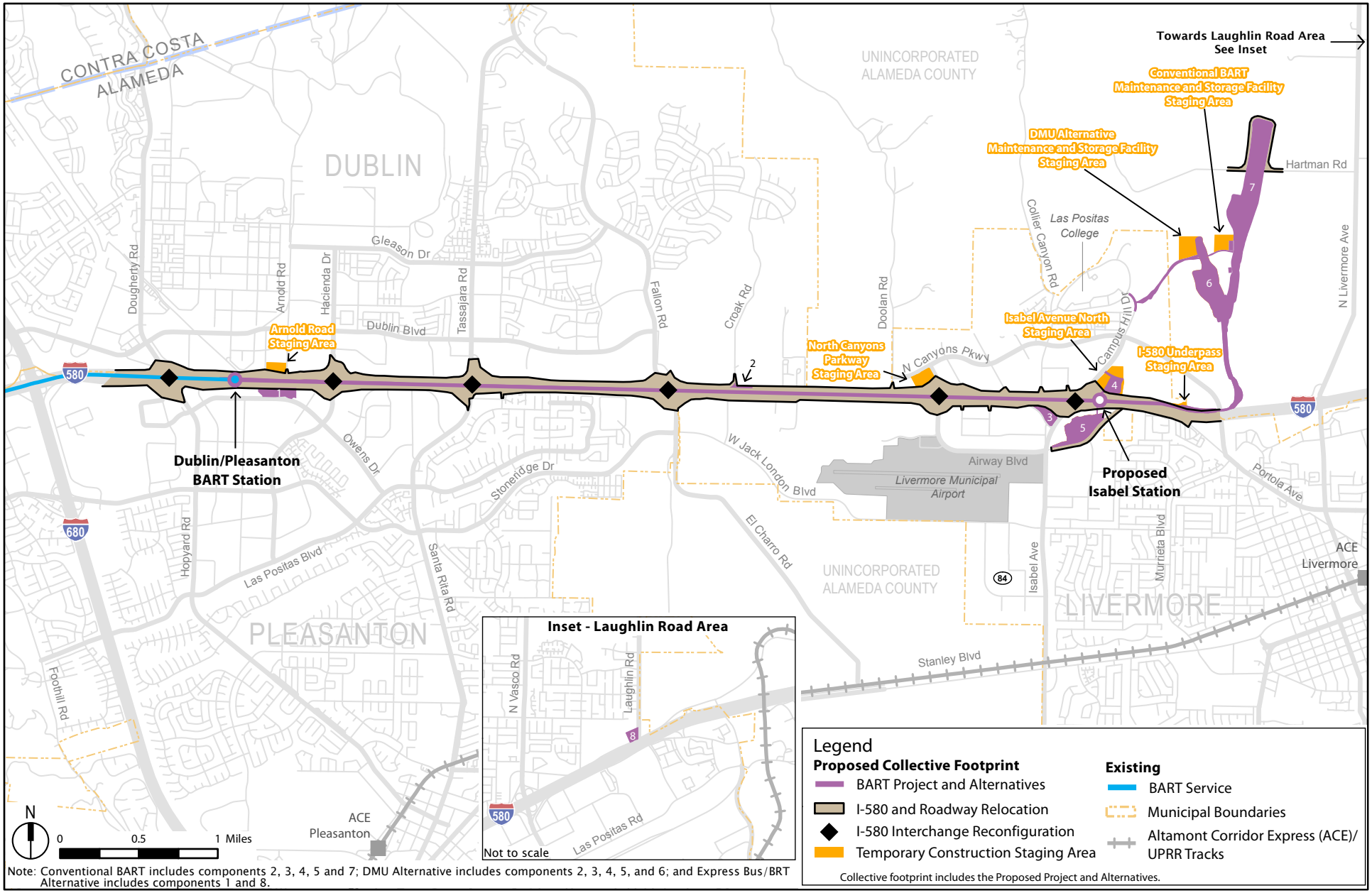
## 3. Staging Areas and Haul Routes

Construction staging areas would be used for material lay-down, off-site construction activities, storage of construction equipment, temporary offices, and storage of other construction-related materials such as fuel. Several temporary staging areas that might be used during project construction have been identified for the Proposed Project and Build Alternatives, as shown in Figure 2-25. These temporary staging areas are on undeveloped land in close proximity to the project corridor; they would be used in addition to the areas within the permanent project footprint where construction and staging would also occur.

Construction staging areas within the permanent project footprint include the following: (1) the area north of I-580 at Isabel Avenue (north station area); (2) the southwest quadrant of Kitty Hawk Road and Isabel Avenue; (3) the area south of I-580 at Isabel Avenue (south station area); and (4) the storage and maintenance facility area east of Campus Hill Drive. These areas would be used for staging, in addition to the temporary staging areas identified in Figure 2-25. The construction contractor would make the final determination about which staging areas to use, prior to commencement of construction activities.

Temporary staging areas from west to east along the project corridor and potential access to the routes from I-580 are listed below for the Proposed Project:

- Arnold Road Staging Area – North of I-580 and south of Martinelli Way, between Campus Drive and Arnold Road. This staging area is at the western end of the project corridor, northeast of the Dublin/Pleasanton Station. Access from I-580 to this staging area would be from the Hacienda Drive interchange. This staging area could be used under the DMU and Express Bus/BRT alternatives as well.
- North Canyons Parkway Staging Area – North of I-580 and south of North Canyons Parkway, between Airway Boulevard and Doolan Road. Access from I-580 to this staging area would be from the Airway Boulevard or Isabel Avenue interchanges. This staging area would be used under the DMU Alternative as well.
- Isabel Avenue North Staging Area – North of I-580 and east of Isabel Avenue. This staging area would be within the INP area and would serve as a staging area prior to development of the INP. Access from I-580 to this staging area would be principally from the Isabel Avenue interchange. This staging area would be used under the DMU Alternative as well.
- Westbound I-580 Underpass Staging Area – North of I-580 where the proposed BART underpass would re-emerge above ground. This staging area would be used under the DMU Alternative as well.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b.

**BART to Livermore Extension Project EIR**

Figure 2-25
Proposed Project and Build Alternatives
Construction Staging Areas

- Storage and Maintenance Facility Staging Area – North of I-580 and northeast of Campus Hill Drive. Two staging areas are identified, one for the Proposed Project and one for the DMU Alternative, to support the construction of the storage and maintenance facility. Access from I-580 would be from Isabel Avenue to Campus Hill Drive.

Construction haul routes would run along I-580 with regional access from I-880 and I-680 to the west and I-5 and I-205 to the east of the project corridor. Isabel Avenue (State Route 84) would provide access to the south of the project corridor. Construction vehicles would generally travel from I-580 on existing surface roads to and from the staging areas to access nearby portions of the project corridor. In addition, North Vasco Road provides access to the Republic Services Vasco Road Landfill.

To reduce traffic-related construction impacts along I-580 and other roadways, major material deliveries and heavy equipment use would be coordinated with Caltrans and the local jurisdictions. The contractor would develop a traffic mitigation plan to address lane closures for construction activities, deliveries, and equipment access. Vehicle and pedestrian movement could be temporarily delayed during construction at various locations along the project corridor. Lane closures would be expected along portions of the surface roads where roadway relocation would occur. Other detours/delays could be expected along segments of I-580, as well as along the cross streets where aerial structures would be constructed.

While haul routes have not been designated, roadways that reduce residential impacts would be used to the fullest extent feasible. These operations are subject to the traffic safety requirements of Caltrans, Alameda County, and the Cities of Dublin, Pleasanton, and Livermore.

## 4. Equipment, Materials, Excavation, and Haul Trips

Typical equipment for construction of the Proposed Project and Build Alternatives would include excavators, dozers, compactors (including vibratory compactors), loaders, dump trucks, scrapers, graders, pavers, pile drivers, forklifts, and cranes. Other equipment would include drilling rigs; concrete ready-mix trucks; lubrication/fueling service trucks; concrete pumps; specialized truck trailers to deliver precast concrete beams; trucks to deliver forms and reinforcing steel; pavement saws; precast concrete post tensioning jacks; and diesel-driven generators and compressed air units for construction power,

equipment, and tools. Specialized equipment for the BART underpass construction could include water jet excavators and large excavators.[31]

Table 2-12 shows the approximate depth of excavation anticipated for construction of the Proposed Project and Build Alternatives. Generally grading and excavation along the I-580 corridor would extend up to 4 feet below ground surface (bgs). Construction activities at the Dublin/Pleasanton Station, the proposed Isabel Station, and along the tail track (including the westbound I-580 underpass and hillside tunnel) would entail greater amounts of excavation, as shown in Table 2-12, based on types of structure and existing slope at the sites. Furthermore, where piles are needed for structural support, they could be installed up to 60 feet bgs, depending on the final engineering.

The amount of excavation, materials and soils imported and exported for construction, and related truckloads are shown in Tables 2-13 to 2-15. The amount of excavation, soil and demolition export, and on-hauling of soil and construction materials would be greatest for the DMU Alternative, as this alternative would have the greatest amount of construction activity associated with the longer project corridor along I-580. The DMU Alternative includes relocation of I-580 from west of Dougherty Road to the Portola Avenue/I-580 interchange, whereas the Proposed Project includes relocation of I-580 from Hacienda Drive to the Portola Avenue/I-580 interchange, and the Express Bus/BRT Alternative includes relocation of I-580 for a shorter stretch of I-580, from west of Dougherty Road to Tassajara Road/Santa Rita Road.

Overall, construction of the Proposed Project would require approximately 262 truck trips per work day over the construction period.[32] These trips would be dispersed along the project corridor, consistent with project phasing. For the other Build Alternatives, truck trips per work day are anticipated to be as follows: 305 truck trips for the DMU Alternative; and 62 truck trips for the Express Bus/BRT Alternative. The Enhanced Bus Alternative would require a very limited number of truck trips compared to the Express Bus/BRT Alternative, as the amount of construction would be substantially less.

[31] Water jet is a method of excavation that uses a stream of high-pressure water to remove soil rather than standard mechanical chippers.

[32] Delivery of each truckload would require a return truck trip; therefore, the truck trip count is double the number of truckloads.

**TABLE 2-12 APPROXIMATE DEPTHS OF EXCAVATION FOR CONSTRUCTION OF THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Below Ground Surface (feet) | | | |
|---|---|---|---|---|
| **Area/Component** | **Conventional BART Project** | **DMU Alternative** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| **Dublin/Pleasanton Station Area** | | | | |
| Transfer platform | -- | 25* | 25* | -- |
| Other areas | 4 | 4* | 4* | 2 |
| **I-580 Corridor Area** | | | | |
| Underpass under westbound I-580 | 25* | 25* | -- | -- |
| Isabel Station | 10* | 10* | -- | -- |
| Other areas | 4* | 4* | 4 | 2 |
| **Isabel North and Isabel South Areas** | | | | |
| All areas | 4* | 4* | -- | -- |
| **Cayetano Creek Area** | | | | |
| Majority of tail tracks | 4* | 4* | -- | -- |
| Tail tracks (area of slope cut) | up to 23 | up to 23 | -- | -- |
| Tail tracks (hillside tunnel) | up to 70 | up to 70 | -- | -- |
| Storage and Maintenance Facility | up to 28 | up to 30 | -- | -- |
| **Laughlin Road Area** | | | | |
| | -- | -- | 4 | -- |

Notes:
-- = Not applicable.
* Areas where piles may be installed for structures up to 60 feet bgs.

**TABLE 2-13 CONSTRUCTION QUANTITIES AND TRUCKLOADS FOR CONVENTIONAL BART PROJECT**

| | I-580 Project Corridor (Hacienda Drive to Isabel Avenue/I-580 Interchange) | Isabel North and South Area (including Station and Parking) | Tail Tracks and Storage and Maintenance Facility |
|---|---|---|---|
| Total Excavation of Soil (cubic yards) | 326,442 | 69,024 | 1,135,307 |
| **Export Materials** | | | |
| Export Soil (cubic yards) | 21,689 | 27,678 | 115,954 |
| Export Demolished Material (cubic yards) | 75,719 | 12,089 | 18,757 |
| **Import Materials** | | | |
| Import Soil (cubic yards) | 151,966 | 75,204 | 12,561 |
| Import Concrete, Paving Material, Ballast (cubic yards) | 274,495 | 52,525 | 110,200 |
| Import Steel, Rail, Ties, Rebar (tons) | 10,203 | 2,660 | 8,217 |
| **Truckloads** | | | |
| Off-Haul | 17,626 | 6,443 | 16,669 |
| On-Haul | 47,791 | 16,074 | 11,977 |
| **Total Truckloads** | **65,416** | **22,516** | **28,645** |

Notes: Assumed capacities for dump trucks are 10 cubic yards for soil and 8.5 cubic yards for construction materials. Capacities for other truck types are not noted here. Truckloads are one-way trips; delivery of each truckload would require a return truck trip. Therefore, the truck trip count is double the number of truckloads.

TABLE 2-14 CONSTRUCTION QUANTITIES AND TRUCKLOADS FOR DMU ALTERNATIVE

| | Dublin/Pleasanton Station (West of Dougherty Road to Hacienda Drive) | I-580 Project Corridor (Hacienda Drive to Isabel Avenue/I-580 Interchange) | Isabel North and South Area (including Station and Parking) | Tail Tracks and Storage and Maintenance Facility |
|---|---|---|---|---|
| Total Excavation of Soil (cubic yards) | 20,495 | 446,970 | 32,846 | 277,883 |
| **Export Materials** | | | | |
| Export Soil (cubic yards) | - | 53,226 | - | 137,452 |
| Export Demolished Material (cubic yards) | - | 88,196 | 12,089 | 16,292 |
| **Import Materials** | | | | |
| Import Soil (cubic yards) | 8,993 | 177,010 | 113,724 | 12,561 |
| Import Concrete, Paving Material, Ballast (cubic yards) | 7,541 | 322,913 | 54,092 | 92,647 |
| Import Steel, Rail, Ties, Rebar (tons) | 1,111 | 10,222 | 2,821 | 6,859 |
| **Truckloads** | | | | |
| Off-Haul | 194 | 23,808 | 3,818 | 18,648 |
| On-Haul | 1,742 | 57,209 | 20,129 | 11,200 |
| **Total Truckloads** | **1,935** | **81,016** | **23,946** | **29,848** |

Notes: Assumed capacities for dump trucks are 10 cubic yards for soil and 8.5 cubic yards for construction materials. Capacities for other truck types are not noted here. Truckloads are one-way trips; delivery of each truckload would require a return truck trip. Therefore, the truck trip count is double the number of truckloads. Construction quantities and truckloads are the same for the EMU Option.

**TABLE 2-15 CONSTRUCTION QUANTITIES AND TRUCKLOADS FOR EXPRESS BUS/BRT ALTERNATIVE**

| | Dublin/Pleasanton Station (West of Dougherty Road to Hacienda Drive) | I-580 Project Corridor (Hacienda Drive to Tassajara Road/Santa Rita Road | Laughlin Parking Lot |
|---|---|---|---|
| Total Excavation of Soil (cubic yards) | 84,056 | 71,939 | - |
| **Export Materials** | | | |
| Export Soil (cubic yards) | - | 55,897 | - |
| Export Demolished Material (cubic yards) | 6,542 | 12,477 | 1,780 |
| **Import Materials** | | | |
| Import Soil (cubic yards) | 53,624 | 6,037 | - |
| Import Concrete, Paving Material, Ballast (cubic yards) | 49,517 | 48,228 | 5,335 |
| Import Steel, Rail, Ties, Rebar (tons) | 1,853 | 492 | - |
| **Truckloads** | | | |
| Off-Haul | 2,169 | 8,604 | 315 |
| On-Haul | 11,807 | 6,844 | 734 |
| **Total Truckloads** | **13,975** | **15,448** | **1,049** |

Notes: Assumed capacities for dump trucks are 10 cubic yards for soil and 8.5 cubic yards for construction materials. Capacities for other truck types are not noted here. Truckloads are one-way trips; delivery of each truckload would require a return truck trip. Therefore, the truck trip count is double the number of truckloads.

## 5. Project Workforce

The construction workforce for the Proposed Project is expected to consist of several hundred workers per day, depending on the construction phase, and would vary by location along the alignment. Worker shifts would be 8 hours on average. Staff parking would be located at common staging areas for the duration of construction. Additionally, construction staff parking would be located in staging and spoils areas at the sites.

The construction workforce for the DMU Alternative would be similar to the workforce for the Proposed Project. The Express Bus/BRT Alternative and the Enhanced Bus Alternative would have fewer workers per day than the Proposed Project.

## 6. Utilities Relocation

Utilities located in the project footprint would be relocated prior to construction of the Proposed Project, as needed. Temporary utilities for electricity and water would be provided to the staging areas during the construction phases. New utility infrastructure—including water, power, communication, and sewer utilities—would be required for the Isabel Station and north and south station area improvements, including the pedestrian touchdown structure, south station area parking facility, wayside facilities, and storage and maintenance facility. See Section 3.P, Utilities, of this EIR for additional information.

## 7. Coordination with Caltrans and Local Cities

I-580 is a Caltrans facility and the ROW is owned by Caltrans. Therefore, coordination with Caltrans would be essential throughout the design and construction of the Proposed Project. Throughout construction, primary access to the median work areas and median station sites would be through interior I-580 eastbound and westbound traffic lanes. Temporary openings would be made in the existing concrete barriers to allow for vehicle and equipment access. These openings, wherever necessary, would be subject to direct authorization from Caltrans for configuration and traffic safety. In work areas that do not have existing barriers, construction areas would be separated from the vehicular traffic by (K-rail) barriers. Vehicle and pedestrian movement on overpasses (for example, Isabel Avenue) could be delayed during certain construction activities. These construction operations would be subject to the traffic safety requirements of Caltrans.

In addition, BART and its construction contractors would coordinate with the Cities of Dublin, Pleasanton, and Livermore, and with Alameda County, on activities related to construction in their jurisdictions, including for possible encroachment permits for construction within city-owned ROWs. Table 1-1 in Chapter 1, Introduction, shows a list of cities and other agencies with which BART would coordinate regarding the Proposed Project and/or Build Alternatives.

## H. SUSTAINABILITY

The Proposed Project and Build Alternatives represent an opportunity to implement sustainable design innovations related to energy conservation, alternative energy systems, stormwater management, and judicious material selection that were not available when the original BART system was constructed. The facilities would incorporate a number of sustainable elements into the project design, and a variety of other sustainable practices are being considered. During the final design of the Proposed Project or an Alternative, the particular sustainable designs and practices would be determined.

The following design features would be included:

- 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.
- Photovoltaics to generate electricity and reduce reliance on the power grid. As described for the Proposed Project and DMU Alternative above, solar panels with a photovoltaic capacity of approximately 1,000 kW would be installed on the Isabel Station parking structure.
- Energy efficient systems such as solar hot water, more efficient HVAC (heating, ventilation, and air conditioning), and elevators/escalators, where feasible.
- Xeriscaping and other drought-tolerant landscaping.
- Use of recycled water in landscaping, as available.
- Swales to treat runoff from parking lots and other hardscape areas.
- Waste management and recycling.
- Use of recycled materials where feasible.
- Other sustainable technologies or practices that become feasible or required at the time the system is in final design.

Other sustainable features could include:

- Electric car charging ports
- Lighter color aggregate or cool pavement technologies for parking lots and other paved surfaces to reduce the heat island effect
- Signage and other educational tools about sustainable methods

- Vehicle-to-grid system charging[33]

## I. PROJECTED RIDERSHIP

The BLVX Travel Demand Model, a version of the Alameda County Transportation Commission travel demand model customized for the BART to Livermore Extension Project, was used to forecast station-to-station origin-destination ridership for all of the project alternatives under each analyzed scenario.[34]

Estimated ridership for the entire BART system is presented in Table 2-16 and estimated ridership at the Tri-Valley Area BART stations—existing West Dublin/Pleasanton and Dublin/Pleasanton stations and proposed Isabel Station—is presented in Table 2-17.

**TABLE 2-16 EXISTING AND FUTURE BART SYSTEMWIDE DAILY RIDERSHIP (WEEKDAY)**

| | Total Ridership (Change from No Project) | | | | |
|---|---|---|---|---|---|
| Year | No Project Alternative | Conventional BART Project | DMU Alternative | Express Bus/BRT Alternative | Enhanced Bus Alternative |
| Existing Ridership (2013) | 400,400 | -- | -- | -- | -- |
| Projected Ridership 2025 | 472,200 | 478,800 (+6,600) | 477,200 (+5,000) | 473,900 (+1,700) | 472,200 (0) |
| Projected Ridership 2040 | 657,300 | 669,200 (+11,900) | 664,300 (+7,000) | 669,800 (+3,500) | 657,700 (+400) |

Notes:
-- = Not applicable.
Ridership refers to the number of linked trips on the BART system; a theoretical passenger boarding the Dublin/Pleasanton-Daly City Line at the Dublin/Pleasanton Station and transferring at the Coliseum BART Station to the Richmond-Fremont Line would count as one trip. Net change in ridership compared to the No Project Conditions is shown in parentheses (positive values indicate an increase in ridership).
Source: Cambridge Systematics, 2017.

[33] Vehicle-to-grid system charging is a system in which plug-in electric vehicles communicate with the power grid to return electricity to the grid.

[34] Cambridge Systematics, 2017. BART to Livermore Ridership Projections (Draft). July.

**TABLE 2-17 EXISTING AND FUTURE TRI-VALLEY AREA DAILY BOARDINGS (WEEKDAY)**

| | Total Boardings by Station (Change from No Project) | | | |
|---|---|---|---|---|
| | West Dublin/ Pleasanton | Dublin/ Pleasanton | Proposed Isabel Station | Total Tri-Valley |
| **Existing (2013)** | | | | |
| | 3,000 | 7,300 | N/A | 10,300 |
| **Projected Boardings 2025** | | | | |
| No Project Alternative | 3,100 | 8,300 | -- | 11,400 |
| Conventional BART Project | 3,100 | 7,200 | 4,700 | 15,000 (+3,600) |
| DMU Alternative | 3,100 | 7,900 | 3,100 | 14,100 (+2,700) |
| Express Bus/ BRT Alternative | 3,100 | 9,300 | -- | 12,400 (+1,000) |
| Enhanced Bus Alternative | 3,100 | 8,300 | -- | 11,400 (0) |
| **Projected Boardings 2040** | | | | |
| No Project Alternative | 3,400 | 10,800 | -- | 14,200 |
| Conventional BART Project | 3,600 | 9,000 | 8,100 | 20,700 (+6,500) |
| DMU Alternative | 3,500 | 9,800 | 4,800 | 18,100 (+3,900) |
| Express Bus/BRT Alternative | 3,400 | 12,700 | -- | 16,100 (+1,900) |
| Enhanced Bus Alternative | 3,500 | 10,900 | -- | 14,400 (+200) |

Notes:
-- = Not applicable.
Net change in ridership compared to the No Project Conditions is shown in parentheses (positive values indicate an increase in ridership).
Sources: Cambridge Systematics, 2017.

Ridership as reported in this table represents the number of trips taken on the BART system itself. For the Proposed Project, a rider boarding at the new Isabel Station and getting off at the Embarcadero Station represents one trip. For the DMU Alternative, a rider boarding at the Isabel Station, taking the DMU to the Dublin/Pleasanton Station, boarding BART and getting off at the Embarcadero Station represents one trip. In addition, for purposes of this ridership table, a rider taking the DMU for one stop, from the Isabel Station to the Dublin/Pleasanton Station, also counts as one trip on the BART

system. For the Express Bus/BRT Alternative and Enhanced Bus Alternative, a rider taking the bus to the Dublin/Pleasanton Station, boarding BART and getting off at the Embarcadero Station represents one trip. For the DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative, BART ridership would increase from the riders connecting to BART via those alternatives.

Overall, systemwide ridership is expected to grow approximately 18 percent from 2013 to 2025, and then to accelerate to nearly 40 percent from 2025 to 2040, a trend that reflects land use growth expectations. The Proposed Project would result in the highest systemwide ridership in both 2025 and 2040. In 2040, the Proposed Project would generate 11,900 more BART trips than would occur without the project. The alternatives would add fewer net new trips in 2040 to the BART system than the Proposed Project, as follows: (1) the DMU Alternative would add 7,000 new BART trips; (2) the Express Bus/BRT Alternative would add 3,500 new trips; and (3) the Enhanced Bus Alternative would add 400 new trips. Ridership comparisons of different alternatives for 2025 yield similar trends to those for 2040.

The Proposed Project would also result in the greatest increase in the number of new boardings in the Tri-Valley BART stations in 2025 and 2040. In 2040, the Proposed Project would result in 6,500 new boardings. New boardings for the alternatives would be as follows: (1) DMU Alternative – 3,900 new boardings; (2) Express Bus/BRT Alternative – 1,900 new boardings; and (3) Enhanced Bus Alternative – 200 new boardings. A more detailed description of ridership for the Proposed Project and Build Alternatives is provided in Section 3.B, Transportation, of this Draft EIR.

## J. COSTS AND FUNDING

The estimated costs for construction, operation, and maintenance of the Proposed Project and Build Alternatives are summarized below, followed by a discussion of known funds and funding sources. Cost estimates are based on the preliminary engineering completed for the Proposed Project and Build Alternatives.

### 1. Capital Costs

The total estimated capital costs for the Proposed Project and Build Alternatives are presented in Table 2-18. The Proposed Project's capital cost is approximately $1,635 million (cost escalated to the mid-point of construction); the DMU Alternative's capital cost is approximately $1,599 million; the EMU Option's capital cost is approximately $1,665 million; the Express Bus/BRT Alternative's capital cost is approximately $376 million; and the Enhanced Bus Alternative's capital cost is approximately $25 million.

**TABLE 2-18 ESTIMATED CAPITAL COSTS FOR THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Dollars ($ Millions) | | | | |
|---|---|---|---|---|---|
| | **Conventional BART Project** | **DMU Alternative** | **EMU Option** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| Guide-Way and Track Elements | $38 | $39 | $44 | $0.7 | -- |
| Stations and Parking | $153 | $148 | $148 | $26 | $6 |
| Support Facilities (includes tail tracks and storage and maintenance facility) | $112 | $107 | $108 | -- | -- |
| Site Work (includes relocating I-580 and frontage roads, relocating utilities, and environmental mitigations) | $89 | $99 | $99 | $32 | $0.5 |
| Systems (includes communications, traction power, wayside facilities, and train control) | $95 | $60 | $87 | $14 | $1 |
| **Subtotal – Construction Cost (2016$)** | **$487** | **$454** | **$485** | **$72** | **$8** |
| ROW Acquisition | $101 | $130 | $130 | $40 | -- |
| Purchase of Vehicles | $191 | $176 | $176 | $70 | $5 |
| Professional Services (includes design and engineering and project and construction management) | $248 | $240 | $249 | $57 | $4 |
| Contingency | $181 | $181 | $190 | $38 | $3 |
| Program Reserve | $121 | $118 | $123 | $28 | $2 |
| **Total Cost (2016$)** | **$1,329** | **$1,300** | **$1,353** | **$305** | **$21** |
| **Total Cost (escalated to construction mid-point)** | **$1,635** | **$1,599** | **$1,665** | **$376** | **$25** |

Notes:
Estimates are based on primary engineering. Costs are based on 2016 dollars. Numbers are rounded to the nearest million and the sum of the values may not exactly match the totals. Total project cost is escalated to the estimated mid-point of construction (2024).
Sources: Arup, 2017c; BART, 2017a.

The capital costs for the Proposed Project and Build Alternatives differ primarily based on the length of the rail alignment to be constructed and the length of the I-580 corridor that would require modifications to accommodate the Proposed Project and Build Alternatives. Specifically, the DMU Alternative would have the longest work zone along I-580, followed

by the Proposed Project, with a substantially shorter work zone under the Express Bus/BRT Alternative, and no work along I-580 under the Enhanced Bus Alternative. In addition, the size of the storage and maintenance facility affects the cost of construction; e.g., the Proposed Project has a substantially larger facility than the DMU Alternative. The EMU Option has increased costs compared to the DMU Alternative due to the additional infrastructure needed for electrification, i.e., the catenary system and wayside facilities.

The capital cost for the Proposed Project includes 25 percent of the cost to include a BART storage and maintenance facility. A BART storage and maintenance facility is needed to service the overall future needs of the Daly City-Dublin/Pleasanton Line.

## 2. Operating and Maintenance Costs

The total estimated annual operating costs for the Proposed Project and Build Alternatives in 2025 and 2040 are presented in Table 2-19. Operating and maintenance costs in 2025 and 2040 are as follows for the Proposed Project and Build Alternatives:

- **Conventional BART Project**. Approximately $19.0 million in 2025 and $22.8 million in 2040
- **DMU Alternative**. Approximately $14.5 million in 2025 and $16.8 million in 2040
- **EMU Option**. Approximately $14.3 million in 2025 and $16.6 million in 2040
- **Express Bus/BRT Alternative**. Approximately $2.1 million in 2025 and $3.0 million in 2040
- **Enhanced Bus Alternative**. Approximately $1.7 million in both 2025 and 2040

Operating and maintenance costs are higher for the Proposed Project and Build Alternatives in 2040 than in 2025 due to the higher level of service to accommodate increased ridership and the higher cost of providing service.

Similar to the capital cost, the operating cost for the Proposed Project includes a 25 percent allocation of the cost to operate a BART maintenance facility.

## 3. Funding

As of 2016, approximately $533 million in funding has been committed to the design and construction of the BART to Livermore Extension Project. Committed project funding is provided by a combination of revenues from local impact fees, Alameda County use tax, and State and regional funds.

These sources would provide funds for the adopted project's capital costs. The largest source of secured funding comes from the Alameda County Transportation Commission Measure BB, which provides approximately $398 million to the Proposed Project or Alternatives, as reflected in the 2014 Alameda County Transportation Expenditure Plan.

**TABLE 2-19 OPERATING AND MAINTENANCE COSTS FOR THE PROPOSED PROJECT AND BUILD ALTERNATIVES**

| | Dollars ($ Millions) | | | | |
|---|---|---|---|---|---|
| | Conventional BART Project | DMU Alternative | EMU Option | Express Bus/BRT Alternative | Enhanced Bus Alternative |
| **2025** | | | | | |
| Rail (BART and DMU or EMU) | 17.4 | 12.9 | 12.8 | 0.5 | 0 |
| Bus | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 |
| **Total Operation and Maintenance Cost (2016$)** | **19.0** | **14.5** | **14.4** | **2.1** | **1.7** |
| **2040** | | | | | |
| Rail (BART and DMU or EMU) | 21.1 | 15.2 | 15.0 | 1.4 | 0 |
| Bus | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 |
| **Total Operation and Maintenance Cost (2016$)** | **22.8** | **16.8** | **16.6** | **3.0** | **1.7** |

Notes: Costs are based on 2016 dollars. Numbers are rounded to the nearest million and the sum of the values may not exactly match the totals.
Source: Arup, 2017d; BART, 2017b.

The funding sources and amounts are identified below.

- **Alameda County Transportation Commission Measure BB ($398 million).** On November 4, 2014, Alameda County voters approved an extension of an existing 0.5 percent transactions and use tax through March 31, 2045, and an increase to the transactions and use tax by 0.5 percent, resulting in a total tax of 1 percent, and authorization for the ACTC to issue limited tax bonds. Measure BB funds the 2014 Transportation Expenditure Plan, which includes funding for a BART extension to Isabel Avenue using the most efficient transit technology.
- **Metropolitan Transportation Commission Assembly Bill 1171 ($80 million).** Assembly Bill 1171 was adopted by the State legislature in 2001 to fund the cost of the seismic retrofit of Bay Area toll bridges and imposed an indefinite extension of the current $1 surcharge on State-owned toll bridges in the Bay Area. Approximately $80 million of these bridge tolls have been set aside for funding the design and construction of the Proposed Project and Build Alternatives.
- **Livermore Traffic Impact Fee Program ($40 million).** As a result of increasing regional growth, significant residential, commercial, and industrial development within the city of Livermore, the Livermore City Council adopted a traffic impact fee for development in 1988. The impact fee is intended to help reduce adverse traffic-related

impacts associated with the increasing growth in the area. The City of Livermore has programmed $40 million of projected program funding to the capital costs of the Proposed Project only. Without further analysis, funding from this source could not be used on any of the Build Alternatives. Funding from this program can only be expended on project elements within the city of Livermore.

- **Metropolitan Transportation Commission Regional Measure 1 ($15 million).** In 1988, Regional Measure 1 established a uniform $1 base toll on the Bay Area's seven State-owned toll bridges. Approximately $15 million of these bridge tolls have been set aside for funding of the Proposed Project and Build Alternatives.

The remaining funding required for the Proposed Project and Build Alternatives has yet to be determined.

## K. ALTERNATIVES CONSIDERED BUT WITHDRAWN

Alternatives that are considered but withdrawn are required to be analyzed per CEQA Guidelines Section 15126.6(c), 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 rejected as infeasible during the scoping process, and then briefly explain the reasons underlying the lead agency's determination. Additional information explaining the choice of alternatives may be included in the administrative record. Factors that may be used to eliminate alternatives from detailed consideration in an EIR include (1) failure to meet most of the project objectives; (2) infeasibility; and (3) inability to avoid significant environmental impacts.

This subsection does not list the alternative alignments that were considered in the PEIR, but rather focuses on the variants to the Proposed Project and two of the project-specific Build Alternatives (the DMU Alternative and Express Bus/BRT Alternative) that were considered but rejected, and describes the reasons why they were withdrawn from consideration.

### 1. Variants to the Conventional BART Project

As described below and listed in Table 2-20, variants to the Proposed Project include one or more of the following elements: (1) different vertical alignments for the BART tracks, such as elevated (aerial) tracks or underground tracks instead of the proposed at-grade tracks; (2) different horizontal alignments for the BART tracks, such as locations north of I-580 or south of I-580 instead of in the I-580 median; (3) different locations for the storage and maintenance yard; (4) increased parking supply at the proposed Isabel Station; (5) elevated bus connections at the proposed Isabel Station instead of via the north Isabel Station bus transfer facility; and (6) an aerial structure over I-580 instead of

an underpass for the tail track connection to the storage and maintenance yard. The cost of these variants relative to the Proposed Project is provided, where available.[35]

**TABLE 2-20 VARIANTS TO THE CONVENTIONAL BART PROJECT – CONSIDERED BUT WITHDRAWN**

| Variant | Location of Variant[a] | Reasons for Rejection |
|---|---|---|
| Elevated BART Tracks | Entire alignment | ▪ Greater visual impacts<br>▪ Increased cost<br>▪ Reduced opportunity for TOD (north of I-580 variant)<br>▪ Possible conflict with Federal Aviation Administration requirements (south of I-580 variant) |
| Underground BART Tracks | Entire alignment | ▪ Increased cost<br>▪ Similar or increased ROW impacts (cut and cover tunnel) |
| At-Grade Tracks, North of I-580 from Tassajara Road to Isabel Station | North of I-580 from Tassajara Road to Isabel Station | ▪ ROW impacts would be disproportionately concentrated north of I-580<br>▪ Station would occupy land planned for development |
| Storage and Maintenance Facility Locations | Various locations along the alignment | ▪ Operational performance deficiencies (Location 1)<br>▪ Conflicts with local zoning (Location 1)<br>▪ Increased cost (Location 3)<br>▪ Significant visual impacts (Location 3) |
| Larger Parking Facility | Isabel Station | ▪ Increased visual impacts<br>▪ Conflict with Station Access Policy<br>▪ Unnecessary to meet projected demand<br>▪ Increased cost |
| Elevated Bus Connections | Isabel Station | ▪ Increased costs<br>▪ Minimal increase in ridership |
| Aerial Tail Track Structure over I-580 | West of the Portola Avenue overcrossing | ▪ Increased visual impacts |

Note:
[a] Location of Variant = along entire alignment (Dublin/Pleasanton Station to proposed Isabel Station) or portion of the alignment.
Sources: Arup, 2013; Arup, 2014: Arup, 2015b; Arup, 2017a; BART, 2016.

[35] The cost of the variants is compared to the unescalated capital cost of the Proposed Project ($1.329 billion). See Chapter 2, Project Description, for further detail.

### a. Elevated BART Tracks

The three variants described below include an aerial (or elevated) BART track alignment instead of the at-grade alignment of the Proposed Project.[36] In addition, two of the variants include different horizontal alignments for the tracks, either north of I-580 or south of I-580 instead of in the I-580 median as under the Proposed Project. These variants would extend BART service approximately 5.5 miles from the Dublin/Pleasanton Station to the proposed Isabel Station as follows:

- **Aerial Track North of I-580**. This variant would consist of an elevated BART track north of I-580. The elevated section of the track would extend from east of Hacienda Drive to the proposed Isabel Station, which would be located north of I-580 instead of in the I-580 median. An aerial flyover structure would be required east of Hacienda Drive to connect the existing tracks in the median of I-580 to the elevated guideway on the north side of I-580. The elevated guideway would traverse above the on- and off-ramps and roadways at the I-580 interchanges at Tassajara Road/Santa Rita Road, Fallon Road/El Charro Road, Airway Boulevard, and Isabel Avenue by approximately 25 to 35 feet above grade.

  The aerial track would require approximately 10 feet of ROW, which would be less than the ROW required for the Proposed Project (approximately 46 feet). In addition, under this variant, the location of the proposed Isabel Station north of I-580 (instead of in the I-580 median) would result in increased engineering challenges should BART ever be extended beyond the Isabel Station. The Isabel Station would occupy undeveloped land that is currently being planned for development as part of the City of Livermore's INP, reducing the opportunities for TOD, which is one of the project objectives. The Aerial Track North of I-580 variant would cost approximately 7 percent or $93 million more than the Proposed Project.[37]

- **Aerial Track South of I-580.** This variant would consist of an elevated BART track south of I-580. The elevated section of the track would extend from east of Hacienda Drive to the proposed Isabel Station, which would be located south of I-580 instead of in the I-580 median. An aerial flyover structure would be required east of Hacienda Drive to connect the existing tracks in the median of I-580 to the elevated guideway on the south side of I-580. The elevated guideway would traverse above the on- and off-ramps and roadways at the I-580 interchanges by approximately 25 to 55 feet above grade.

[36] Arup, 2013. BLVX Alternatives Analysis, Alternative Analysis Scoping Summary (Draft). December.

[37] Amounts are in 2016 dollars.

Similar to the variant north of I-580, the aerial track would require approximately 10 feet of ROW, which would be less than the total ROW required for the Proposed Project (approximately 46 feet). The aerial structure south of I-580 would be in the vicinity of the Livermore Municipal Airport. Compliance with Federal Aviation Administration regulations may affect the viability of this variant. An aerial track south of I-580 would have greater ROW requirements and cost than an aerial track north of I-580, because the area south of I-580 has more development than the area north of I-580.

- **Aerial Track in I-580 Median.** This variant would consist of an elevated BART track in the I-580 median extending BART service from the Dublin/Pleasanton Station to the proposed Isabel Station. The elevated section would extend from east of Hacienda Drive to the proposed Isabel Station. The elevated guideway would traverse above the road overcrossings at the I-580 interchanges by approximately 25 to 55 feet above grade. This variant would require less widening of the I-580 ROW to accommodate the columns and structures to support the BART tracks (approximately 12 feet) than would the Proposed Project (approximately 46 feet). The Aerial Track in I-580 Median variant would cost approximately 35 percent or $465 million more than the at-grade design of the Proposed Project.[38]

The variants outside the I-580 median would require less relocation of I-580 and would result in a shorter construction duration than the Proposed Project. Furthermore, BART riders would have a more pleasant station experience while waiting for trains on the Isabel Station platform because it would not be located in the I-580 median.

The elevated BART track variants were rejected from further consideration because the height of the elevated structures above the freeway interchanges would result in substantially greater adverse visual impacts than the Proposed Project. In addition, the Aerial Track North of I-580 variant would require the station to occupy undeveloped land that is currently being planned for development as part of the INP, reducing the opportunities for TOD, which is one of the project objectives. The Aerial Track South of I-580 variant would cause greater disruption to existing and planned land uses because there is more development south of I-580 where all right-of-way acquisition would occur. Lastly, all three variants would both cost more than the Proposed Project.

### b. Underground BART Tracks

Underground tracks were considered for the BART track alignment instead of the at-grade alignment under the Proposed Project.[39] Under this variant, BART service would also be

[38] Amounts are in 2016 dollars.
[39] Arup, 2013. BLVX Alternatives Analysis, Alternative Analysis Scoping Summary (Draft). December.

extended approximately 5.5 miles from the Dublin/Pleasanton Station to the proposed Isabel Station, similar to the Proposed Project. Two different construction techniques were considered for the underground tracks, as described below.

- **Bored Tunnel.** The tunnel boring technique entails the use of a boring machine to drill or excavate a tunnel horizontally underground through the soil. Launching and receiving pits are required for the start and end of the tunnel. The boring machine is placed in the launch pit, from which the machine proceeds to remove soils. As the machine bores, tunnel liner segments are fixed and bolted into place behind it, forming the inside wall of the tunnel. Bore launching/reception pits, located within the I-580 median, would be required to accommodate the boring machine, requiring approximately 80 feet of ROW acquisition at these locations. The Bored Tunnel variant is estimated to cost approximately 150 percent or $1.99 billion more than the at-grade design of the Proposed Project.[40]
- **Cut and Cover Tunnel.** With this construction technique, the ground is excavated, and the tunnel (subway) is built inside an excavation. Once construction is complete, the tunnel is covered over with backfill material (such as soils). It typically involves installation of shoring or retaining walls, excavation for the trench, construction of the tunnel within the trench, covering the tunnel with soils, and restoration of the surface. This construction technique would require widening I-580 to make room for the excavation. Thus, it needs as much ROW acquisition, if not more, than the Proposed Project, increasing impacts to adjacent land uses. The Cut and Cover Tunnel would cost approximately 37 percent or $492 million more than the Proposed Project.[41]

The underground track variants would have impacts to the existing I-580 roadway interchange foundations that extend beneath the I-580 median, requiring the relocation or reconstruction of support columns. The underground BART track variants were rejected from further consideration because the cost would be substantially greater than the Proposed Project, and in the case of the Cut and Cover Tunnel variant, it would increase ROW impacts.

### c. At-Grade Tracks, North of I-580 from Tassajara Road to Isabel Station

This variant would entail at-grade tracks similar to the Proposed Project. The tracks would be within the I-580 median from the Dublin/Pleasanton Station to just east of the Tassajara Road/Santa Rita Road interchange. At that point, the tracks would cross to the north of I-580 and continue adjacent to I-580 to the proposed Isabel Station. Under this variant, the proposed Isabel Station would be located north of I-580 instead of in the I-580

[40] Amounts are in 2016 dollars.
[41] Amounts are in 2016 dollars.

median. An underpass below I-580, approximately 1,300 feet long, would be required to connect the tracks from the median to north of I-580. Short tunnels would also be needed for the BART tracks to pass below the I-580 on- and off-ramps at three interchanges.[42]

BART tracks north of I-580 would require less relocation of I-580 lanes, shortening the overall construction schedule by approximately 1.5 years and would require less coordination with Caltrans. Furthermore, under this variant, BART riders would have a more pleasant station experience while waiting for trains on the Isabel Station platform because it would not be in the I-580 median.

As described above, although the area north of I-580 is generally less developed than the area south of I-580 along this portion of the alignment, the variant would still result in disruption of existing and planned land uses. Under the Proposed Project, the total ROW widening would be split between the north and south of I-580; however, under this variant, all of the ROW acquisition would occur north of the freeway, disproportionally affecting uses there. In addition, under this variant, the location of the proposed Isabel Station north of I-580 (instead of in the I-580 median) would result in increased engineering challenges should BART ever be extended beyond the Isabel Station. A station north of I-580 would occupy undeveloped land that is currently being planned for development as part of the INP, reducing the opportunities for TOD, which is one of the project objectives. This variant is estimated to have similar costs to the Proposed Project.

For the above reasons, the at-grade BART alignment north of I-580 was rejected from further consideration.

### d. Storage and Maintenance Facility Locations

Several locations were considered for a BART storage and maintenance facility. Initially, the BART facility was to be only a storage yard, but as project plans evolved, BART incorporated a combined storage and maintenance facility into the Proposed Project. Although it is possible to have a stand-alone storage yard, operationally, it is more efficient to locate a storage yard and maintenance facility together. Such co-location reduces unnecessary non-revenue travel time. BART currently does not have a maintenance facility at the east end of the Daly City-Dublin Pleasanton Line; BART cars travel to either the Daly City Yard or the Hayward Maintenance Complex for service. This results in increased car mileage that could be avoided and longer times that BART cars are out of revenue service.

[42] Arup, 2014. BLVX DMU Median vs. North Conceptual Cost Comparison. October 13. [Note: Although this document pertains to the DMU Alternative, a similar variant was considered for the Proposed Project.]

Several potential locations were considered for the BART storage yard, which were narrowed to three sites (as shown in Figure 2-26), all north of I-580. The potential locations are as follows: north of I-580 and east of Croak Road near Cottonwood Creek and Doolan Canyon (Location 1); approximately 0.6 mile north of I-580 and east of Portola Avenue in the vicinity of Cayetano Creek (Location 2); and immediately north of I-580 and west of North Livermore Avenue (Location 3). Initially, BART performed a siting analysis for a stand-alone storage yard, and Location 2 along Cayetano Creek was considered the best choice among candidate sites.[43] As the design evolved into a combined storage and maintenance facility, an additional siting analysis was not conducted because the basic criteria for the combined site were the same as for the storage yard: undeveloped land, relatively level terrain, access from the median of the freeway, and limited grading. Many of the same factors relevant to the additional maintenance facility element for the Proposed Project had already been evaluated in the siting analysis for the DMU maintenance facility, as discussed below in the Variants to the DMU Alternative subsection. Location 2 continued to be the best choice for the combined BART storage and maintenance facility, and it has been incorporated into the Proposed Project.

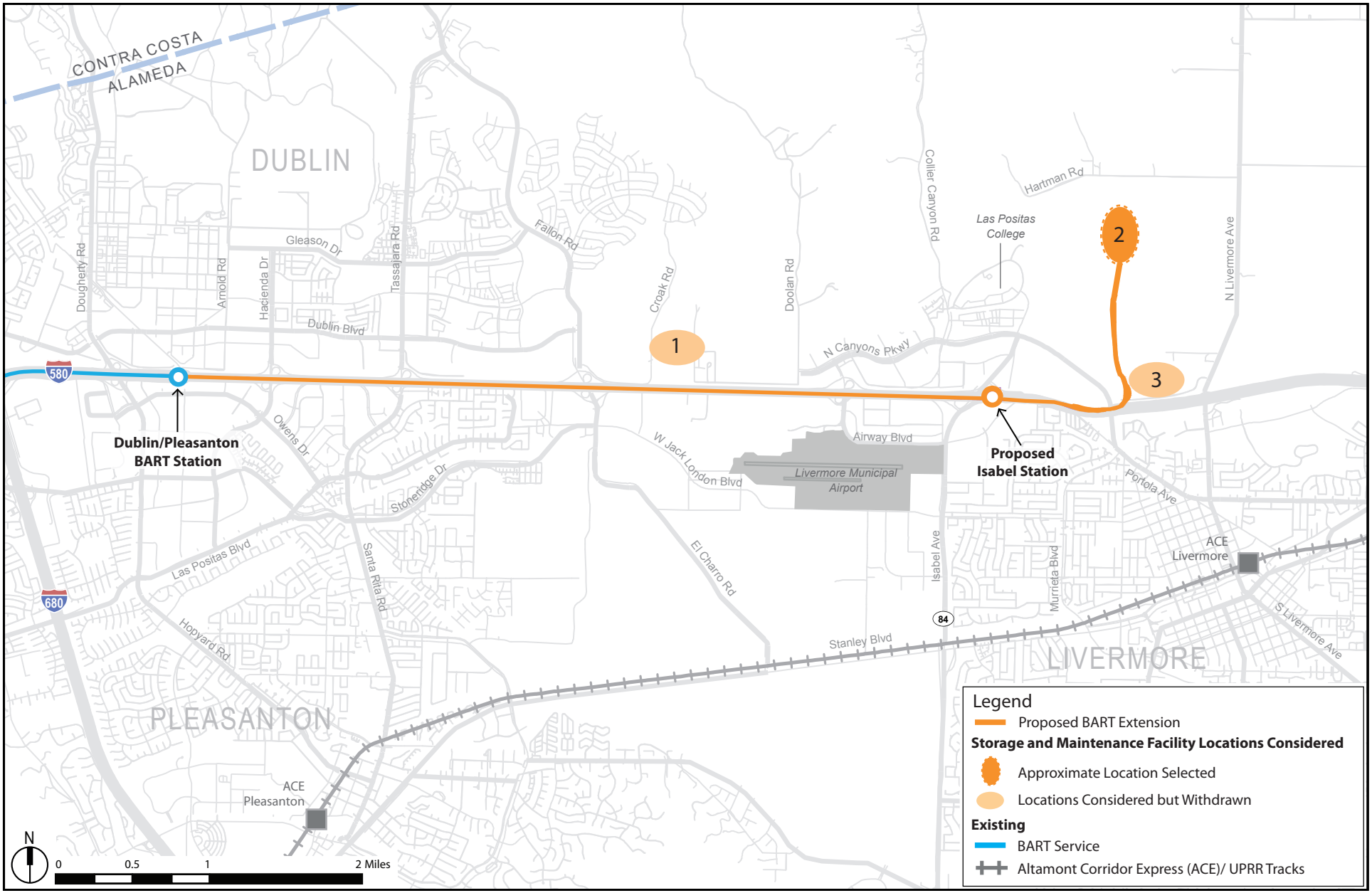
Location 1 was not chosen because it would entail operational challenges due to BART cars needing to travel on mainline tracks from the Isabel Station west to the storage yard, which could interfere with revenue operations. In addition, Location 1 is considered unacceptable by the City of Dublin because it would require acquiring land that is currently zoned for commercial and industrial uses. Location 3, immediately north of I-580, would require extensive earthworks involving cutting into a steep hillside parallel to I-580. This would result in a significant visual impact, as well as substantially increased project costs. Location 3 would increase the project cost by approximately $149 million or 11 percent.[44]

For the reasons presented, the alternative storage yard locations described above were rejected from further consideration.

### e. Larger Parking Facility at Isabel Station

The larger parking facility variant at the proposed Isabel Station would entail the construction of a substantially larger number of parking spaces than under the Proposed Project. This variant was considered in response to scoping period comments regarding maximizing parking at the Isabel station. Additional spaces could be provided on site by either adding additional levels to the parking structure and/or providing structured

[43] Arup, 2015b. BART Storage Track Locations. July 13.
[44] Amounts are in 2016 dollars.




Source: Arup, 2017b.

**BART to Livermore Extension Project EIR**

Figure 2-26
Alternatives Considered but Withdrawn
Locations Considered for the BART Storage and Maintenance Facility

parking over the areas planned for surface parking. As described in Section 3.B, Transportation, the amount of parking at the proposed Isabel Station was chosen to satisfy all the demand for parking projected in 2040 by the Travel Demand Model. Based on the origins and destinations of passengers most likely to use the Isabel Station, the Travel Demand Model forecast that parking demand would be for 3,200 spaces in 2040. Therefore, the 3,412 parking spaces at the Isabel Station included in the Proposed Project would satisfy the demand.

Any parking spaces beyond 3,412 spaces are projected to remain unoccupied. Constructing substantially more parking would not result in any additional ridership and would increase the cost of the Proposed Project. Furthermore, constructing substantially more parking would result in a correspondingly larger physical footprint compared to the Proposed Project and entail an increase in environmental impacts, including visual impacts.

BART prioritizes investments in station access based on its Station Access Policy, adopted June 9, 2016, and further described in Section 3.B, Transportation.[45] The proposed Isabel Station is designated as an auto-dependent station. For auto-dependent stations, the primary investment mode is walking, and the secondary investment modes are biking, drop-off, auto parking and transit. Furthermore, the Station Access Policy has the following two goals:

- A3. Prioritize the most sustainable access modes, with a focus on the lowest greenhouse gas and pollutant emissions per trip.
- A4. Reduce the access mode share of the automobile by enhancing multi-modal access to and from BART stations in partnership with communities and access providers.

Building more parking than the projected demand would conflict with the above goals of the Station Access Policy. For these reasons, the larger parking facility variant at the proposed Isabel Station was rejected from further consideration.

As described for the Proposed Project in Chapter 2, Project Description, while the Isabel Station parking facility has been designed to accommodate the anticipated demand, unanticipated demand for parking could exceed supply in the future. To address this possibility, the Isabel Station parking garage would be designed to accommodate the potential future construction of two additional levels of parking if demand were to increase.

[45] San Francisco Bay Area Rapid Transit District (BART), 2016. BART Station Access Policy. Available at: http://www.bart.gov/about/planning/access. Accessed June 2017.

### f. Elevated Bus Connections at Isabel Station

Two different bus-to-BART connections were considered for the proposed Isabel Station. Both of the options included a widening of Isabel Avenue to allow bus stops directly above the station; one featured a direct bus ramp to Isabel Avenue above the station and the other featured no direct ramp. For comparison, the Proposed Project would not include a direct ramp, but would provide access to the proposed bus transfer facility north of I-580 from the existing westbound I-580 off-ramps via Isabel Avenue.[46] Patrons would then use the pedestrian overcrossing of I-580 to reach the station platform.

- **Westbound Direct Ramp, Isabel Avenue Bus-to-BART Connection.** This variant would construct a new bus-only ramp from the westbound I-580 lanes that would allow buses to exit from the left-most lane directly to the Isabel Avenue/I-580 overcrossing. The Isabel Avenue/I-580 overcrossing would be widened to provide a passenger drop-off on the west side and a passenger pick-up on the east side of the overcrossing. Passengers would connect to the Isabel Station BART platform below via stairs/ramps/or elevators from the overcrossing. Eastbound buses would use the existing Isabel Avenue on-ramp to I-580. While this variant would result in a slight decrease in passenger travel time, it would only increase BART systemwide ridership by approximately 1 percent (approximately 100 riders) and would increase costs by approximately 18 percent above the Proposed Project (approximately $239 million).[47]
- **No Direct Ramp, Isabel Avenue Bus-to-BART Connection.** This variant would not construct a direct ramp from I-580, but would use the existing Isabel Avenue on-/off-ramps from I-580, similar to the Proposed Project. However, similar to the Westbound Direct Ramp connection, this variant would entail the widening of the Isabel Avenue/ I-580 overcrossing to allow for bus-to-BART connections. Passenger drop-off would be on the west side of the overcrossing and a passenger pick-up would be on the east side of the overcrossing. Passengers would connect to the Isabel Station BART platform below via stairs/ramps/or elevators from the overcrossing.

  This variant would reduce transfer times from BART-to-bus compared to the Proposed Project because the distance the buses would travel from I-580 to the passenger drop-off/pick-up locations would be shorter and the distance passengers would walk to connect to the BART platform would be reduced.

  While this variant would result in a slight decrease in passenger travel time, it would only increase BART systemwide ridership by approximately 1 percent (approximately

[46] Arup, 2017a. BART to Livermore Extension Bus Operations Technical Memorandum. July.
[47] Amounts are in 2016 dollars.

100 riders) and would increase costs by approximately 6 percent above the Proposed Project (approximately $80 million).[48]

Due to the substantial increased costs and limited increase in ridership, the bus-to-rail connection variants for the proposed Isabel Station were rejected from further consideration.

### g. Aerial Tail Track Structure over I-580

An aerial structure was considered to support the BART tail tracks east of the proposed Isabel Station crossing over westbound I-580 from the median to north of I-580, where they would extend to the storage and maintenance facility. The aerial structure would be elevated above grade for approximately 500 feet, and its maximum height at the top of the deck would be approximately 33 feet above I-580. For comparison, the Proposed Project would include an underpass structure under westbound I-580 east of the proposed Isabel Station that would connect the tail tracks from the I-580 median to the north. The tail track aerial structure is estimated to decrease project cost by approximately $23 million, or 2 percent, compared to the Proposed Project.[49] However, the aerial structure for the tail tracks was rejected from further consideration because the height of the structure above the freeway would result in substantially greater adverse visual impacts than the Proposed Project.

## 2. Variants to the DMU Alternative

As described below and listed in Table 2-21, variants to the DMU Alternative include (1) a different horizontal alignment for the DMU tracks (north of I-580 instead of in the I-580 median); (2) extended single-track design; (3) different locations for the storage and maintenance facility; and (4) a DMU transfer platform south of the existing BART platform, instead of north of the existing platform as under the proposed DMU Alternative. Information pertaining to the costs of these variants relative to the DMU Alternative is provided, where available.[50]

[48] Amounts are in 2016 dollars.
[49] Amounts are in 2016 dollars.
[50] The cost of the variants is compared to the unescalated capital cost of the DMU Alternative ($1.3 billion). See Chapter 2, Project Description, for further detail.

**TABLE 2-21 VARIANTS TO THE DMU ALTERNATIVE – CONSIDERED BUT WITHDRAWN**

| Variant | Location of Variant[a] | Reasons for Rejection |
|---|---|---|
| At-Grade Tracks, North of I-580 from Tassajara Road to Isabel Station | North of I-580 from Tassajara Road to Isabel Station | ▪ ROW impacts would be disproportionately concentrated north of I-580<br>▪ Reduced opportunity for TOD |
| Extended DMU Single-Track Design | 0.8 mile east of Dublin/Pleasanton Station to approximately halfway between Fallon Road and Airway Boulevard | ▪ Operational performance deficiencies |
| Storage and Maintenance Facility Locations | Various locations along the alignment | ▪ Operational performance deficiencies (Locations 1, 2)<br>▪ Conflict with local zoning (Location 1)<br>▪ Increased cost (Locations 2,4)<br>▪ Significant visual impact (Location 4) |
| DMU Transfer Platform South of BART Tracks | Dublin/Pleasanton Station | ▪ Increased cost<br>▪ Increased impacts to watercourse |

Notes:
[a] Location of Variant = along entire alignment (Dublin/Pleasanton Station to proposed Isabel Station) or portion of the alignment.
Source: Arup, 2014; Arup, 2015a; Arup, 2015c; Arup, 2015d.

### a. At-Grade Tracks, North of I-580 from Tassajara Road to Isabel Station

This variant to the DMU Alternative would include tracks at-grade in the I-580 median. This is a similar alignment to that described for the Conventional BART Project variants. This design would feature at-grade tracks within the I-580 median from the Dublin/Pleasanton Station to just east of the Tassajara Road/Santa Rita Road interchange. There the tracks would cross to the north of I-580 and extend adjacent to the north side of I-580 to the proposed Isabel Station. Under this variant, the proposed Isabel Station would be located north of I-580 instead of in the I-580 median. An underpass below westbound I-580, approximately 1,300 feet long, would be required to connect the tracks from the median to north of I-580. Short tunnels would also be needed for the DMU tracks to pass below the I-580 on- and off-ramps at three interchanges. [51]

[51] Arup, 2014. BLVX DMU Median vs. North Conceptual Cost Comparison. October 13.

This variant would have similar merits to the at-grade BART tracks north of I-580 described as a variant to the Conventional BART Project above; it would require less relocation of I-580 lanes, shortening the overall construction schedule. It would not have any cost savings compared to the DMU Alternative.

The at-grade tracks, north of I-580 from Tassajara Road to the Isabel Station, would have increased ROW impacts to the properties north of I-580. Furthermore, locating the Isabel Station north of I-580 rather than in the median would occupy undeveloped land that is currently being planned for development as part of the INP, reducing the opportunities for TOD, which is one of the project objectives. Therefore, this variant was rejected.

### b. Extended DMU Single-Track Design

The extended DMU single-track variant would have a longer stretch of single track than the DMU Alternative.[52] Under this variant, 3.75 miles of the track (from the Dublin/Pleasanton Station to approximately halfway between Fallon Road and Airway Boulevard) would be single track, with approximately 1.75 miles of double track at the eastern end of the alignment near the proposed Isabel Station. In comparison, under the DMU Alternative, the single-track section would extend from the Dublin/Pleasanton Station approximately 0.8 mile, and the double-track section would extend approximately 4.7 miles to the proposed Isabel Station.

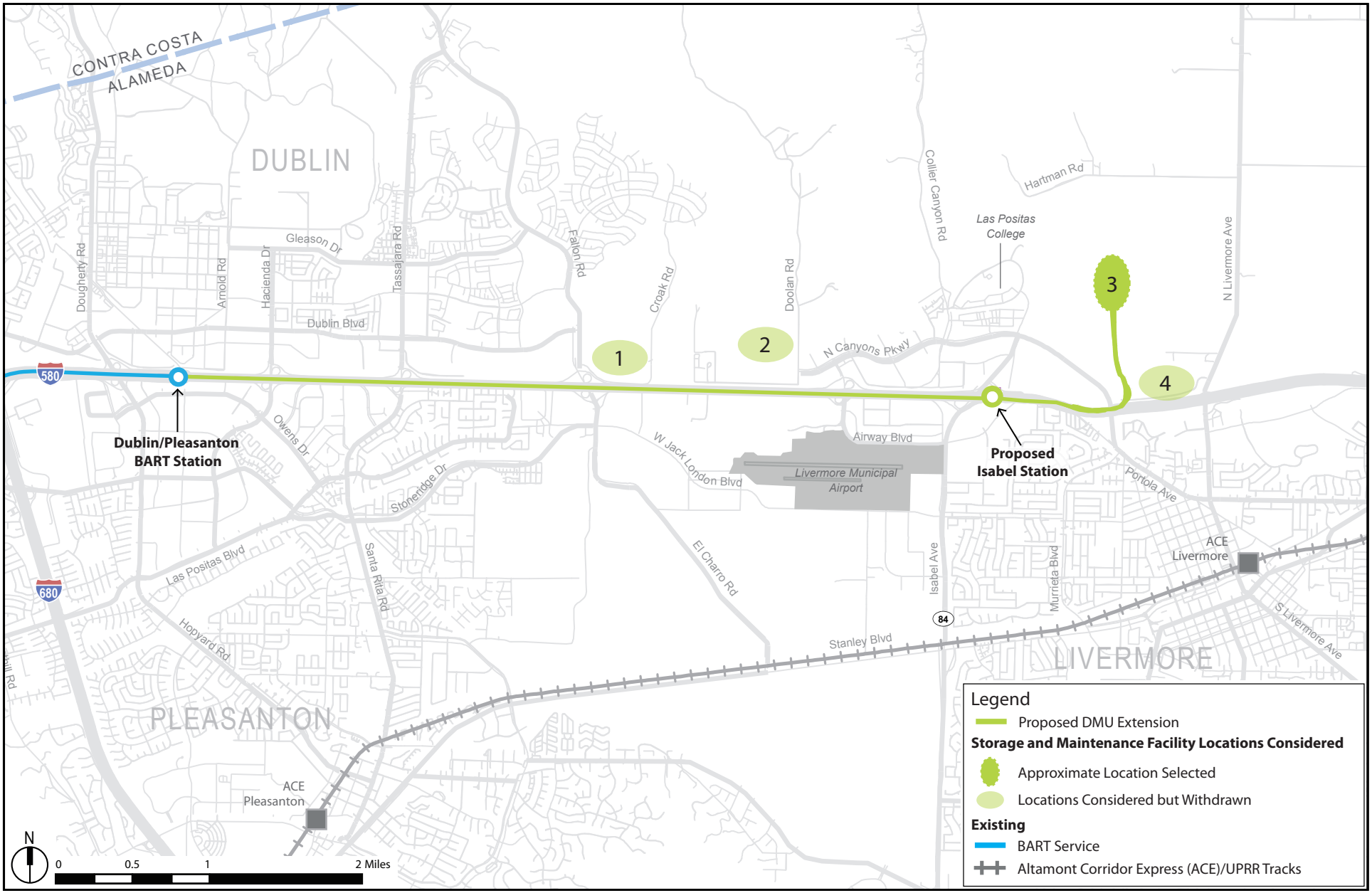
This variant would have an estimated $78 million cost savings because it would avoid building a second track and would require less relocation of I-580.[53] This would represent a cost savings of approximately 6 percent compared to the DMU Alternative.

However, the extended single-track section would not provide a robust operating scenario. Any failed trains on the single track would shut down the system until those trains could be moved. The increased potential for delayed DMU trains (and subsequent missed connections to BART trains) and the reduced reliability in the DMU service would be inconsistent with the service standards of BART's existing system. Therefore, the extended DMU single-track design was rejected from further consideration.

### c. Storage and Maintenance Facility Locations

Four potential locations were considered for the storage and maintenance facility under the DMU Alternative.[54] These locations are shown in Figure 2-27 and are described below. Location 3, located north of I-580 and west of North Livermore Avenue, would require

[52] Arup, 2015c. DMU/EMU Single Track Analysis. June 2.
[53] Amounts are in 2016 dollars.
[54] Arup, 2015d. DMU/EMU Yard Site Selection Analysis. February 9.




Source: Arup, 2017b.

BART to Livermore Extension Project EIR

Figure 2-27
Alternatives Considered but Withdrawn
Locations Considered for the DMU Storage and Maintenance Facility

relatively less earthwork than the other locations and was incorporated into the DMU Alternative.

Location 1, located just east of Fallon Road and north of I-580, is an open field requiring minimal earthworks relative to the other options, and is close to the proposed main DMU trackway, thus requiring a limited length of connection track. Location 1 is the least costly of the locations considered and would decrease the cost of the DMU Alternative by approximately $70 million, or 5 percent.[55] However, Location 1 was considered unacceptable by the City of Dublin because it would require acquiring land that is currently zoned for commercial and industrial uses. Location 1 is also west of the proposed Isabel Station. This presents operational challenges because it would require DMU vehicles to travel on mainline tracks from the Isabel Station to the storage and maintenance facility, which could interfere with revenue operations. For the above reasons, this location was rejected.

Location 2, located west of Dolan Road and north of I-580, is close to the proposed main DMU trackway and would also require a short connection track. However, Location 2 would require extensive earthworks involving excavating and grading a steep hillside, and is therefore the second most expensive location. Location 2 would increase the cost of the DMU Alternative by approximately $41 million, or 3 percent.[56] Furthermore, Location 2 is also west of the proposed Isabel Station. This presents operational challenges because it would require DMU vehicles to travel on revenue tracks from the Isabel Station to the storage and maintenance facility, which could interfere with revenue operations. Therefore, this location was rejected.

Location 4, located immediately north of I-580 and west of North Livermore Avenue, is the most expensive location because of the large earthworks cutting into a steep hillside, and its substantial distance east of the proposed main DMU trackway. Location 4 would increase the cost of the DMU Alternative by approximately $44 million, or 3 percent.[57] This location was rejected due to the increased cost and because the earthworks would result in a significant visual impact.

For the variety of reasons presented, the alternative storage and maintenance facility locations (locations 1, 2, and 4) were rejected from further consideration.

[55] Amounts are in 2016 dollars.
[56] Amounts are in 2016 dollars.
[57] Amounts are in 2016 dollars.

### d. DMU Transfer Platform South of BART Tracks

An alternative location was considered for the DMU transfer platform at the Dublin/Pleasanton Station. This option considered locating the DMU platform south of the existing BART platform rather than north of the BART platform as proposed under the DMU Alternative. For this option, the eastbound I-580 lanes would have to be relocated up to 45 feet to the south, which would require an additional 10 feet compared to that needed under the DMU Alternative. This additional relocation could cause greater impacts to the Hacienda Drive interchange, adjacent watercourse (Line G-2), Dublin/Pleasanton Station facilities, local access road, and adjacent property. Approximately 3,100 feet of Line G-2 would have to be realigned.[58] This option is estimated to increase project cost by $25 million, or 2 percent, compared to the DMU Alternative.[59] For the above reasons, this alternative was rejected.

## 3. Variants to the Express Bus/BRT Alternative

As described below and listed in Table 2-22, variants to the Express Bus/BRT Alternative include: (1) bus ramps from I-580 to an elevated structure above the Dublin/Pleasanton Station; and (2) descending bus ramps from I-580 to the existing ground-level bus facility at the Dublin/Pleasanton Station. These variants would differ from the Express Bus/BRT Alternative, which would have bus ramps from I-580 to at-grade bus platforms north and south of the existing BART platform. Information pertaining to the costs of these variants relative to the Express Bus/BRT Alternative is provided, where available.[60]

### a. Elevated Bus Connections at Dublin/Pleasanton Station

Two variants for bus connections at the Dublin/Pleasanton Station would include elevated station designs, with a new bus connection level above the existing BART platform in the I-580 median. This would allow for a direct bus-to-BART connection, similar to the Express Bus/BRT Alternative, and would reduce the amount of ROW acquisition required. In these variants, the bus transfer platforms would be elevated above the existing station, instead of north and south of the station, in the I-580 median.[61]

[58] Arup, 2015a. BLVX DMU/EMU DP North vs. South Conceptual Comparison. February 26.
[59] Amounts are in 2016 dollars.
[60] The cost of the variants is compared to the unescalated capital cost of the Express Bus/BRT Alternative ($305 million). See Chapter 2, Project Description, for further detail.
[61] Arup, 2017e. Elevated Express Bus Station at Dublin/Pleasanton. February 24.

TABLE 2-22 VARIANTS TO THE EXPRESS BUS/BRT ALTERNATIVE – CONSIDERED BUT WITHDRAWN

| Variant | Location of Variant[a] | Reasons for Rejection |
|---|---|---|
| Elevated Bus Connections | Dublin/Pleasanton Station | ▪ Increased costs<br>▪ Increased visual impacts<br>▪ Complexity of construction and operation (Two-Level Cross Platform Median Station Design) |
| Descending Bus Ramps from I-580 | Dublin/Pleasanton Station | ▪ Spatial constraints<br>▪ Pedestrian safety concerns<br>▪ Less convenient BART to bus transfers |

Notes:
[a] Location of Variant = along entire alignment (Dublin/Pleasanton Station to proposed Isabel Station) or portion of the alignment.
Source: Arup, 2013; Arup, 2017e.

- **Two-Level Median Station Design**. This variant would have a two-level platform, with express buses operating on the upper level and BART operating on the lower level. A new bus-only ramp would be constructed from the westbound I-580 lanes that would allow buses to exit from the left-most lane directly to the north side of the upper level platform, and then cross to the south side of the platform to allow boarding and alighting. The upper level bus platform would be 360 feet long, and the approach ramps would be 22 feet wide and 500 feet long. The upper level would be approximately 30 feet above the existing BART track level. A single escalator, staircase, elevator, and fare collection equipment would be provided for access directly to the BART platform below. Buses would return to I-580 eastbound via a similar bus-only ramp.
- **Two-Level Cross Platform Median Station Design**. Under this variant, a configuration similar to that described above would be constructed; however, this variant would allow for direct cross-platform transfers between buses and BART without requiring passengers to change levels. This would be achieved by separating BART and bus services by direction such that eastbound BART and buses would operate on the first level and westbound BART and buses would operate on the second level. This variant would be a similar height to the two-level median station design.

These variants would reduce the ROW required compared to the Express Bus/BRT Alternative. At the Dublin/Pleasanton Station and east of the Dublin/Pleasanton Station, the Express Bus/BRT Alternative would require the I-580 ROW to be permanently widened by approximately 85 feet. The elevated bus connection variants would reduce the permanent widening needed to approximately 25 feet at the Dublin/Pleasanton Station and 50 feet east of the Dublin/Pleasanton Station. A widening of 25 feet would be needed

at the Dublin/Pleasanton Station to provide room for the columns supporting the upper level. An additional 25 feet would be needed east of the Dublin/Pleasanton Station to provide space for the ramps from I-580 to the upper level. The elevated bus variant would also require one I-580 lane in each direction to be closed for approximately 3 years to allow space for construction.

The Two-Level Median Station Design would increase costs by approximately 10 percent, or $31 million, compared to the Express Bus/BRT Alternative.[62] The Two-Level Cross Platform Median Station Design would increase cost by substantially more due to the need to build new BART tracks and BART facilities so that westbound BART trains could operate on the second level.

Furthermore, the Two-Level Cross Platform Median Station Design was considered infeasible due to the complexity of construction and operation, particularly for the relocation of the BART track. This alternative would also require BART to install additional fare gates at both the upper and lower levels, each of which would likely require an additional station attendant.

Due to the substantial increased costs and increased visual impacts from a structure 30 feet above BART track level, the variants to the Express Bus/BRT Alternative providing elevated bus connections at the Dublin/Pleasanton Station were rejected from further consideration.

### b. Descending Bus Ramps from I-580 at Dublin/Pleasanton Station

This variant entails bus ramps from I-580 directly to the existing Dublin/Pleasanton Station ground-level bus facilities.[63] These ramps would descend from the I-580 express lanes directly to the existing north-south bus access road that crosses under I-580 and provides access to the current Dublin/Pleasanton Station entrance.

While this variant would provide a direct bus route to the Dublin/Pleasanton Station, it was rejected because of various challenges, including less convenient BART to bus transfers, safety concerns, and the need to lower the existing bus access road by at least 1 foot to meet Caltrans standard overhead clearance requirements underneath I-580, which could impact major utility pipelines. Existing freeway overpass columns in the middle of the north-south bus access road would likely have to be relocated. Safety would be a concern with buses transitioning from high freeway speeds while descending the bus ramp toward the main Dublin/Pleasanton Station entrance, where there are many pedestrians.

[62] Amounts are in 2016 dollars.
[63] Arup, 2013. BLVX Alternatives Analysis, Alternative Analysis Scoping Summary (Draft). December.

Furthermore, significantly increased bus activity along the north-south access road could conflict with pedestrian circulation between the parking garage and the station as well as pedestrian circulation to/from the TODs north of the station.

In addition, this variant is less convenient for passengers than the proposed Express Bus/BRT Alternative. The Express Bus/BRT Alternative accommodates passengers transferring between BART and buses at convenient platforms adjacent to the existing BART platforms. Under this variant, buses arriving at the Dublin/Pleasanton Station could drop off passengers near the entrance to the station, but because of space constraints would have to travel to a layover location to wait before picking up passengers. Thus, descending bus ramps at the Dublin/Pleasanton Station would provide a convenient location for passengers transferring from bus to BART, but not for passengers transferring from BART to bus. For the reasons described above, the descending bus ramps from I-580 at the Dublin/Pleasanton Station were rejected.

# CHAPTER 3
# ENVIRONMENTAL ANALYSIS

## A. INTRODUCTION TO ENVIRONMENTAL ANALYSIS

This chapter provides the environmental analysis for the Proposed Project and Alternatives and describes background information that will assist the reader in understanding the analysis.

This introductory section of the chapter outlines the chapter organization, presents an overview of the study area for the analysis, and describes the scenarios used in the analysis, including the cumulative projects list.

### 1. Organization of the Environmental Analysis

Chapter 3 is organized into 15 environmental topic sections, which generally correspond to the resource topics contained in Appendix G of the CEQA Guidelines.[1] The 15 topics are listed below with their EIR section number and title (with abbreviation in parentheses):

- 3.B Transportation (TRAN)
- 3.C Land Use and Agricultural Resources (LU and AG)
- 3.D Population and Housing (PH)
- 3.E Visual Quality (VQ)
- 3.F Cultural Resources (CUL)
- 3.G Geology, Soils, Seismicity, Mineral and Paleontological Resources (GEO and PALEO)
- 3.H Hydrology and Water Quality (HYD)
- 3.I Biological Resources (BIO)
- 3.J Noise and Vibration (NOI)
- 3.K Air Quality (AQ)
- 3.L Greenhouse Gas Emissions (GHG)
- 3.M Energy (EN)
- 3.N Public Health and Safety (PHS), which includes Electromagnetic Fields
- 3.O Community Services (CS), which includes Recreation
- 3.P Utilities (UTIL)

[1] California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387.

### a. Organization of the Sections

Each of the environmental topic sections included in this chapter—i.e., Sections 3.B through 3.P—is organized as follows:

- **Introduction.** This subsection provides an overview of the environmental topic, introduces the critical issues and concerns considered in the analysis, and briefly summarizes the comments (if any) received in response to the Notice of Preparation (NOP) for the EIR or during the scoping meeting.
- **Existing Conditions.** This subsection presents setting information for the environmental resource topic, including applicable regional and study area information. The NOP for the BART to Livermore Extension Project was issued in August 2012, and this is typically the period in which existing conditions were noted. The description of existing conditions has been updated with more recent information or surveys to provide the most current information available, as noted in each section. In most cases, the existing conditions constitute the environmental baseline for identifying environmental impacts, which is defined as changes to the baseline conditions that would result from the Proposed Project or Alternatives. In some cases, for topics that are quantitative in nature (i.e., transportation, air quality, noise and vibration, greenhouse gas [GHG] emissions, and energy), a different baseline is used in the analysis, as explained below. All other resource topics sections are qualitative in nature.
- **Regulatory Framework.** This subsection identifies relevant federal, State of California (State), and local regulations governing the environmental topic. 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 all local land use policies and ordinances; however, these policies and ordinances are discussed in certain sections for informational purposes, to describe the extent to which the BART to Livermore Extension Project conforms to them.
- **Impacts and Mitigation Measures.** This subsection analyzes how the environmental resources would be affected by the Proposed Project and Alternatives, and is organized as follows:
    - *Standards of Significance.* This subsection describes the criteria by which an impact is determined to be significant, and thus whether mitigation measures (actions to reduce or eliminate the effects) are required. The criteria are largely based on the CEQA Guidelines as well as applicable State or federal standards.
    - *Impact Methodology.* This subsection describes the approach used in the impacts analysis, including any specialized computer models, techniques, or methodologies.

- *No Project Conditions.* For the resource topics where the No Project Conditions are used in connection with a quantitative analysis methodology, those conditions are described in this subsection (see the Analysis Years – 2025 and 2040 subsection below).
- *Summary of Impacts.* Impacts of the Proposed Project and Alternatives are summarized for each impact corresponding to the standards of significance.
- *Environmental Analysis*. The environmental analysis identifies and describes the effects of the Proposed Project and Alternatives on the environmental resource. Impacts that would occur during construction (either short-term or long-term/permanent) are analyzed first, for the Proposed Project and each of the Build Alternatives; this is followed by an analysis of construction-related cumulative impacts. The analysis then examines any additional operational impacts of the Proposed Project and each Alternative, followed by an analysis of the potential operational cumulative impacts. (See the Cumulative Analysis subsection, below, for further information about the cumulative impacts.)

  The impacts of the Proposed Project and each Alternative are analyzed separately when impacts are unique to the Proposed Project and/or an Alternative. However, when the impacts would be similar among the Proposed Project and/or an Alternative, the impacts analysis provides a combined impact discussion.

  Each impact analysis title uses the abbreviation for the environmental topic listed above, is numbered sequentially, and is shown in ***bold italics***. For example, ***Impact LU-1*** denotes the first project impact analysis in the Land Use subsection. Cumulative impacts are distinguished from project impacts by the addition of "CU"; thus, ***Impact LU-2(CU)*** denotes a cumulative impact analysis for Land Use.

  Mitigation measures are enumerated with the corresponding impact number. For example, **Mitigation Measure HYD-3** would correspond to **Impact HYD-3**. A brief title is included to identify the topic of the mitigation measure and indicate whether the measure applies to the Proposed Project and/or any of the Alternatives. For example, **Mitigation Measure HYD-3: Hydraulic Capacity for Non-Flood Hazard Area Crossings (Conventional BART Project and DMU Alternative)** denotes that the measure would apply to the Proposed Project and the DMU Alternative only.

### b. Significance Determinations

Environmental impacts are identified as the changes to environmental resources that would be caused by the BART to Livermore Extension Project. The severity of these effects is classified as shown below, with the abbreviation for the impact's level of significance indicated in parentheses.

- **Significant Impact (S)** includes adverse impacts that exceed or have the potential to exceed the identified thresholds of significance.
- **Less-than-Significant Impact (LS)** includes adverse effects that do not exceed the identified thresholds of significance.
- **No Impact (NI)** includes conditions under which the BART to Livermore Extension Project would not result in any impacts to a resource.
- **Beneficial Impact (B)** includes effects that enhance or improve the baseline conditions. For example, reductions in energy use due to fewer vehicle trips with implementation of the Proposed Project or an Alternative would constitute a beneficial effect related to energy use and conservation.

For each impact identified as being significant, this Draft EIR suggests mitigation measures to reduce or eliminate the impact, and describes whether the mitigation measures individually or collectively would reduce effects to a less-than-significant level. In this case, the following significance conclusion is made:

- **Less than Significant with Mitigation (LSM)** includes impacts where the significant impact can feasibly be reduced to less than significant through the identified mitigation measures. For cumulative impacts, any mitigation measures identified for project-specific impacts are taken into account in evaluating the significance of the project's contribution to the cumulative impact. The LSM abbreviation is used for cumulative impacts when further mitigation is added specifically to mitigate the cumulative impact. If no additional mitigation is required, the LS abbreviation is used, even though project-specific mitigation continues to apply.

However, if the significant or potentially significant impact cannot be reduced to less than significant, the following significance conclusion is made:

- **Significant and Unavoidable (SU)** impacts exceed the defined significance criteria and cannot be eliminated or reduced to a less-than-significant level through feasible mitigation measures or alternatives.

## 2. Footprint, Study Areas, and Project Corridor

The BART to Livermore Extension Project would be located in eastern Alameda County, extending along the Interstate (I-) 580 corridor from the cities of Dublin and Pleasanton, through a portion of unincorporated Alameda County to the city of Livermore. See Chapter 1, Introduction, for information about the regional context of the area, including growth trends and transportation.

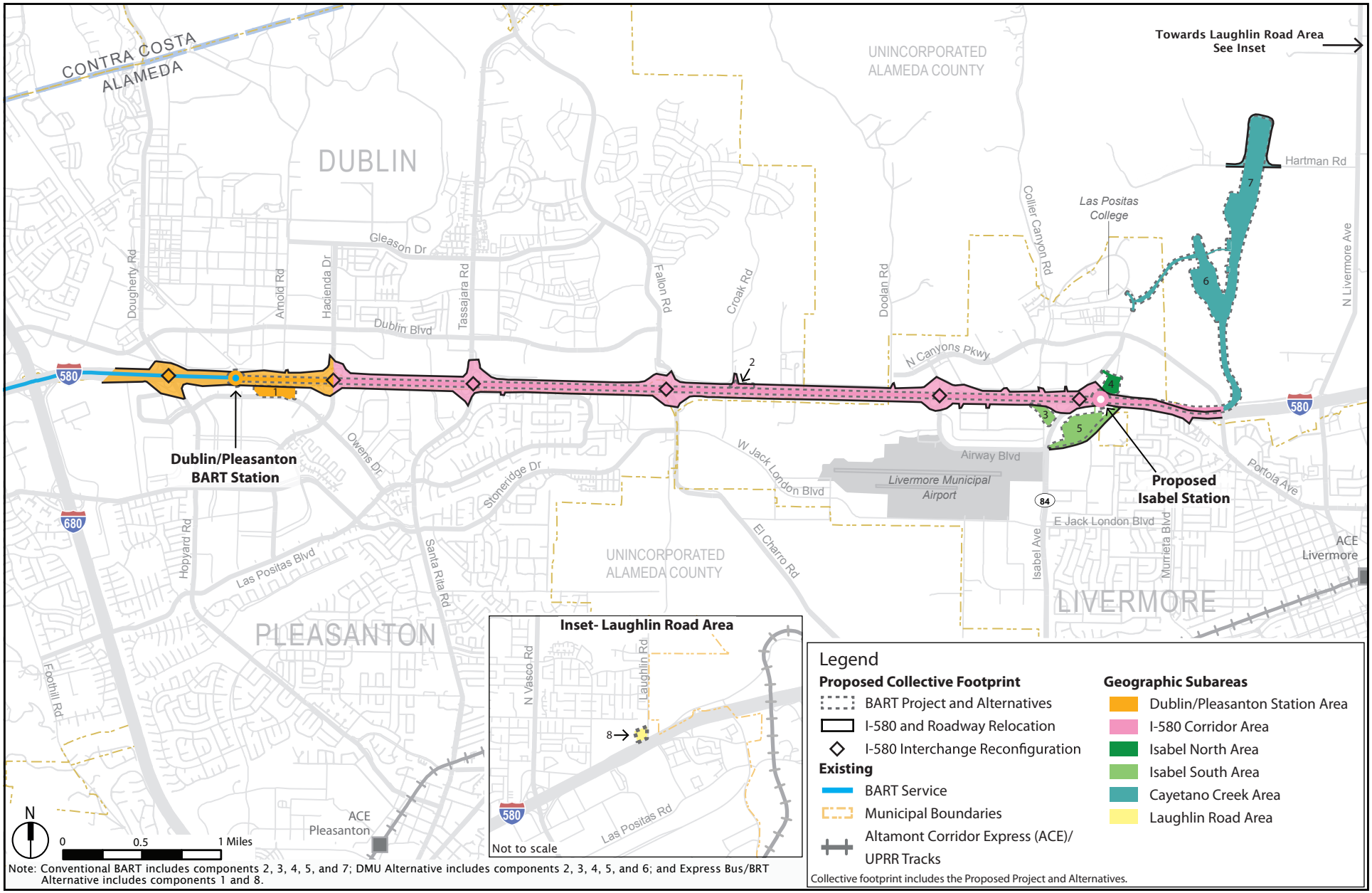
For the purposes of this Draft EIR, the following terms—footprint, study area, and project corridor—are used to describe the geographic area that could be affected by the Proposed Project and Alternatives.

- **Footprint.** The footprint of the Proposed Project includes the area that would be either permanently altered through construction of the Proposed Project or temporarily altered through the use of land for construction staging areas. Figure 2-2 in Chapter 2, Project Description, contains a schematic representation of the Proposed Project. Similarly, the DMU Alternative and Express Bus/BRT Alternative would result in permanent and temporary alterations. Plans for the DMU Alternative and Express Bus/BRT Alternative are shown on Figure 2-14 and Figure 2-20, respectively, in Chapter 2, Project Description. A more detailed representation of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative are shown in Appendix B. This area is generally considered to be the area of potential direct impacts, as analyzed in the Sections 3.B through 3.P of this EIR.

  In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative (as well as for the feeder buses for the Proposed Project and other Build Alternatives) that are expected to extend within the street ROWs, are addressed at a programmatic level in this EIR, as described in Chapter 2, Project Description. While the proposed bus routes for the Enhanced Bus Alternative, as well as the Proposed Project and other Build Alternatives, are shown in Chapter 2, the routes are conceptual and were developed for the analysis of BART ridership and operational costs. Similarly, the candidate locations for bus infrastructure improvements are identified in this EIR to document the availability of such locations and for purpose of programmatic impact analysis.

  Thus, there is no final physical footprint for the Enhanced Bus Alternative or for the bus improvements for the feeder buses under the Proposed Project and other Build Alternatives. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements could be subject to subsequent environmental review, if required.

  In addition, a representative collective footprint is used in this Draft EIR to identify the maximum extent of ground disturbance that could occur with implementation of the Proposed Project, the DMU Alternative, or the Express Bus/BRT Alternative, as they require the greatest amount of infrastructure. This proposed collective footprint is shown in Figure 3.A-1. The Existing Conditions subsections describe the environmental resources within the vicinity of the collective footprint for each respective resource topic.




Note: Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017.

BART to Livermore Extension Project EIR

Figure 3.A-1
Introduction to Environmental Analysis
Project Corridor and Geographic Subareas

- **Study Area.** Each section in this chapter defines a study area specific to the respective environmental resource topic for the purposes of identifying environmental resources that may be affected by the Proposed Project or Alternatives. The study area encompasses the Proposed Project and Alternatives footprints and generally includes a specified area beyond the footprints, as noted in the respective sections for each resource topic. The study area informs the analysis of both direct and indirect impacts that could result from implementation of the Proposed Project and Alternatives.
- **Project Corridor.** The project corridor is used to refer to the area along I-580 through which the Proposed Project and Alternatives footprints extend, and typically includes the study area. The corridor generally extends from east of I-680 to east of the I-580/Portola Avenue overcrossing, and includes the area near Laughlin Road and I-580. The project corridor is represented by six geographic subareas that correspond to different components of the Proposed Project and Alternatives. The subareas, shown in Figure 3.A-1, are as follows:
    - Dublin/Pleasanton Station Area – From west of Dougherty Road/Hopyard Road/I-580 overcrossing to just west of Hacienda Drive/I-580 overcrossing
    - I-580 Corridor – From Hacienda Drive/I-580 overcrossing to Portola Avenue/I-580 overcrossing; this area includes the Isabel Station within the I-580 median and tail track tunnel under westbound I-580
    - Isabel North Area – At Isabel Avenue, north of I-580; the area that is proposed to have the BART pedestrian touchdown structure, bus transfer facility, and access loop
    - Isabel South Area – At Isabel Avenue, south of I-580; the area that is proposed to have the BART pedestrian touchdown structure, parking garage/surface parking lots, and wayside facility at Kitty Hawk Road
    - Cayetano Creek Area – North of I-580, from Portola Avenue/I-580 overcrossing through Cayetano Creek area; the area that is proposed to have the storage and maintenance facility and access road from Campus Hill Drive
    - Laughlin Road Area – North of I-580, at Laughlin Road and Northfront Road, the area that is proposed to have a park and ride lot under the Express Bus/BRT Alternative

## 3. Environmental Analysis Scenarios

The level and severity of impacts from the Proposed Project and Alternatives is determined based on the changes that the Proposed Project and Alternatives would have on the environmental resources. This EIR uses several scenarios to evaluate the effects of the Proposed Projects and Alternatives. The following scenarios are used in the impacts analysis:

- **No Project Conditions**. The No Project Conditions constitute the scenario prior to implementation of the Proposed Project or an Alternative. Typically, the No Project Conditions are the existing conditions at the time of the NOP. As noted in Existing Conditions above, some setting information has been updated since the date the NOP was issued (2012). Furthermore, a future No Project Conditions (for 2025 and 2040) is used for five of the environmental resource sections, as described below.
- **Project**. The Project Conditions describe the impacts the project would have on the environment. This evaluation is conducted for the Proposed Project and the three Build Alternatives: DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative.
- **Cumulative**. The cumulative scenario evaluates the impacts from implementation of the Proposed Project (or an Alternative) combined with the impacts of past, present, and reasonably probable future projects. The Cumulative Conditions are discussed in the Cumulative Analysis subsection below.

### a. Analysis Years – 2025 and 2040

Two future years are used in the analysis. The BART to Livermore Extension Project could be constructed and in operation by 2026. However, the analysis assumes opening year in 2025, for consistency with the land use projections used in the Alameda County Transportation Commission Countywide Travel Demand Model (Travel Demand Model). The baseline year for this analysis is considered to be 2025. Although operation may begin in 2026, it may take some time before BART patrons become acquainted with the new Isabel Station and adjust their travel patterns to make the best use of it. By 2040, the BART to Livermore Extension Project would be in full operation; therefore, that year is used as the project's horizon year. The Metropolitan Transportation Commission and the Alameda County Transportation Commission also analyzed 2025 and 2040 for their transportation modeling; 2040 is also the horizon year for Plan Bay Area 2013 (Plan Bay Area),[2] the regional land use plan produced by the Association of Bay Area Governments (ABAG). For most topics in this EIR, impacts would be greater in 2040 than in 2025; thus, the analysis focuses on the impacts to the environment in 2040. For five of the sections (Transportation, Air Quality, Noise and Vibration, GHG, and Energy), the analysis includes both 2025 and 2040.

[2] Association of Bay Area Governments (ABAG), and Metropolitan Transportation Commission (MTC), 2013. Plan Bay Area 2013. Available at: http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf

### b. Use of Future Analysis Years

In accordance with CEQA requirements, an EIR must describe the existing physical environmental conditions in the vicinity of the project. The existing conditions at the time that CEQA review commences "will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines §15125[a]). However, "normally" does not mean "always." Where environmental conditions have varied over time, past conditions or a representative range of past variation can constitute the proper baseline, rather than a snapshot of conditions as of the date of the Notice of Preparation of an EIR.

For long-range transit projects such as the Proposed Project or Build Alternatives, which would not begin operation for approximately 10 years, the use of existing conditions as a baseline could be misleading because many existing conditions (for example, background traffic volumes and transit ridership) would change by the opening of passenger service. In Neighbors for Smart Rail v. Exposition Metro Line Construction Authority (2013) 57 Cal.4th 439, the California Supreme Court approved the use of a future baseline for determining the significance of a proposed project's impacts under CEQA, where using an existing conditions baseline would be misleading. The Court explained that CEQA analysis must employ a realistic baseline that provides the most accurate picture practically possible of potential environmental impacts. In particular, the Court found, for "a large-scale transportation project like that at issue here, to the extent changing background conditions during the project's lengthy approval and construction period are expected to affect the project's likely impacts, the agency has discretion to consider those changing background conditions in formulating its analytical baseline." However, noting the uncertainties involved in projecting future baselines, the Court also required that an agency using a future baseline for a long-term project must find, based on substantial evidence in the record, that analysis of impacts of the long-term project on currently existing conditions would be uninformative or misleading to decision-makers and the public.

In the case of the Proposed Project and Build Alternatives, use of the existing conditions baseline would be misleading as the existing conditions will not adequately represent the anticipated population in the Tri-Valley Area at the time of the assumed opening year of the Proposed Project or Build Alternatives (2025). As shown in Table 3.A-1, the population of Alameda County is projected to increase by approximately 11 percent by 2025, and San

**TABLE 3.A-1 GROWTH PROJECTIONS FOR THE PROJECT CORRIDOR THROUGH 2040**

| Population[a] | Existing | 2025 | Percent Increase (Existing to 2025) | 2040 | Percent Increase (Existing to 2040) |
|---|---|---|---|---|---|
| Alameda County (total) | 1,559,308 | 1,730,100 | 11% | 1,987,900 | 27% |
| Dublin | 49,694 | 58,700 | 18% | 73,800 | 49% |
| Pleasanton | 73,164 | 80,200 | 10% | 91,800 | 25% |
| Livermore | 83,901 | 91,700 | 9% | 104,300 | 24% |
| San Joaquin County | 742,781 | 872,051 | 17% | 1,070,486 | 44% |
| **Households** | **Existing** | **2025** | | **2040** | |
| Alameda County (total) | 551,734 | 624,300 | 13% | 705,330 | 28% |
| Dublin | 16,476 | 19,200 | 17% | 23,610 | 43% |
| Pleasanton | 25,222 | 28,730 | 14% | 32,300 | 28% |
| Livermore | 29,956 | 33,970 | 13% | 38,940 | 30% |
| San Joaquin County | 231,693 | 267,262 | 15% | 319,756 | 38% |
| **Jobs[b]** | **Existing** | **2025** | | **2040** | |
| Alameda County (total) | 746,688 | 850,610 | 14% | 947,650 | 27% |
| Dublin | 19,138 | 25,620 | 34% | 31,650 | 65% |
| Pleasanton | 64,152 | 64,320 | 0% | 69,640 | 9% |
| Livermore | 44,953 | 47,860 | 6% | 53,210 | 18% |
| San Joaquin County | 219,330 | 248,748 | 13% | 299,717 | 37% |

Notes:
[a] Existing population and households for Alameda County and municipalities are from the 2010-2014 American Community Survey 5-Year Estimates. Existing population and households for San Joaquin County are 2015 estimates from the SJCOG Regional Transportation Plan/Sustainable Communities Strategy.
[b] Existing jobs are shown for 2012 for Alameda County and municipalities, and for 2015 for San Joaquin County.
Sources:
U.S. Census Bureau, 2014. [for existing population and households – Alameda County and municipalities]
U.S. Census Bureau, 2012. [for existing jobs – Alameda County and municipalities]
Association of Bay Area Governments (ABAG), 2013. [for 2025 and 2040 data – Alameda County and municipalities]
Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), 2013. Draft Plan Bay Area, Final Forecast of Jobs, Population and Housing. July. [for 2025 and 2040 data – Alameda County and municipalities]
San Joaquin Council of Governments (SJCOG), 2014. [for existing, 2025, and 2040 data – San Joaquin County]

Joaquin County is projected to increase by approximately 17 percent.[3, 4, 5] Similarly, traffic conditions are anticipated to change by 2025 due to the growth in the Tri-Valley Area, San Joaquin County, and other Central Valley counties. Furthermore, elevated growth rates are expected to continue through 2040. The population of Alameda County is expected to grow by 27 percent, and within the Tri-Valley Area, Dublin, Pleasanton, and Livermore would grow by 49 percent, 25 percent, and 24 percent respectively. San Joaquin County is expected to grow by 44 percent by 2040.

I-580 will continue as the one major highway from the Central Valley through the Tri-Valley Area to the East Bay and San Francisco. However, multiple secondary regional routes are planned for extensions or other upgrades that will increase their capacity to support vehicles and their attractiveness to regional travelers, including Dublin Boulevard, which is planned to be extended and will serve as a parallel route to I-580 for local traffic in the Tri-Valley Area, and Isabel Avenue (State Route 84), which is planned to be widened in some sections and will become a more attractive potential alternative route to I-580 and I-680 for those traveling from the Tri-Valley Area to Santa Clara County. Thus, the use of existing conditions baseline for the analysis of transportation and other topics that rely on such metrics as vehicle delay and vehicle miles traveled would be entirely misleading, as the existing conditions would not represent the conditions at the time the project were to begin operations.

There is inevitably some uncertainty regarding the use of projected future conditions as the baseline. However, what is certain is that the project, which will not begin service before 2025, will not operate under the conditions that exist today. Projections represent the best available information assembled by the agencies with jurisdiction and expertise.

For the above reasons, and consistent with Neighbors for Smart Rail, the analysis of operational impacts for the quantitative EIR sections—Transportation, Air Quality, Noise and Vibration, GHG, and Energy—uses a future baseline that represents the anticipated start of project operation (2025) because this most accurately informs decision-makers and the public of the project's potential environmental impacts.

For all other EIR sections (referred to as the qualitative sections), existing conditions are considered to adequately represent the baseline physical conditions by which the significance of operational impacts is assessed. As described above, the description of

[3] United States Census Bureau, 2014. 2010-2014 American Community Survey 5-Year Estimates. Available at: https://factfinder.census.gov/.

[4] San Joaquin Council of Governments, 2014. Regional Transportation Plan, Sustainable Communities Strategy. Available at: http://www.sjcog.org/278/Adopted-2014-RTPSCS

[5] Association of Bay Area Governments (ABAG), and Metropolitan Transportation Commission (MTC), 2013. Plan Bay Area 2013. Available at: http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf.

existing conditions at the date of the issuance of the NOP (2012) has been updated with more recent information or surveys to provide the most current information available, as noted in each section. Therefore, the existing conditions baseline is considered to range from 2012 to 2017. For all construction impacts, the existing conditions baseline is used, because construction would take place in the near term and be completed by 2026.

### c. Land Use Assumptions

The EIR analysis, particularly the transportation and land use sections, is informed by growth projections for the nine-county Bay Area region from Plan Bay Area as well growth projections by the San Joaquin Council of Governments (SJCOG) in its Regional Transportation Plan/Sustainable Communities Strategy.[6, 7, 8] The growth forecasts provide an overview of regional land use trends with data provided for 5-year increments (for example 2020, 2025, and 2030) and the Travel Demand Model used in the transportation analysis is based on the land use assumptions provided in Plan Bay Area, which is this region's Regional Transportation Plan/Sustainable Communities Strategy.

Table 3.A-1 presents ABAG's population, household and employment growth projections for Alameda County and municipalities along the project corridor (Dublin, Pleasanton, and Livermore) and SJCOG's population, household and employment growth projections for San Joaquin County.

## 4. Cumulative Analysis

The cumulative impacts from implementation of the Proposed Project or an Alternative combined with the impacts of past, present, and probable future projects also are analyzed. The cumulative scenarios include probable future projects in addition to ABAG's Plan Bay Area projections and SJCOG's Regional Transportation Plan/Sustainable Communities Strategy projections.[9,10] For most environmental topics, the cumulative scenario is provided for 2040 only, as 2040 would be the worst-case year cumulative scenario. As development increases in accordance with projected trends, cumulative impacts to a wide range of resources (e.g. biology, cultural resources, etc.) would be expected to worsen. For the quantitative sections, the cumulative analysis is provided for

[6] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.
[7] Association of Bay Area Governments (ABAG), and Metropolitan Transportation Commission (MTC), 2013. Plan Bay Area 2013. Available at: http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf.
[8] San Joaquin Council of Governments, 2014. Regional Transportation Plan, Sustainable Communities Strategy. Available at: http://www.sjcog.org/278/Adopted-2014-RTPSCS
[9] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.
[10] San Joaquin Council of Governments, 2014. Regional Transportation Plan, Sustainable Communities Strategy. Available at: http://www.sjcog.org/278/Adopted-2014-RTPSCS

both 2025 and 2040 to best represent potential cumulative impacts at the beginning of operations and in the horizon year.

The approach to the cumulative impacts analysis is described below, including an overview and the specific projects considered in the analysis.

### a. Overview and Approach

Cumulative impacts, as defined in Section 15355 of the CEQA Guidelines, refer to two or more individual effects that, when taken together, are "considerable" or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of the project when added to those of other closely related past, present, and probable future projects. Pertinent guidance for cumulative impact analysis is provided in Section 15130 of the CEQA Guidelines, as follows:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable (i.e., incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary). CEQA Guidelines §§ 15064(h)(1) explains that "cumulatively considerable" means that the "incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."
- An EIR should not address impacts that do not result in part from the project evaluated in the EIR.
- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The extent of discussion of cumulative impacts depends on their severity and likelihood of occurrence, but need not be as detailed as for the effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than the attributes of other cumulative projects that do not contribute to the cumulative impact.

Cumulative effects must be considered because, even if the BART to Livermore Extension Project on its own has a less-than-significant impact, its contribution to a potential significant impact combined with other projects can create a collective impact that exceeds the standard of significance. If the BART to Livermore Extension Project's contribution combined with those of other projects would not exceed the significance

standard, the cumulative impact is less than significant. Additionally, if the project does not make any contribution to an adverse impact, it does not have a significant cumulative impact, even if the effects of other projects are cumulatively significant.

In accordance with CEQA Guidelines Section 15130, cumulative impacts may be analyzed by applying a list-based approach (a list of past, present, and probable future projects, including projects outside the control of the lead agency), a projections-based approach (a summary of projections in an adopted general plan or related planning document), or a reasonable combination of the two.

This EIR uses a combination of the two approaches for the analysis of cumulative impacts; that is, the projections-based approach is used, but is augmented where appropriate with the list-based approach of past, present, and probable future projects in the project area.

### b. Cumulative Projections

As described above, population, housing, and employment projections for 2025 and 2040 are based on ABAG's Plan Bay Area and SJCOG's Regional Transportation Plan/Sustainable Communities Strategy. Table 3.A-1 presents population and employment growth projections through 2040, as prepared by ABAG for Alameda County and for municipalities along the project corridor (Dublin, Pleasanton, and Livermore). For the quantitative sections, the cumulative No Project Conditions for 2025 and 2040 are based on the traffic volumes forecast for those years determined by the Travel Demand Model. The Travel Demand Model is a computer model used to forecast travel volumes by different travel modes (BART, bus, automobile, etc.) across a transportation network based on projected land uses. The Travel Demand Model is discussed further in the Impact Methodology subsection of Section 3.B, Transportation.

### c. Cumulative Projects and Plans

The proposed Dublin/Pleasanton Station Parking Expansion and the City of Livermore's Isabel Neighborhood Plan (INP) are two specific probable future projects/plans that are focused on in the cumulative analysis. Other probable future projects/plans are also considered in the analysis, as described below.

**Dublin/Pleasanton Station Parking Expansion.** BART is proposing to expand the amount of parking available at the Dublin/Pleasanton Station. The station currently has 2,890 spaces in a combination of surface parking lots and a six-level, 1,512-space parking structure. This project was initially planned as Phase II of the BART parking structure construction that was part of the Dublin Transit Center project. The initially proposed project would expand the existing parking structure with 655 additional parking spaces. Because an existing surface parking lot would be removed for the garage expansion, the net increase in parking would be approximately 540 spaces, increasing total available

parking from 2,890 to 3,430. BART is considering an alternative to constructing an expanded parking structure, referred to as a hybrid strategy. This strategy also provides approximately 540 spaces through a combination of approaches, as follows: (1) attendant-assisted parking to increase the capacity of the existing parking facilities by approximately 340 spaces; (2) restriping an existing surface parking lot to add approximately 60 spaces; and (3) utilizing 140 spaces of shared parking with nearby businesses. Future phases would replace the attendant-assisted parking with an automated parking system adjacent to the existing parking structure. If approved, the first phase of the hybrid strategy is expected to be completed within 1 to 2 years from the date of project approval by the BART Board of Directors.

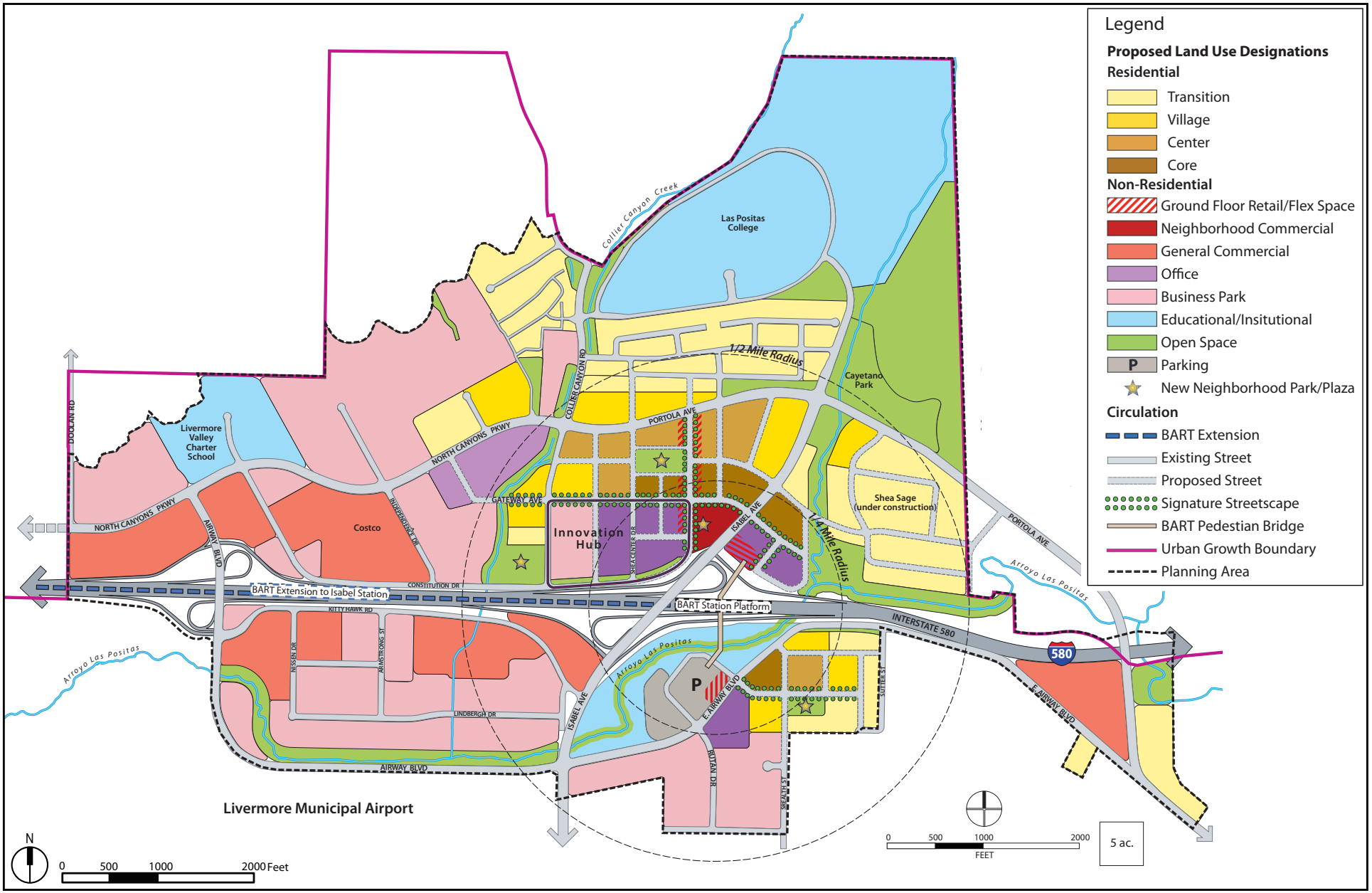
**Isabel Neighborhood Plan.** As discussed in Chapter 1, Introduction, the INP is a project separate from but related to the BART to Livermore Extension Project. One of BART's requirements for implementation of the Proposed Project is for the City of Livermore to create a Ridership Development Plan for the area around the potential future BART station at Isabel Avenue, consistent with BART's system expansion policy and criteria.[11, 12] The City of Livermore is preparing the INP to meet the Ridership Development Plan requirement and to serve as the Specific Plan for the station area. The INP will provide for more development around the proposed station area than is currently permitted by either the City of Livermore General Plan or projected by Plan Bay Area.

The INP planning area covers approximately 1,138 acres in the northwest area of Livermore and surrounding the I-580/Isabel Avenue interchange. The INP area and land use changes are shown in Figure 3.A-2. The INP intends to set design standards, create safe and vibrant neighborhoods, create circulation improvements, and promote compatibility with existing development within the 0.5-mile radius of the proposed BART station. At full buildout of the preferred plan, net new development would include the following:

- 4,095 residential housing units
- 1,655,850 square feet of office space
- 240,880 square feet of business park
- 324,310 square feet of neighborhood commercial space
- 296,320 square feet of general commercial space
- 9,148 jobs

[11] San Francisco Bay Area Rapid Transit District (BART), 1999. BART System Expansion Policy. Adopted December 2, 1999.

[12] San Francisco Bay Area Rapid Transit District (BART), 2002. System Expansion Criteria and Process. Adopted December 5, 2002.




Source: City of Livermore, 2017.

BART to Livermore Extension Project EIR

Figure 3.A-2
Introduction to Environmental Analysis
Isabel Neighborhood Plan

Proposed land uses immediately adjacent to the Isabel Station include office, retail, and residential uses north of I-580, and office, business park, and residential uses south of I-580.

For planning and environmental review purposes, a portion of the planned development is expected to be constructed by 2025, and full buildout of the plan is anticipated by 2040. Table 3.A-2 shows projections for the INP area from the City of Livermore General Plan, Plan Bay Area, and the INP. The INP would result in more development in the area compared to Plan Bay Area and the Livermore General Plan. Under the INP, approximately 48 percent of the households (up to 2,914 households) and 60 percent of the jobs (11,562 jobs) would be established by 2025. By 2040, 100 percent of the households (up to 6,069 households) and 100 percent of the jobs (19,374 jobs) would be established. Compared to the City of Livermore General Plan assumptions for the INP area, which anticipate 2,178 households and 16,337 new jobs by 2040, the INP represents an approximately 179 percent increase in households and 19 percent increase in jobs by 2040. Compared to the Plan Bay Area assumptions for the INP area, the INP would have approximately 6 percent more households and 3 percent more jobs in 2025. By 2040, the INP would have an approximately 42 percent increase in the number of households and 58 percent increase in the number of jobs.

**TABLE 3.A-2 PROJECTED GROWTH IN THE INP AREA THROUGH 2040**

| **Population** | **2013** | **2025** | **2040** |
|---|---|---|---|
| City of Livermore General Plan | -- | -- | -- |
| Plan Bay Area for INP Area | 4,187 | 7,510 | 11,663 |
| Isabel Neighborhood Plan[a] | -- | 7,343 | 15,294 |
| **Households** | | | |
| City of Livermore General Plan | -- | 2,178 | 2,178 |
| Plan Bay Area for INP Area | 1,519 | 2,737 | 4,260 |
| Isabel Neighborhood Plan[a] | -- | 2,914 | 6,069 |
| **Jobs** | | | |
| City of Livermore General Plan | -- | 11,335 | 16,337 |
| Plan Bay Area for INP Area | 3,300 | 11,265 | 12,237 |
| Isabel Neighborhood Plan | -- | 11,562 | 19,374 |

Notes:
[a] Assumes an average household size of 2.52 persons and an average vacancy rate of 5 percent.
-- = not available or not applicable
Sources:
Cambridge Systematics, 2017.
City of Livermore, 2016. Staff Report, Preferred Plan for the INP. July 5.

As described in Chapter 1, Introduction, the City of Livermore is the lead agency for the INP, which is undergoing a separate environmental review and approvals process from the

BART to Livermore Extension Project. The City of Livermore is preparing the INP to guide future development around a potential Isabel Station. For the purpose of this EIR, implementation of the INP is assumed to be implemented under the Proposed Project or DMU Alternative, but not under the Express Bus/BRT Alternative or Enhanced Bus Alternative.

**Other Cumulative Projects and Plans.** In addition to the Dublin/Pleasanton Station Parking Expansion and INP described above, a list was developed of other approved or reasonably foreseeable projects in the BART project corridor. The purpose of using a list approach in addition to the projections approach described above was to ensure that the impacts of major projects in the I-580 corridor (particularly construction impacts) would be included in the cumulative analysis. This list includes projects in Dublin, Pleasanton, and Livermore. The list of cumulative projects is provided in Appendix E.

### d. ACEforward

The San Joaquin Regional Rail Commission (SJRRC) is the designated owner, operator, and policy-making body for the Altamont Corridor Express (ACE) service, which focuses on connecting northern San Joaquin County, the Tri-Valley Area, and Silicon Valley by providing daily train service from Stockton to San Jose. SJRRC proposes to implement ACEforward, a phased rail infrastructure and service improvement plan to increase frequency, increase service reliability, and enhance passenger facilities along the existing ACE service corridor from San Jose to Stockton, and to extend ACE service to Modesto and Merced. This improvement plan would provide the foundation for SJRRC's long-term vision of intercity/commuter passenger rail services.

ACEforward includes near-term and longer-term improvements. Near-term improvements include plans to increase service to six trains per day and extend service to Modesto. Longer-term improvements include expanding service to 10 trains per day and extending service to Merced. These improvements are considered to be part of the future baseline for purposes of this EIR.

In addition, the ACEforward EIR considers 11 alternatives to connect ACE to BART in the Tri-Valley Area, as follows:

- Alternative P-TV-1a: ACE to BART Isabel Avenue at grade
- Alternative P-TV-1b: ACE to BART Isabel Avenue on elevated structure
- Alternative P-TV-1c: DMU/EMU to BART Isabel Avenue
- Alternative P-TV-1d: Bus shuttle from ACE Livermore to BART Isabel Avenue
- Alternative P-TV-2a: ACE to BART Dublin/Pleasanton at grade
- Alternative P-TV-2b: ACE to BART Dublin/Pleasanton on elevated structure

- Alternative P-TV-2c: DMU/EMU to BART Dublin/Pleasanton
- Alternative P-TV-2d: Existing bus shuttle from ACE Pleasanton to BART West Dublin/Pleasanton
- Alternative P-BART-1: BART to Greenville and ACE Greenville Road
- Alternative P-BART-2: BART to ACE Livermore intermodal and ACE Vasco Road
- Alternative P-BART-3: BART to ACE Livermore and ACE Vasco Road intermodal

Most of these alternatives would connect directly to the BART system. For instance, Alternatives P-TV-1a, b, and c would extend ACE to the proposed Isabel BART Station, and Alternatives P-TV-2 a, b, and c would extend ACE to the Dublin/Pleasanton BART Station. Alternatives P-BART-1, 2, and 3 would extend BART to meet ACE at Greenville, the Livermore intermodal, or the Vasco Road intermodal. The remaining two alternatives would use a bus shuttle to make the ACE-to-BART connection. These alternatives have not been developed enough to permit a comprehensive, detailed evaluation and will not be completed until at least 2023.[13] The ACEforward EIR does not provide project-level environmental analysis of any BART connection alternative, which must be conducted before SJRCC or another lead agency may decide whether to proceed with a project connecting ACE to BART. Accordingly, at this time the long-term prospect of a future connection between ACE and BART is considered speculative, and not a reasonably foreseeable future project for purposes of the BART to Livermore Extension Project EIR.

[13] San Joaquin Regional Rail Commission, 2017. ACEforward Draft Environmental Impact Report, Introduction, page 1-14. May.

# B. TRANSPORTATION

## 1. Introduction

This section describes the transportation setting and existing conditions as they relate to the BART to Livermore Extension Project, discusses the applicable State of California (State) and federal regulations, and assesses the potential impacts to transportation from construction and operation of the Proposed Project and Alternatives.

Figure 3.B-1 illustrates the overall transportation study area in eastern Alameda County. The study area—which comprises the cities of Dublin, Pleasanton, and Livermore, as well as portions of unincorporated Alameda County—generally extends from Greenville Road on the east, Dublin Boulevard and North Canyons Parkway on the north, Interstate Highway (I-) 680 on the west, and Stanley Boulevard on the south. The facilities included in the analysis vary according to transportation sub-topic, as noted in the subsections that follow.

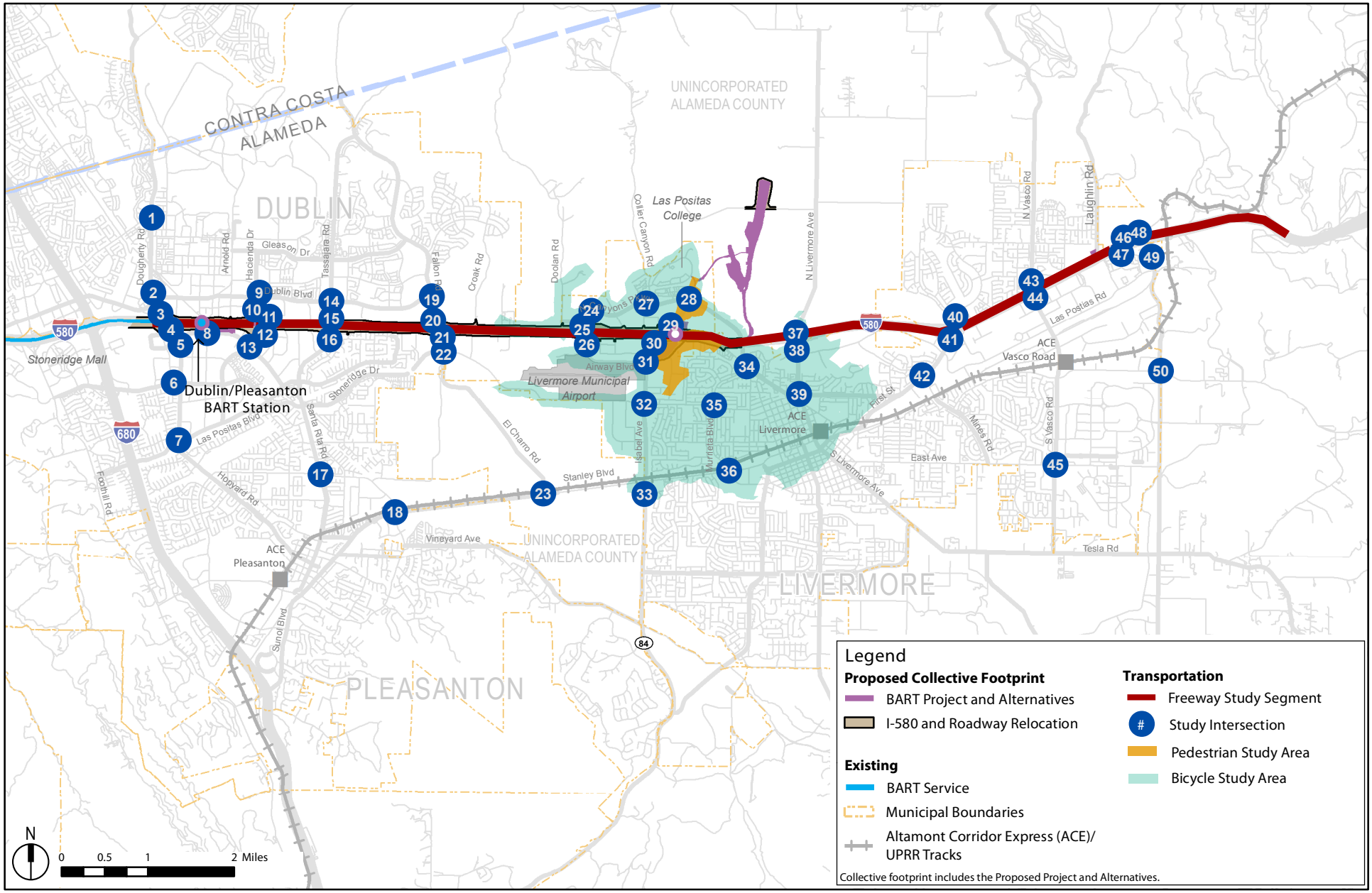
This section addresses impacts for the following resource topics:

- Freeway segments
- Local roadway intersections
- Transit, including the BART system and other nearby transit services
- Bicyclists
- Pedestrians
- Vehicle miles traveled (VMT)

Comments pertaining to transportation were received in response to the Notice of Preparation for this EIR and during the public scoping meeting held for the EIR. These comments focused on increased traffic from automobiles traveling on Collier Canyon Road. Traffic volumes on Collier Canyon Road would remain unchanged as a result of the Proposed Project and all Alternatives in 2040.

## 2. Existing Conditions

This subsection addresses the existing conditions for transportation, including the regional overview, local setting, freeway segments, local roadway intersections, transit, bicycle facilities, and pedestrians.




Source: Arup, 2017.

BART to Livermore Extension Project EIR

Figure 3.B-1
Transportation
Study Areas

### a. Regional Overview

The Tri-Valley Area is located east of San Francisco Bay within the I-580 and I-680 freeway corridors, and includes the Amador, Livermore, and San Ramon Valleys. The Tri-Valley Area encompasses the cities of Dublin, Pleasanton, and Livermore in eastern Alameda County and the town of Danville and the city of San Ramon in south Contra Costa County.

Regional trends in the Tri-Valley Area that affect transportation within the project vicinity are described below. The region has been one of the fastest-growing subregions of the San Francisco Bay Area (Bay Area). The Tri-Valley Area's housing market has largely driven its transportation patterns, although the Tri-Valley Area also includes multiple employment areas. The strongest travel pattern is in-commuting from the Tri-Valley Area and points east (including San Joaquin and Stanislaus Counties) to the rest of the Bay Area. Demand following this pattern has increased, leading to regular heavy traffic congestion on I-580.

### b. Local Setting

This subsection describes the existing conditions related to freeway segments, local roadway intersections, transit, bicycles, and pedestrians.

#### (1) Freeway Segments

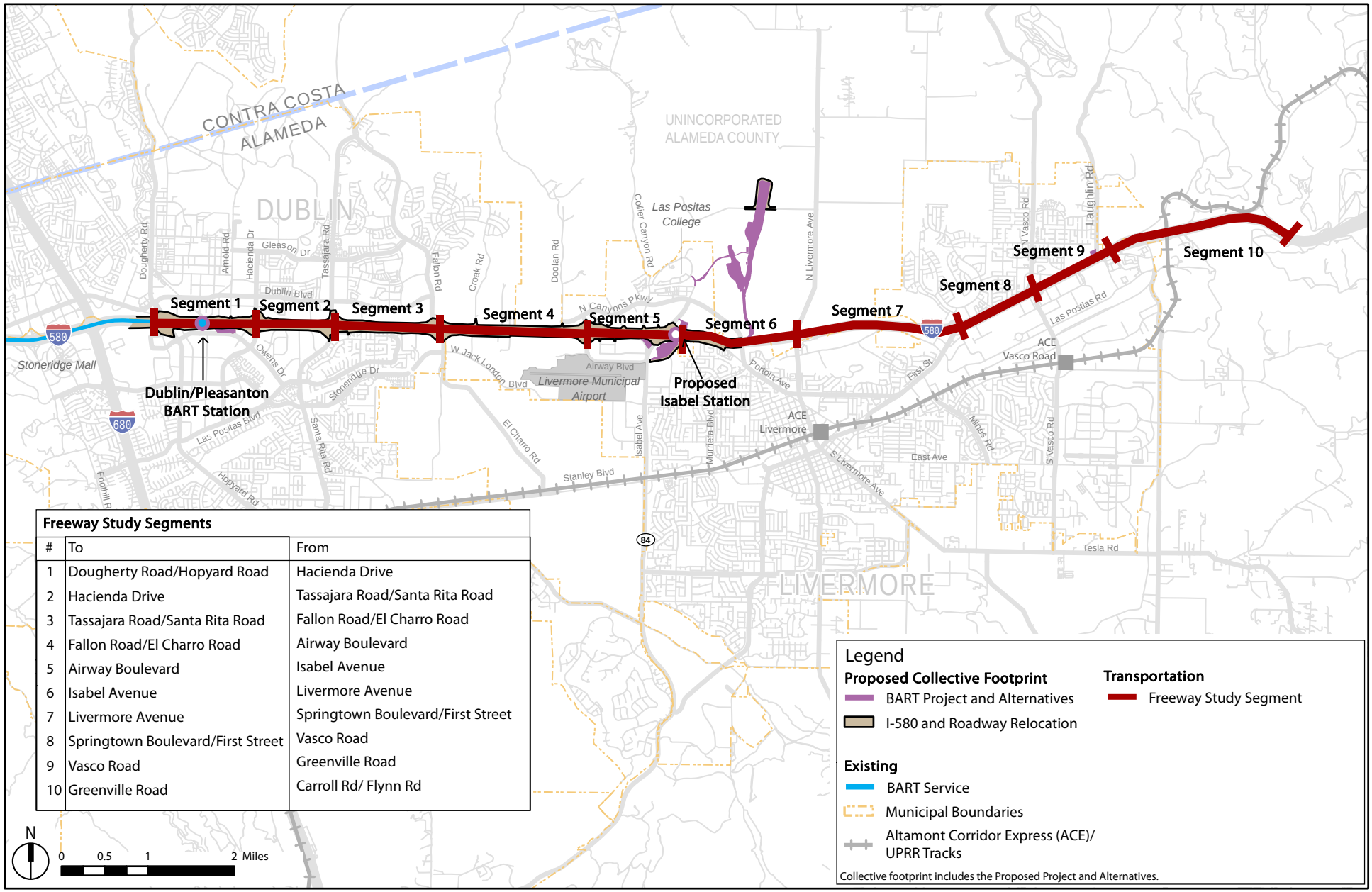
The key regional freeway route through the study area is I-580. Table 3.B-1 and Figure 3.B-2 identify the freeway segments analyzed as part of this study. Project impacts on the study area roadways were identified by measuring the effect of project traffic on freeways in the site vicinity during the morning (6:30 to 8:30 a.m.) and evening (4:30 to 6:30 p.m.) peak periods, when traffic volumes are the greatest and the project is expected to generate the most vehicular traffic. These segments were selected based on their location along I-580 and major travel routes serving the potential project station locations and in consultation with local jurisdictions.

I-580 is a freeway that runs east-west from I-5 near Tracy to United States (U.S.) Highway 101 in San Rafael. I-580 connects the Bay Area with San Joaquin County and is a major inter-regional route for commuting, truck commerce, and recreational travel. Through the study area, I-580 currently features at least four general-purpose lanes in each direction, as well as one auxiliary lane in each direction between most interchanges. I-580 also includes one high-occupancy toll (HOT) lane in the westbound direction between Greenville Road and San Ramon Road/Foothill Road and two HOT lanes in the eastbound direction, with one of the eastbound HOT lanes extending from Hacienda Drive to Greenville Road and the other extending from El Charro/Fallon Road to Vasco Road. All together, these HOT lanes are known as the I-580 Express Lanes.

**TABLE 3.B-1 I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, EXISTING (2014)**

| | | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|---|
| # | To | From | WB LOS | EB LOS | WB LOS | EB LOS |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | D | A | C | E |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | A | C | E |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/El Charro Road | D | A | B | E |
| 4 | Fallon Road/El Charro Road | Airway Boulevard | E | A | A | D |
| 5 | Airway Boulevard | Isabel Avenue | F | A | A | E |
| 6 | Isabel Avenue | Livermore Avenue | F | A | A | E |
| 7 | Livermore Avenue | Springtown Boulevard/First Street | F | A | A | D |
| 8 | Springtown Boulevard/First Street | Vasco Road | F | A | A | F |
| 9 | Vasco Road | Greenville Road | F | A | A | F |
| 10 | Greenville Road | Carroll Road/ Flynn Road | E | A | A | E |

Notes: EB = eastbound; WB = westbound; LOS = level of service.
Source: Alameda County Transportation Commission (Alameda CTC), 2014.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-2
Transportation
Freeway Study Area

I-580 experiences severe congestion during the morning (AM) peak period and evening (PM) peak period. The peak hour varies for each study segment; however, the AM peak hour typically occurs between 6:30 and 8:30 a.m. while the PM peak hour typically occurs between 4:30 and 6:30 p.m. Within the Livermore city limits in 2015, I-580 carried an average daily traffic volume of 149,000 to 214,000 vehicles in both directions.[1]

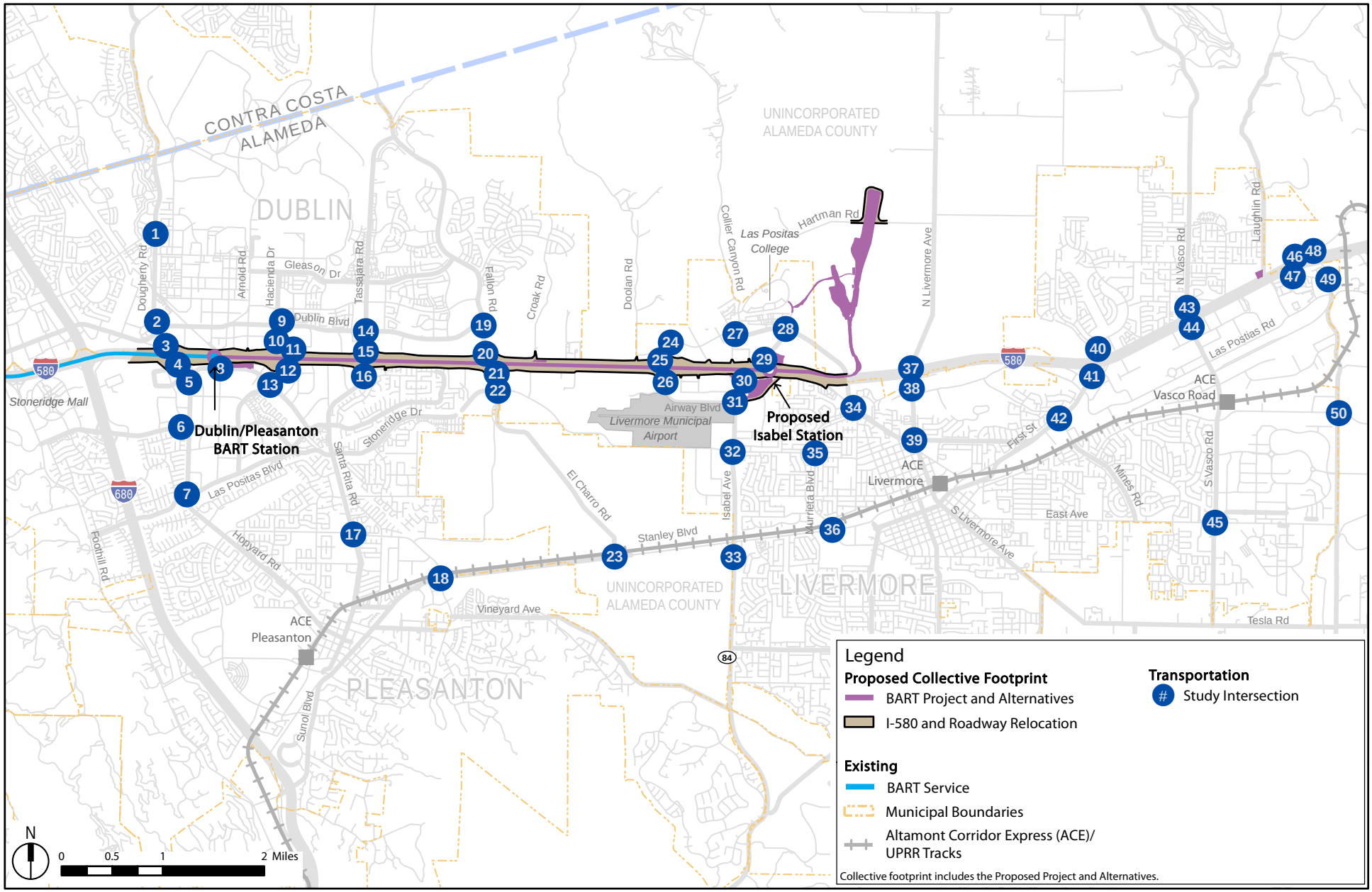
The stretch of I-580 through Altamont Pass just east of Livermore is a primary transportation gateway to the Bay Area from the Central Valley (including San Joaquin and Stanislaus Counties). On an average weekday in 2015, 149,000 vehicles passed over Altamont Pass on I-580 (counting trips in either direction).[2]

The operational performance of freeway segments is described by level of service (LOS), a performance metric for roadways and intersections based on the ratio of vehicle demand to available capacity. Levels range from LOS A, which indicates free-flowing or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays. For more information about the freeway segment LOS methodology, please see the Methodology subsection below. Existing freeway operations were evaluated using information from the Alameda County Congestion Management Program 2014 LOS Monitoring Study[3] developed by the Alameda County Transportation Commission (Alameda CTC). Table 3.B-1 summarizes the AM and PM LOS results for the general-purpose lanes.

### (2) Local Roadways and Intersections

The local roadway network for the study area includes arterials, collectors, and local streets. This network is described below from north to south and east to west, as designated in general plan documents for the relevant jurisdictions. The roadway intersections included in this analysis are based on consultation with local jurisdictions, and the intersection location along major travel routes that may be affected by the Proposed Project and Build Alternatives. Figure 3.B-3 identifies the intersections analyzed as part of this study.

[1] California Department of Transportation (Caltrans), 2015. Traffic Volumes on the California State Highway System.
[2] Ibid.
[3] Alameda County Transportation Commission (Alameda CTC), 2014. Alameda CTC 2014 Level of Service Monitoring Report. Spring.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-3
Transportation
Study Area Intersections

Operating conditions on the study area roadways were determined by measuring the effect of traffic on intersections in the site vicinity during the AM and PM peak hours, when traffic is typically the highest and when the Proposed Project and Build Alternatives are expected to generate the most vehicular traffic. Traffic conditions at study intersections, listed in Table 3.B-2, were evaluated using the Highway Capacity Manual (HCM) 2000[4] LOS methodology, as described in the Impact Methodology subsection below.

### (a) City of Dublin

In Dublin, the major streets in the project study area are Dublin Boulevard, Hacienda Drive, Dougherty Road, Tassajara Road, and Fallon 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.

- **Dublin Boulevard** is a major east-west arterial that runs from west of San Ramon Road east to Fallon Road. This arterial is primarily a four- to six-lane road with a median. It is the principal east-west route to the Dublin/Pleasanton BART Station (Dublin/Pleasanton Station). Bicycle lanes and sidewalks are provided on portions of Dublin Boulevard.
- **Hacienda Drive** is a north-south arterial that connects I-580 to Dublin to the north (as far as Gleason Road) and Pleasanton to the south (as far as Las Positas Boulevard). It is a six-lane road with a landscaped median. Sidewalks and bicycle lanes are provided along Hacienda Drive from the I-580 interchange to Gleason Drive.
- **Dougherty Road** is a major north-south arterial that connects Crow Canyon Road in the north in San Ramon to I-580 in the south. It is primarily a four- to six-lane road. Sidewalks are provided along both sides of the arterial.
- **Tassajara Road** is a major north-south arterial that connects I-580 with points north. Tassajara Road continues south into Pleasanton as Santa Rita Road. Tassajara Road is a four- to six-lane arterial, with bicycle lanes and sidewalks adjacent to the road provided.
- **Fallon Road** is a major north-south arterial that connects I-580 with Tassajara Road to the north. Fallon Road continues south into Pleasanton as El Charro Road. Fallon Road is a four- to six-lane road, with bicycle lanes and sidewalks adjacent to the road provided.

[4] Transportation Research Board, 2000. Highway Capacity Manual.

**TABLE 3.B-2 INTERSECTION LEVEL OF SERVICE, EXISTING (2013)**

| | | | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|---|---|
| # | Intersection | Control | Location | Avg. Delay (sec) | LOS | Avg. Delay (sec) | LOS |
| 1 | Dougherty Road & Amador Valley Road | Signal | Dublin | 53.0 | D | 37.1 | D |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard | Signal | Dublin | 41.5 | D | 56.9 | E |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps | Signal | Dublin | 12.1 | B | 12.6 | B |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | Signal | Pleasanton | 50.2 | D | 27.9 | C |
| 5 | Hopyard Road & Owens Road | Signal | Pleasanton | 37.6 | D | 180.9 | F |
| 6 | Hopyard Road & Stoneridge Drive | Signal | Pleasanton | 25.5 | C | 42.2 | D |
| 7 | Hopyard Road & Las Positas Boulevard | Signal | Pleasanton | 27.0 | C | 13.1 | B |
| 8 | Willow Road & Owens Road | Signal | Dublin | 11.4 | B | 29.6 | C |
| 9 | Hacienda Drive & Dublin Boulevard | Signal | Dublin | 23.7 | C | 23.1 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings | Signal | Dublin | 19.1 | B | 8.6 | A |
| 11 | Hacienda Drive & I-580 WB Ramps | Signal | Pleasanton | 7.8 | A | 15.9 | B |
| 12 | Hacienda Drive & I-580 EB Ramps | Signal | Pleasanton | 11.9 | B | 51.0 | D |
| 13 | Hacienda Drive & Owens Road | Signal | Dublin | 43.2 | D | 47.2 | D |
| 14 | Tassajara Road & Dublin Boulevard | Signal | Dublin | 41.8 | D | 9.8 | A |
| 15 | Tassajara Road & I-580 WB Ramps | Signal | Pleasanton | 10.2 | B | 29.3 | C |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | Signal | Pleasanton | 33.2 | C | 54.4 | D |
| 17 | Santa Rita Road & Valley Avenue | Signal | Pleasanton | 45.3 | D | 35.3 | D |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | Signal | Dublin | 35.3 | D | 12.1 | B |
| 19 | Fallon Road & Dublin Boulevard/Croak Road | Signal | Dublin | 22.0 | C | 8.1 | A |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps | Signal | Livermore | 8.3 | A | 6.2 | A |
| 21 | El Charro Road & I-580 EB Ramps | Signal | Livermore | 5.9 | A | 26.3 | C |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | Signal | Livermore | 20.8 | C | N/A | N/A |

**TABLE 3.B-2 INTERSECTION LEVEL OF SERVICE, EXISTING (2013)**

| | | | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|---|---|
| # | Intersection | Control | Location | Avg. Delay (sec) | LOS | Avg. Delay (sec) | LOS |
| 23 | Stanley Boulevard & El Charro Road | Signal | Livermore | N/A | N/A | 15.8 | B |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | Signal | Livermore | 7.0 | A | 4.7 | A |
| 25 | Airway Boulevard & I-580 WB Ramps | Signal | Livermore | 3.1 | A | 36.1 | D |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | Signal | Livermore | 35.4 | D | 26.1 | C |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | Signal | Livermore | 23.3 | C | 23.5 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | Signal | Livermore | 25.5 | C | 8.3 | A |
| 29 | Isabel Avenue & I-580 WB Ramps | Signal | Livermore | 7.8 | A | 5.2 | A |
| 30 | Isabel Avenue & I-580 EB Ramps | Signal | Livermore | 6.3 | A | 23.3 | C |
| 31 | Isabel Avenue & Airway Boulevard | Signal | Livermore | 27.7 | C | 45.3 | D |
| 32 | Isabel Avenue & Jack London Boulevard | Signal | Livermore | 93.6 | F | 15.4 | B |
| 33 | Isabel Avenue Connector & Stanley Boulevard | Signal | Livermore | 18.8 | B | 13.1 | B |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | Signal | Pleasanton | 23.7 | C | 30.1 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | Signal | Livermore | 17.8 | B | 17.3 | B |
| 36 | Murrieta Boulevard & Stanley Boulevard | Signal | Livermore | 48.6 | D | 44.5 | D |
| 37 | Livermore Avenue & I-580 WB Ramps | Signal | Livermore | 33.2 | C | 12.9 | B |
| 38 | Livermore Avenue & I-580 EB Ramps | Signal | Livermore | 15.6 | B | 148.3 | F |
| 39 | Livermore Avenue & Portola Avenue | Signal | Livermore | 38.6 | D | 36.4 | D |
| 40 | First Street/Springtown Boulevard & I-580 WB Ramps | Signal | Livermore | 8.4 | A | 5.7 | A |
| 41 | First Street & I-580 EB Ramps | Signal | Livermore | 8.4 | A | 29.8 | C |
| 42 | First Street & Mines Road | Signal | Livermore | 27.8 | C | 63.3 | E |
| 43 | Vasco Road / I-580 WB Ramps | TWSC | Livermore | 0.9 | A | 1.1 | A |
| 44 | Vasco Road / I-580 EB Ramps | TWSC | Livermore | 0.3 | A | 0.6 | A |

**TABLE 3.B-2 INTERSECTION LEVEL OF SERVICE, EXISTING (2013)**

| | | | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|---|---|
| # | Intersection | Control | Location | Avg. Delay (sec) | LOS | Avg. Delay (sec) | LOS |
| 45 | Vasco Road & East Avenue | Signal | Livermore | 16.3 | B | 77.3 | E |
| 46 | Greenville Road & I-580 WB Ramps | Signal | Livermore | 11.7 | B | 4.6 | A |
| 47 | Greenville Road & I-580 EB Ramps | Signal | Livermore | 9.6 | A | 13.6 | B |
| 48 | Greenville Road /Altamont Pass Road | Signal | Livermore | 80.8 | F | 47.7 | E |
| 49 | Greenville Road & Southfront Road | Signal | Livermore | 10.9 | B | 13.6 | B |
| 50 | Greenville Road / Patterson Pass Road | TWSC | Livermore | >120 | F | >120 | F |

Notes: LOS = level of service; Avg. = average; sec = seconds; TWSC = two-way stop controlled; WB = westbound; EB = eastbound; N/A = not applicable.
Sources: Arup, 2017; Cambridge Systematics, 2017.

### (b) City of Pleasanton

In Pleasanton, the major streets in the project study area are, Stoneridge Drive, Owens Drive, Hopyard Road, Hacienda Drive, Valley Avenue, Santa Rita Road, and El Charro Road. Vehicles use this network of arterials to access the collector streets that provide access to homes and businesses on the local street network.

- **Stoneridge Drive** is generally a four- to six-lane minor arterial in Pleasanton that extends from Foothill Road east of I-680 to El Charro Road. The roadway is temporarily narrowed across the Arroyo Mocho to provide one travel lane in each direction. Bicycle lanes and sidewalks are provided on Stoneridge Drive. Stoneridge Drive is a route of regional significance.
- **Owens Drive** is a six-lane east-west arterial running along the northern edge of Pleasanton, parallel to I-580. Owens Drive terminates at Johnson Drive to the east and at West Las Positas Boulevard to the west. Owens Drive is a principal access route to the Dublin/Pleasanton Station. Owens Drive has bicycle and pedestrian facilities along the majority of the corridor as well as a landscaped median.
- **Hopyard Road** is a north-south arterial that connects southern Pleasanton with I-580, where it continues north into Dublin as Dougherty Road. Hopyard Road is a two- to six-lane arterial, with bicycle lanes and sidewalks provided adjacent to the road.

- **Valley Avenue** is an arterial tracing a semi-circular path through Pleasanton. It is a two- to four-lane arterial that connects Bernal Avenue in the west to Hopyard Road, Santa Rita Road, Stanley Boulevard, Vineyard Avenue and returns to Bernal Road in the east. Bicycle lanes are provided on portions of the corridor, and sidewalks are provided along much of the corridor.
- **Santa Rita Road** is a six-lane arterial that connects southern Pleasanton with I-580. Santa Rita Road connects with Main Street to the south and continues north into Dublin as Tassajara Road. Santa Rita Road includes adjacent bicycle and pedestrian facilities.
- **El Charro Road** is a four-lane minor arterial in Pleasanton between Stoneridge Drive/Jack London Boulevard and I-580, where it continues north into Dublin as Fallon Road. As part of the development of the East Pleasanton Specific Plan area, El Charro Road would be upgraded and extended to connect I-580 and Stanley Boulevard as a four-lane facility (two lanes in each direction) with pedestrian and bicycle facilities.

### (c) City of Livermore

In Livermore, the major streets include Collier Canyon Road, Isabel Avenue, Vallecitos Road/Holmes Street, Murrieta Boulevard, P Street, Livermore Avenue, Mines Road, Springtown Boulevard, Vasco Road, and Greenville Road, which provide north-south access through the city of Livermore. 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. Ten major arterials in Livermore were analyzed for this project EIR; these roadways, for which more than one intersection along the length of the arterial was studied, are described below.

- **Collier Canyon Road** is a north-south arterial in northern Livermore. This arterial is primarily a two-lane undivided roadway, providing access between the Doolan Canyon Regional Preserve and the city of Livermore. The speed limit is 35 miles per hour (mph) along the entire roadway.
- **North Canyons Parkway** is an east-west arterial north of I-580. This arterial is primarily a four-lane divided roadway with left-turn pockets where applicable. The street terminates at Doolan Road to the west and connects to Portola Avenue to the east.
- **Isabel Avenue** is a north-south arterial, a portion of which is also designated as State Route 84. Isabel Avenue typically carries heavy commuter traffic along western Livermore. The arterial traverses the entire length of the city of Livermore, provides direct access to I-580, and connects several neighborhoods and commercial areas in

western Livermore. Isabel Avenue 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 at key locations; however, at major intersection locations, the roadway is two lanes with a painted median. The State Route 84 Expressway Widening project, currently under construction and due for completion in 2018, will upgrade Isabel Avenue to expressway standards. Upon completion, Isabel Avenue will feature three lanes in each direction between Jack London Boulevard and Stanley Boulevard and two lanes in each direction between Stanley Boulevard and Ruby Hill Drive. The speed limit is primarily 50 mph along the entire roadway. Isabel Avenue would provide access to the proposed Isabel BART Station (Isabel Station) facilities north and south of I-580.

- **Vallecitos/Holmes Road** begins at State Route 84 as a two-lane road and extends northeast as a four to five-lane road as Holmes Road until it meets First Street in downtown Livermore. Sidewalks are present along Vallecitos/Holmes Road north of Wetmore Road. Class II bike lanes are featured along Vallecitos Road between Wetmore Road and Concannon Boulevard.
- **Jack London Boulevard** is an east-west arterial south of I-580 in western Livermore. This arterial is primarily a two-lane undivided road with left-turn pockets at most intersections. The street connects to Stoneridge Drive at the Livermore city limit and terminates at Murrieta Boulevard to the east.
- **Murrieta Boulevard** a north-south arterial that in western Livermore. The arterial includes two lanes in each direction, with a raised median and left-turn pockets at most intersections. The street connects to Portola Avenue in the north and Fourth Street in the south. The roadway provides access to I-580 from western Livermore. The speed limit is 35 mph along the entire roadway.
- **P Street** extends from College Avenue to Portola Avenue in Livermore. It is a five-lane road for the majority of its length, featuring on-street parking and sidewalks along its entire length. Class II bicycle lanes are present on P Street between Chestnut Street and Portola Avenue.
- **Livermore Avenue** is a major north-south arterial that extends throughout the entire length of the city 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, it 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 of Livermore. The speed limit along Livermore Avenue is 40 mph near I-580, and the speed limit is reduced to 30 mph near the downtown area. The posted speed limit is 25 mph in the downtown area between Railroad Avenue and Fourth Street.

- **Las Positas Road** is an east-west arterial south of I-580 along northern of Livermore. This arterial is primarily a four-lane divided roadway with bicycle lanes throughout and left-turn pockets at key locations.
- **Springtown Boulevard** is a four-lane road that spans from I-580 to Galloway Street with sidewalks along its entire length. Class II bicycle lanes are present along Springtown Boulevard between Lassen Road and Shire Court.
- **Stanley Boulevard** is a four to five-lane road that extends from Santa Rita Road in Pleasanton to First Street in Livermore. The road features sidewalks and Class II bicycle lanes along its entire length.
- **Portola Avenue** is a major east-west arterial, located in northern Livermore that operates north of downtown. South of I-580, this arterial is primarily a four-lane divided roadway with left-turn pockets where applicable; north of I-580, this arterial is a two-lane facility. The roadway connects several neighborhoods and businesses and provides direct connection to other major arterials throughout northern Livermore. Portola Avenue previously terminated at ramps to/from I-580; in 2012, as the final component of the Isabel/I-580 Interchange project, Portola Avenue was extended over I-580 to connect with North Canyons Parkway, near Las Positas College, north of the Isabel Station site. The speed limit is 35 mph along the roadway.
- **Vasco Road** is a north-south arterial that typically carries truck traffic along eastern Livermore. The arterial operates along the entire length of the city 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 eastern Livermore. The arterial extends north to east Contra Costa County and is a primary commute route. The speed limit is 45 mph along the entire roadway.
- **Greenville Road** is a north-south arterial at the eastern edge of Livermore that typically carries truck traffic along the eastern part of the city. 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 eastern Livermore. The speed limit is 45 mph along the entire roadway.

Dublin, Pleasanton, and Livermore experience a significant amount of nonlocal cut-through traffic on local 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 through the cities. Cut-through traffic can occur on arterial streets as well as on local and collector streets, and can also be accompanied by excessive speeding. Congestion on I-580 is predicted to worsen as cities east of the Altamont Pass continue to grow. 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. Increases in regional commuting, combined with increases in congestion on regional freeways and highways such as I-580, are expected to cause an increase in the amount of cut-through traffic in all Tri-Valley cities as motorists seek non-freeway routes for regional trips.

### (3) Transit

The BART system facilities are described below, followed by other transit services.

#### (a) BART

The BART system consists of six train lines operating out of 46 stations over 112 route miles; the system connects the Bay Area counties of Alameda, Contra Costa, San Francisco, and San Mateo. During fiscal year 2015–2016, 433,000 passengers entered the BART system each weekday. Four out of the six BART lines travel from the East Bay to San Francisco through a 3.6-mile-long tunnel known as the Transbay Tube. The Transbay Tube serves half of BART's daily ridership and is a major capacity constraint for the BART system. The Transbay Tube can safely accommodate about one train per 2.5 minutes, and is at capacity with 23 trains and nearly 25,000 passengers during the peak hour in the peak direction.

BART provides daily service in the study area at the Dublin/Pleasanton Station, which is located in the I-580 median between the Hopyard Road and Hacienda Drive interchanges. All trains serving the Dublin/Pleasanton Station currently run on the Dublin/Pleasanton-Daly City line, directly to Daly City via downtown San Francisco. On weekdays, BART trains complete 76 trips along this route in each direction, offering service from 4:00 a.m. to 1:00 a.m. the following morning. Weekday trains operate at 15-minute headways until about 7:30 p.m., and at 20-minute headways after 7:30 p.m. In fiscal year 2015–2016, an average of 7,900 BART riders per weekday exited the Dublin/Pleasanton Station.

The BART fleet includes 669 revenue vehicles: 59 A2 cars, 380 B2 cars, 150 C1 cars, and 80 C2 cars. The shortest BART train consists of three cars, while the longest consists of ten cars. A2 cars, which can operate only as lead or trail cars, have an operator's cab, automatic train operating equipment, and a two-way communications system; they can seat 60 customers comfortably and can carry over 200 customers in a crush load. B2 cars, which can operate only in the middle of a train, have the same carrying capacity as A2 cars; they do not have a cab and cannot control train operations. C1 cars are equipped with an operator's compartment, automatic train control equipment, and a communications system; they can operate as either lead, trail, or middle cars, allowing for train size to be changed without rerouting to a storage yard. C2 cars are nearly identical to C1 cars.

Table 3.B-3 below shows the average systemwide peak hour loads for existing conditions.

**TABLE 3.B-3 BART SYSTEMWIDE AVERAGE PEAK-HOUR LOAD AT MAXIMUM LOAD POINTS, EXISTING**

| Peak-Hour | Passengers per Car (2013) |
|---|---|
| AM | 107 |
| PM | 109 |

Source: Arup, 2013.

Table 3.B-4 below shows the existing morning peak hour loads at select stations along the Dublin/Pleasanton-Daly City line in the westbound.

**TABLE 3.B-4 ARRIVING TRAIN PEAK-HOUR LOAD, DUBLIN/PLEASANTON-DALY CITY LINE AT SELECTED STATIONS, AM PEAK DIRECTION (WESTBOUND), EXISTING**

| Selected Stations | Passengers per Car (2013) |
|---|---|
| Bay Fair | 82 |
| Coliseum/OAK | 98 |
| West Oakland | 104 |
| Embarcadero | 110 |

Source: Arup, 2013.

### (b) Other Transit Services

This subsection describes other transit services that connect to BART or operate near the Dublin/Pleasanton Station. The Livermore-Amador Valley Transit Authority (LAVTA), San Joaquin Regional Transit District (RTD), Stanislaus Regional Transit, County Connection, and Modesto Area Express (MAX) operate public bus services in the study area. The San Joaquin Regional Rail Commission (SJRRC) is the owner and operator of the commuter rail service in the study area known as the Altamont Corridor Express (ACE). Table 3.B-5 provides a detailed summary of the transit routes serving the study area. LAVTA is the primary bus service provider in the Tri-Valley Area (including the cities of Dublin, Pleasanton, and Livermore). LAVTA currently operates five routes in the study area, all of which connect to the Dublin/Pleasanton Station.

**TABLE 3.B-5 SURROUNDING TRANSIT SERVICES, EXISTING**

| Operator | Route | Existing Peak Headway | Existing Service Span | Route Overview |
|---|---|---|---|---|
| LAVTA | 10 | 30 min | ▪ Weekday: 4:00 a.m. – 1:14 a.m.<br>▪ Saturday: 4:57 a.m. – 1:14 a.m.<br>▪ Sunday: 5:17 a.m. – 1:14 a.m. | LLNL to Dublin/Pleasanton Station (to Stoneridge Mall on weekends and M–F 7:20–11:56 p.m. only). |
| LAVTA | 12 | 30 min | ▪ Weekday: 6:00 a.m. – 10:40 p.m.<br>▪ Weekend *(Sunday only)*: 6:00 a.m. – 10:40 p.m. | Livermore Transit Center to Stoneridge Mall via Dublin/ Pleasanton Station |
| LAVTA | 12X | 45 min | ▪ Weekday: 6:00 a.m. – 9:15 p.m.<br>▪ Weekend: No service | Livermore Transit Center, Valley Care Livermore Campus, Airway Park and Ride, Las Positas College, Kitty Hawk/Armstrong, Dublin Boulevard/Fallon intersection, East Dublin/Pleasanton Station |
| LAVTA | 20X | 45 min | ▪ Weekday: 6:15–10:00 a.m. & 4:00–6:40 p.m.<br>▪ Weekend: *No service* | Dublin/Pleasanton Station, Greenville Road, LLNL/SNL, Livermore Transit Center |
| LAVTA | Rapid Route | 15 min | ▪ Weekday: 5:30 a.m. – 8:00 p.m. | Dublin/Pleasanton Station to Livermore Transit Center |
| RTD | 150 | 60 min | ▪ Weekday: 4:10 a.m. – 10:20 p.m.<br>▪ Weekend: *No service* | Stockton Downtown Transit Center, Stockton-Michigan Park & Ride, Lathrop: Save Mart, Tracy Transit Station, Dublin/Pleasanton Station |
| MAX | BART Express | 60 min (two inbound trips in a.m. and two outbound trips in p.m.) | ▪ Weekday: 4:40–9:00 a.m. & 3:45–8:00 p.m.<br>▪ Weekend: *No service* | Modesto Downtown Transportation Center, Sisk Road Orchard Supply Hardware Parking Lot (Modesto), Dublin/Pleasanton Station |
| SJRRC | ACE | 30 min (four inbound trips in a.m. and four outbound trips in p.m.) | ▪ Weekday: 4:20–9:17 a.m. & 3:35–8:50 p.m.<br>▪ Weekend: *No service* | Downtown Stockton Transit Center to San Jose (via Livermore and Pleasanton) |
| StaRT | Commuter | One trip per peak period, peak direction | ▪ Weekday: 4:15–6:10 a.m. & 4:20–6:20 p.m. | Turlock, Patterson, Pleasanton via I-5 and I-580 |
| County Connection | 35 | 30 min (peak)<br>60 min (off peak) | ▪ Weekday: 6:00 a.m. – 8:17 p.m.<br>▪ Weekend: *No service* | San Ramon Transit Center, Bollinger Canyon Road, Dougherty Road, Dublin/Pleasanton Station |

**TABLE 3.B-5 SURROUNDING TRANSIT SERVICES, EXISTING**

| Operator | Route | Existing Peak Headway | Existing Service Span | Route Overview |
|---|---|---|---|---|
| County Connection | 36 | 60 min | ▪ Weekday: 6:15 a.m. – 9:00 p.m.<br>▪ Weekend: *No service* | San Ramon Transit Center, San Ramon, Dublin/Pleasanton Station |
| County Connection | 97X | 30 min (peak)<br>No off-peak service | ▪ Weekday: 6:30 a.m. – 7:00 p.m. | Bishop Ranch Express, South: Dublin/Pleasanton Station to Bishop Ranch |

Notes: This table refers to existing surrounding transit services prior to implementation of Wheels Forward Plan.
min = minutes; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District; MAX = Modesto Area Express; StaRT = Stanislaus Regional Transit; SJRRC = San Joaquin Regional Rail Commission; LLNL = Lawrence Livermore National Laboratory; SNL = Sandia National Laboratories.
Sources: Livermore-Amador Valley Transit Authority (LAVTA), 2014; San Joaquin Regional Transit District (RTD), 2016; Stanislaus Regional Transit (StaRT), 2016; County Connection, and Modesto Area Express (MAX), 2016; San Joaquin Regional Rail Commission (SJRRC), 2016.

The RTD is the regional transit provider for San Joaquin County, with one express route that connects the Stockton Downtown Transit Center to the Dublin/Pleasanton Station.

The MAX operates one route between the Modesto Downtown Transportation Center and the Dublin/Pleasanton Station.

The SJRRC operates four ACE trains in the peak direction between Stockton and San Jose via downtown Livermore and Pleasanton. The SJRRC is currently in the process of seeking environmental approval for ACEforward, an improvement plan to enhance reliability and service along the ACE corridor. The SJRRC issued a Draft EIR for ACEforward in April 2017. The ACEforward Draft EIR primarily focuses on near-term improvements to ACE service, including expanding from four to six daily trains and extending service to Modesto. Potential long-term improvements include expanding service from six to ten daily trains and extending service to Merced. In addition, the ACEforward EIR considers long-term alternatives for a connection in the Tri-Valley between the ACE regional rail system and the BART system. These BART connection alternatives include (1) extending ACE itself, or a DMU, EMU, or bus connection to BART's Dublin/Pleasanton Station; (2) bus service from ACE's Pleasanton Station to BART's West Dublin/Pleasanton Station; (3) extending BART to ACE's existing Livermore and Vasco Road Stations (with intermodal station features located either at the Livermore Station or the Vasco Road Station); (4) extending BART to meet ACE at a proposed new station at Greenville Road; and (5) extending ACE or a DMU, EMU, or bus connection to BART's proposed Isabel Avenue Station. In total, there are 11 long-term alternatives for connecting ACE to BART, while a proposed project to achieve

such connection remains to be identified at a future date. The ACEforward EIR does not provide project-level environmental analysis of any BART connection alternative; such analysis must be conducted before SJRCC or another lead agency can decide whether to proceed with a project connecting ACE to BART. Accordingly, at this time, the long-term prospect of a future connection between ACE and BART is considered speculative, and not a reasonably foreseeable future project for purposes of the BART to Livermore Extension Project EIR.

In the current condition, there are bus shuttles connecting BART to the ACE Pleasanton Station, operated by LAVTA, including Route 53 to the West Dublin/Pleasanton Station and Route 10 to the Dublin/Pleasanton Station. Stanislaus Regional Transit provides bus service in Stanislaus County. The operator runs one commuter route to the existing Dublin/Pleasanton Station, starting from the city of Turlock, via the city of Patterson.

County Connection provides fixed-route and paratransit service in Contra Costa County. County Connection runs three routes to the Dublin/Pleasanton Station.

The existing annual weekday ridership for key surrounding transit services within the study area is presented in Table 3.B-6.

**TABLE 3.B-6 WEEKDAY RIDERSHIP, EXISTING**

| Operator | Route | Ridership |
|---|---|---|
| LAVTA | 10 | 1,470 |
| LAVTA | 12/12X | 490 |
| LAVTA | 20X | 60 |
| LAVTA | Rapid Route | 1,440 |
| SJRRC | ACE | 4,380 |

Notes: LAVTA = Livermore-Amador Valley Transit Authority; SJRRC = San Joaquin Regional Rail Commission; ACE = Altamont Corridor Express.
Sources: Livermore-Amador Valley Transit Authority (LAVTA), 2014; San Joaquin Regional Rail Commission (SJRRC), 2014.

### (4) Bicycle Facilities

Bicycle facilities include three types: Class I off-street paths and trails; Class II on-street bicycle lanes; and Class III on-street bicycle routes. Bicycle paths and trails provide exclusive use for bicyclists separate from the vehicle road network. Bicycle lanes provide a restricted right-of-way (ROW) for the exclusive use of bicycles with a striped lane on the street. Bicycle routes (Class III) provide a shared facility with pedestrians or motor vehicles designated with signage and/or pavement markings.

The bicycle study area includes all bicycle facilities within a 15-minute bike ride of the proposed Isabel Station. This area is roughly bounded by Stanley Boulevard to the south, past North Canyon Parkway to the north, past Doolan Road to the west, and past North Livermore Avenue to the east. On-street bicycle facilities are designated on the majority of arterial and collector streets in the study area. Existing bicycle facilities and facilities planned by the City of Livermore are shown in Figure 3.B-4.

On-street bicycle (Class II) facilities that serve the study area include the following:

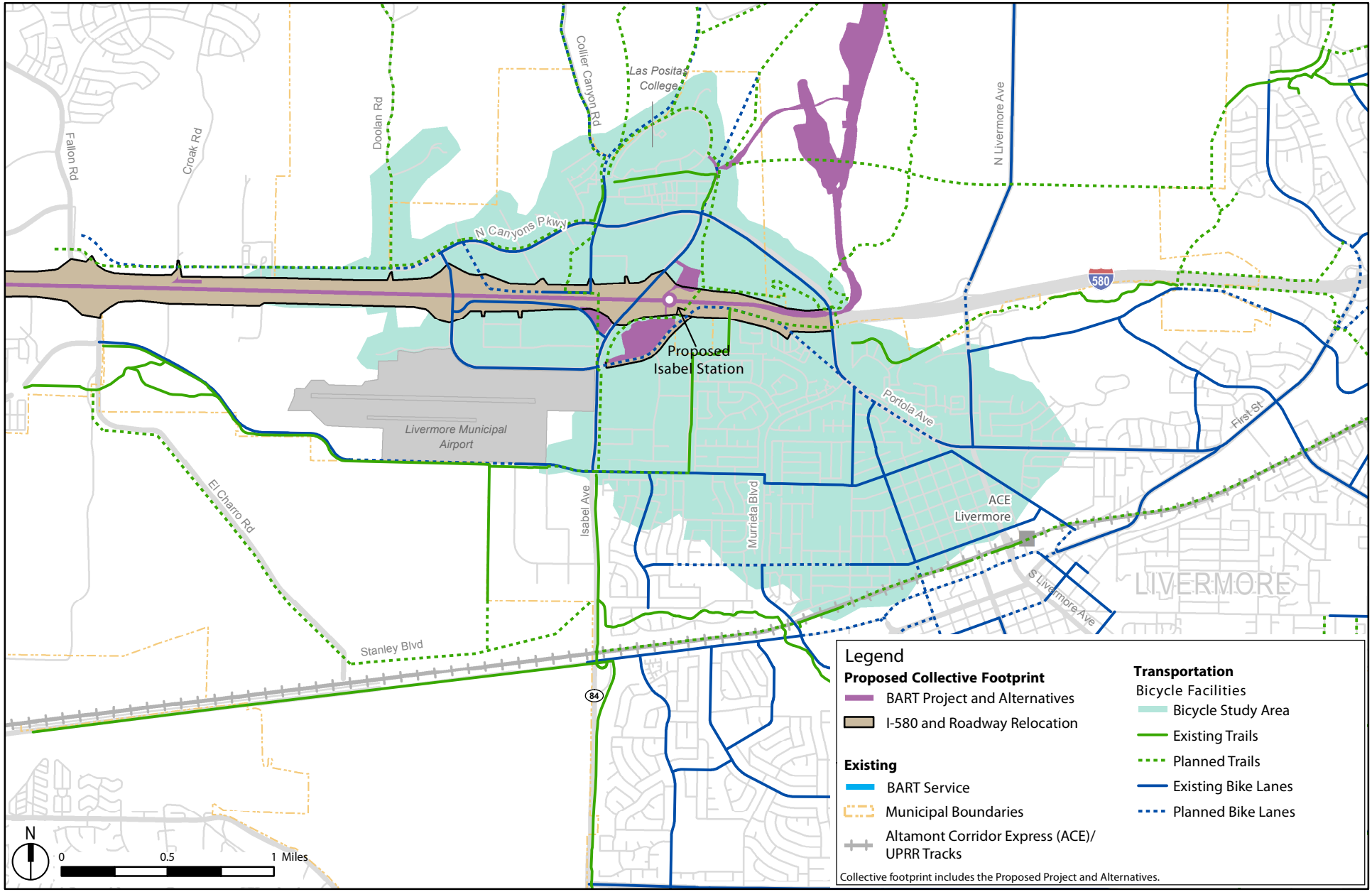
- Airway Boulevard from North Canyons Parkway to Kitty Hawk Road/Isabel Avenue
- Collier Creek Canyon Road from Portola Avenue to I-580
- Isabel Avenue between Portola Avenue and Jack London Boulevard
- Jack London Boulevard between El Charro Road and Murrieta Boulevard
- Portola Avenue between Doolan Road and First Street
- Rincon Street between Portola Avenue and East Jack London Boulevard
- North P Street between Portola Avenue and Chestnut Street
- North Livermore Avenue between Las Positas Road Portola Avenue
- Junction Avenue between East Jack London Boulevard and Railroad Avenue
- Hageman Drive between East Jack London Boulevard and Daisyfield Drive

Within the study area, most of the major arterials have Class II bike lanes. This network provides north-south and east-west corridors through the area. Streets with no bike infrastructure generally serve residential uses and do not have high vehicle traffic volumes.

### (5) Trails

The study area includes a network of Class I trails along major roadways, canals, creeks, and railroad corridors. These trails serve bicycles as well as pedestrians; some are also open for equestrian use. The existing trail network is shown on Figure 3.B-4, including trail designations by the city of Livermore as well as the East Bay Regional Park District and Livermore Area Recreation and Park District.[5, 6, 7] In addition, many of these trails are considered to be of regional significance and are included in the Alameda Countywide

[5] City of Livermore, 2011. Livermore Bikeways Map. Available at: http://www.cityoflivermore.net/civicax/filebank/documents/3620/.
[6] City of Pleasanton, 2007. Existing Community Trails & Bikeways.
[7] City of Dublin, 2012. Bike Lanes and Trails in the City of Dublin. April. Available at: http://dublinca.gov/DocumentCenter/View/7886.




Source: Arup, 2017.

BART to Livermore Extension Project EIR

Figure 3.B-4
Transportation
Bicycle Facilities – Existing and Planned

Bicycle Plan and the Regional Bicycle Plan for the San Francisco Bay Area.[8, 9] The existing trails in the vicinity of the Proposed Project and Build Alternatives footprints are as follows:

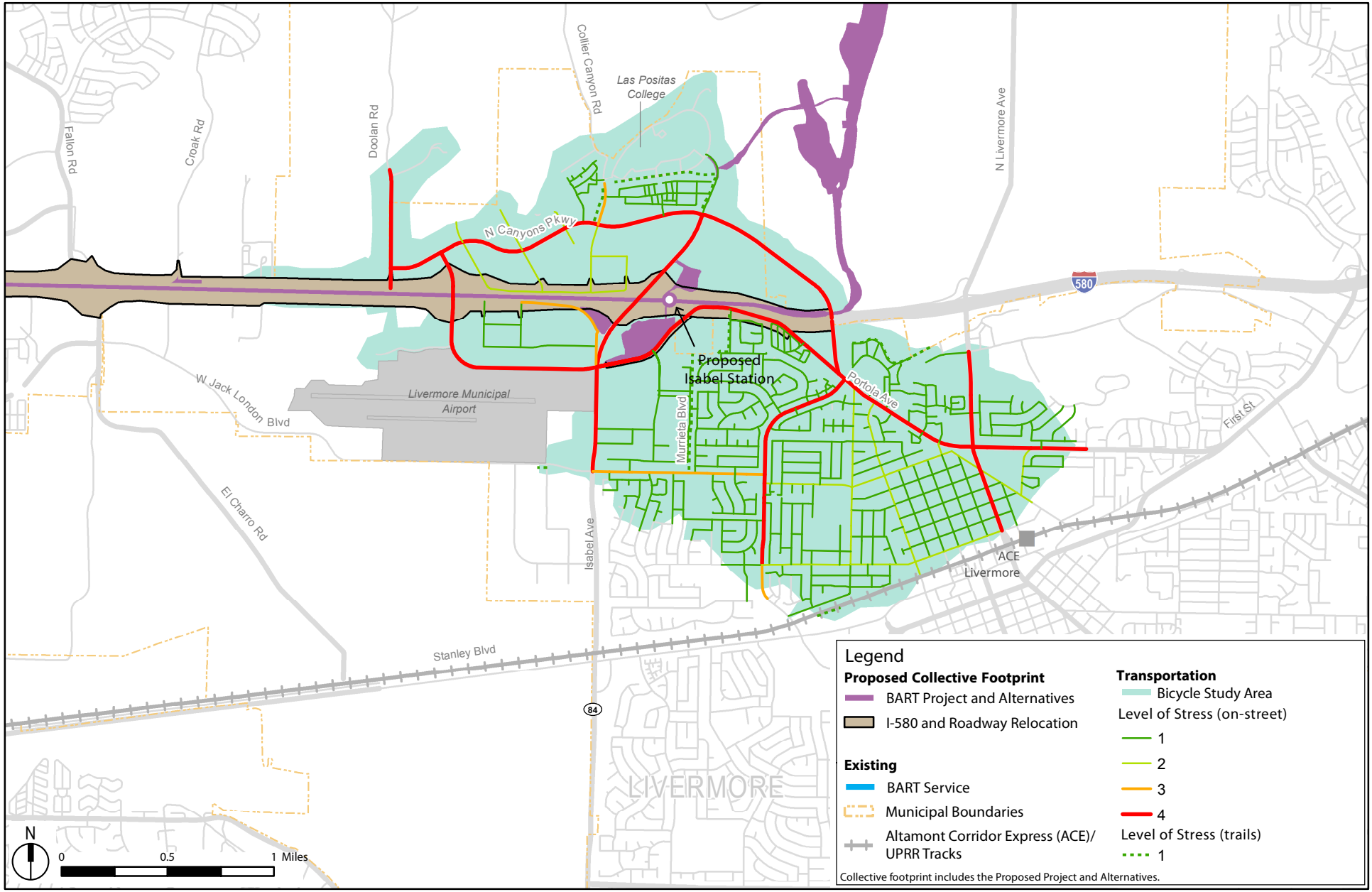
- Altamont Creek Trail – Sections of this trail are in the city of Livermore along Altamont Creek between Hartford Avenue and Laughlin Road.
- Collier Canyon Creek Trail – This trail runs north-south in the city of Livermore along Collier Canyon Creek from Las Positas College to I-580.
- Iron Horse Trail – This north-south trail serves the existing Dublin/Pleasanton Station from Concord to the north along the abandoned Southern Pacific ROW. This trail is maintained by the East Bay Regional Park District. An extension of this trail as far south as the existing Stanley Boulevard Trail has been proposed.
- Isabel Trail – This trail runs 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 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.
- Stealth Street Trail – This trail generally runs adjacent to Stealth Street between Airway Boulevard and Jack London Boulevard.

This report evaluates bicycle facilities using the level of traffic stress (LTS) methodology developed by the Mineta Transportation Institute in San Jose, California. The LTS method is an evaluation model that identifies streets with high traffic stress experienced by people biking in or adjacent to high vehicle traffic streets. The method classifies streets and intersections from LTS 1 (suitable for children) through LTS 4 (suitable for riders who are comfortable sharing the road with automobiles traveling at 35 mph or more). Bikeways are considered low stress if they are on low traffic/ low speed streets or, as roadways volumes and speeds increase, the physical separation between bikeways and traffic lanes also increases, such as bike lanes and protected bike lanes.

For more information about the bicycle facility LTS methodology, please see the Impact Methodology subsection below. Figure 3.B-5 summarizes LTS results for the bicycle facilities in the study area.

[8] Metropolitan Transportation Commission (MTC), 2012. Alameda Countywide Bicycle Plan. Available at: http://www.alamedactc.org/files/managed/Document/10093/ACTC_Ped_Plan_Final_10-25-12_011013.pdf. October.

[9] Metropolitan Transportation Commission (MTC), 2009. Regional Bicycle Plan for the San Francisco Bay Area.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-5
Transportation
Bicycle Level of Stress – Existing

### (6) Pedestrians

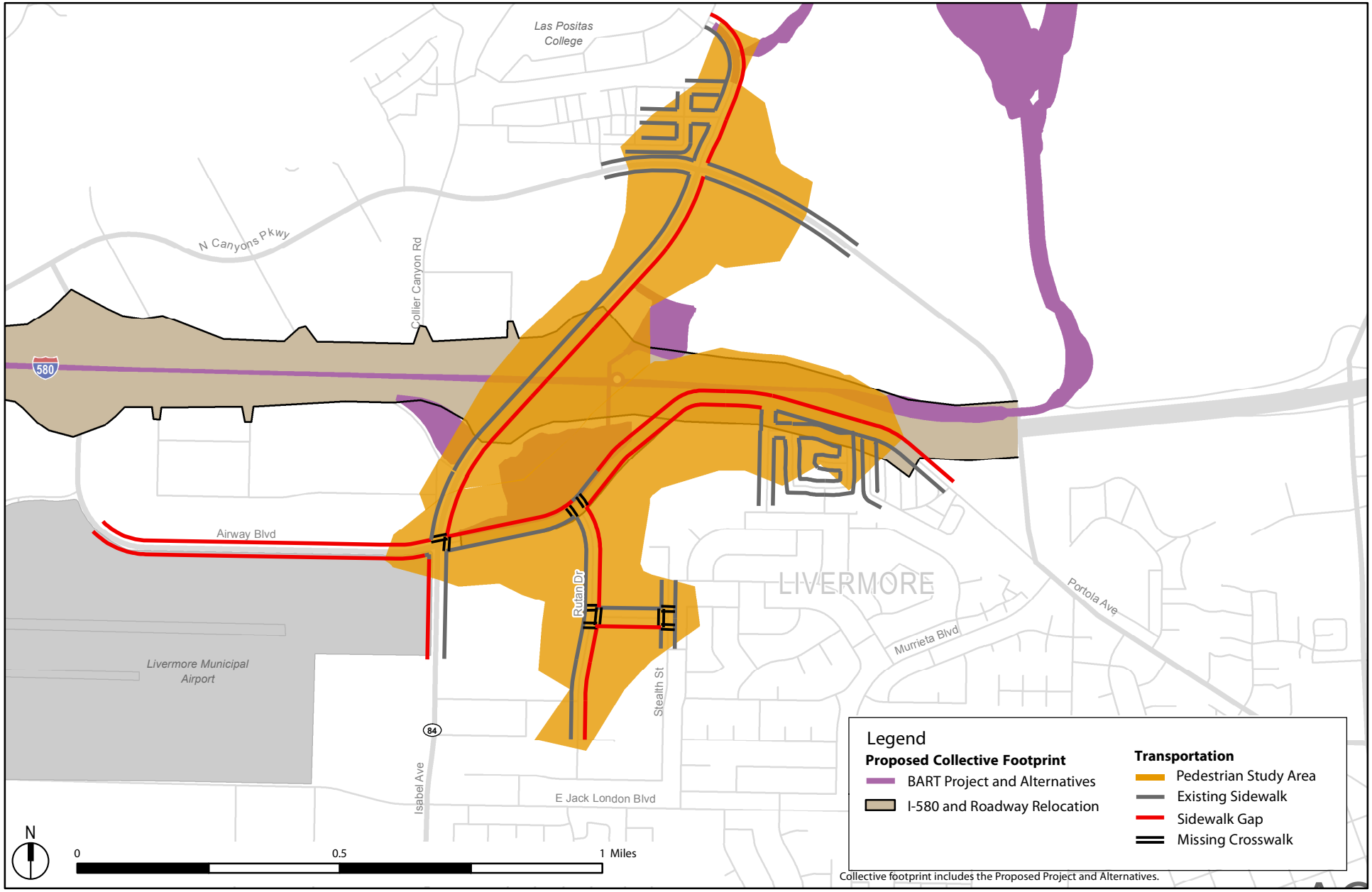
The study area for pedestrians comprises all pedestrian facilities, including sidewalks, street crossings, and off-street paths, within a 15-minute walk from the proposed Isabel Station. Figure 3.B-6 below shows the pedestrian study area, including existing sidewalks, pedestrian street crossings, and off-street paths, as well as facility gaps.

Sidewalks exist throughout the study area, but lack consistency and continuity. Although there are sidewalks on most roads, major gaps appear throughout the study area. The sidewalks range in width from 5 to 10 feet at various locations, and are generally in good condition. The roadways in the study area are mostly wide, multi-lane arterials, and adjacent land uses are sporadic, with stretches of undeveloped land in between developed parcels. 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.

Sidewalks generally exist along the major thoroughfares around the proposed Isabel Station, except at the following locations:

- East side of Isabel Avenue from Airway Boulevard to Portola Avenue
- East side of Campus Hill Drive to Campus Loop
- West side of Isabel Avenue south of Airway Boulevard
- North side of Airway Boulevard for the entirety of the study area, except for the commuter park-and-ride lot
- Portions of the south side of Airway Boulevard between Rutan Drive and Sutter Street
- East side of Rutan Drive from Airway Boulevard to Rickenbacker Place
- South side of Sonic Avenue

Pedestrian access to existing bus transit service is available but indirect, with bus transit connections primarily along major arterials and collector roads, with minimal access along local streets, resulting in long door-to-door trip times. There are no existing sidewalks on the east side of Isabel Avenue turning east onto Airway Boulevard for accessing the existing BART park-and-ride lot on Airway Boulevard near Isabel Avenue. Pedestrians walking from north of I-580 who use Isabel Avenue to access the existing park-and-ride lot need to walk on the west side of Isabel Avenue, cross to the south side of Airway Boulevard to head east, and then must cross to the north side of Airway Boulevard close to the entrance to the park-and-ride lot.




Source: Arup, 2017.

BART to Livermore Extension Project EIR

Figure 3.B-6
Transportation
Pedestrian Facilities and Gaps – Existing

Two major intersections provide direct pedestrian access to the proposed Isabel Station—Isabel Avenue/Airway Boulevard and Isabel Avenue/Portola Avenue—as discussed below.

- **Isabel Avenue/Airway Boulevard.** At this intersection sidewalks are present west of Isabel but not to the east, and along the southern edge of Airway Boulevard, sidewalks are present east of Isabel Avenue but not to the west. Only two of the four legs of this intersection currently feature a striped pedestrian crossing. The south leg of the intersection is a 140-foot-long crossing of Isabel Avenue that includes eight traffic lanes, two bike lanes, and a painted median. The west leg is a 75-foot-long crossing of Airway Boulevard that includes four traffic lanes. Some of the approaches feature vehicle free-right turns, presenting additional complexity for pedestrian crossing conditions.
- **Isabel Avenue/Portola Avenue/Campus Hill Drive.** This intersection also lacks some pedestrian facilities. Although there is an improved streetscape along Portola Avenue with wide sidewalks, there is no sidewalk on the eastern side of Isabel Avenue. There are four striped pedestrian crossings at this intersection. The south leg is a 155-foot-long crossing of Isabel Avenue that includes eight traffic lanes, two bike lanes, and a painted median. The west leg is a 140-foot-long crossing of Portola Avenue that includes six traffic lanes, two bike lanes, and a raised median. The north leg is a 125-foot-long crossing of Campus Hill Drive that includes six traffic lanes and a raised median. The east leg is a 125-foot-long crossing of Portola that includes six traffic lanes, two bike lanes, and a raised median. Some of the approaches feature vehicle free-right turns, presenting additional complexity for pedestrian crossing conditions.

In addition, at the I-580/Isabel Avenue interchange, a set of I-580 on- and off-ramps connect to Isabel Avenue, creating the need for pedestrians traveling on Isabel to cross the ramps.

- **I-580 Isabel Eastbound On- and Off-Ramp and Westbound On-Ramps/Isabel Avenue.** At the I-580/Isabel Avenue interchange, a pedestrian route across I-580 exists only on the west side of Isabel Avenue. South of I-580, to cross the I-580 eastbound off-ramp, there is a 100-foot crossing to a pedestrian island before the I-580 eastbound on-ramp with a crossing of 30 feet. North of I-580, there is a pedestrian crossing of the westbound on-ramp on Isabel with a crossing distance of 40 feet.
- **East Airway Boulevard and Rutan Drive.** This intersection lacks some pedestrian facilities. There are curb ramps, sidewalks along most of the streets, and a marked crosswalk at Rutan Drive. There are no marked crosswalks at either leg of East Airway Boulevard. Additionally, there is no sidewalk on the northern edge of Airway Boulevard to the west of Rutan Drive and along the eastern edge of Rutan Drive.

Off-street pedestrian path and trail facilities are discussed above, in the Bicycle Facilities subsection.

Pedestrian crossing delay at intersections is one way to evaluate the LOS for pedestrians. The impact methodology discussion below describes the LOS methodology in more detail. Table 3.B-7 below presents the existing pedestrian delay at the two pedestrian study intersections.

**TABLE 3.B-7 PEDESTRIAN DELAY FOR STUDY INTERSECTIONS, EXISTING (2013)**

| Intersection | Delay | LOS |
|---|---|---|
| East Airway Boulevard & Isabel Avenue | 60.0 | F |
| Isabel Avenue & Portola Avenue | 64.4 | F |

Notes: LOS = level of service.
Calculated from the Highway Capacity Manual (Transportation Research Board, 2000).
Source: Cambridge Systematics, 2017.

## 3. Regulatory Framework

This subsection describes the State and local environmental laws and policies relevant to transportation and focuses on LOS standards.

Senate Bill (SB) 743, signed into law in 2013, requires CEQA lead agencies to shift from using traditional LOS standards and automobile delay to determine significant traffic impacts. Under SB 743, the State Office of Planning and Research is required to update CEQA guidelines and criteria to promote greenhouse gas emissions reductions, multimodal transportation networks and diverse land uses. The Office of Planning and Research proposes using VMT as the metric for evaluating the significant traffic impacts, where projects that decrease VMT compared to existing conditions may be considered to have a less than significant transportation impact. SB 743 provides that, once the State adopts updated CEQA Guidelines for alternatives to LOS-based significance determinations, automobile delay as described by LOS shall not be considered a significant impact on the environment. However, the State guidelines are still under development. Accordingly, BART has determined to utilize the LOS-based methodology for significance determination in this EIR.

BART is exempt by State law (California Government Code Sections 53090 and 53091) from local city and county general plans and land use policies and ordinances. However, as background information, the relevant transportation policies of other agencies, including those contained in the city and county codes and general plans, are described

below. These local LOS standards were considered in determining the standards used in this EIR when applying the LOS-based methodology for significance determination, also discussed below.

### a. Freeway Segments

#### (1) Caltrans

The California Department of Transportation (Caltrans) endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities; however, Caltrans recognizes that achieving LOS C/LOS D may not always be feasible.[10] This analysis uses a standard of LOS E or better during peak hours as the planning objective for the evaluation of potential impacts of this development on Caltrans facilities, as that is the standard set by Alameda CTC for monitoring Caltrans facilities in the study area.[11]

#### (2) Alameda CTC

Alameda CTC does not have adopted thresholds of significance applicable to CEQA requirements for freeway analysis purposes.[12] Alameda CTC's freeway monitoring efforts set LOS E as the standard for monitoring performance.[13]

### b. Local Roadway Intersections

#### (1) City of Dublin

The City of Dublin General Plan identifies a goal to "strive to phase development and roadway improvements so that operating LOS for intersections within Dublin does not exceed LOS D."[14]

#### (2) City of Pleasanton

The City of Pleasanton "level-of-service (LOS) standards generally require…projects to limit traffic volumes to LOS D or better throughout Pleasanton or provide mitigation measures which will ensure that traffic volumes meet this standard."[15]

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[10] California Department of Transportation (Caltrans), 2002. Guide for the Preparation of Traffic Studies. December.
[11] Alameda County Transportation Commission (Alameda CTC), 2015. Congestion Management Program, Chapter 6, Land Use Analysis Program. October.
[12] Ibid.
[13] Ibid
[14] City of Dublin, 2014. City of Dublin General Plan, Land Use and Circulation Element.
[15] City of Pleasanton, 2009. City of Pleasanton General Plan 2005–2025, Circulation Element.

Additionally, according to the City of Pleasanton General Plan, "[t]here are a few exceptions to the LOS standard within Pleasanton. The exceptions are in the Downtown Area and at the City of Pleasanton gateway intersections. These intersections may have a level of service below the level-of-service D standard if no reasonable mitigation exists or if the necessary mitigation is contrary to other goals and policies of the city."[16]

### (3) City of Livermore

The City of Livermore General Plan stipulates a transportation goal to "maintain adequate levels of service for all areas of the City." "The upper limit of acceptable service at signalized intersections shall be mid-level D, except in the Downtown Area and near freeway interchanges…The upper limit of acceptable level of service at selected intersections near freeway interchanges shall be LOS E."[17] In addition, the General Plan identifies selected intersections that may exceed the LOS standard.

## c. BART Station Access Guidelines and Policy

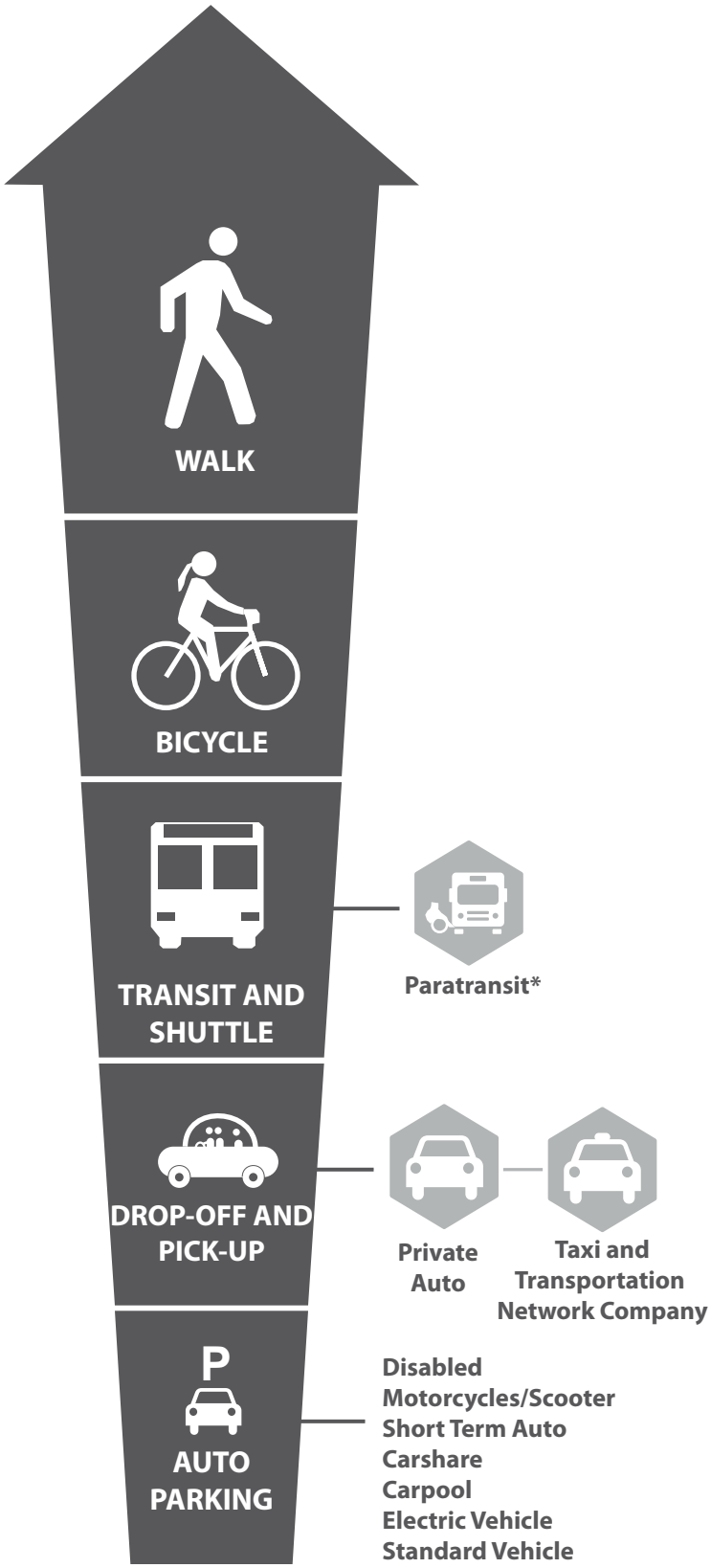
BART adopted its Station Access Policy in June 2016 to support livability goals for the Bay Area, reinforce sustainable communities, and enable riders to get to and from stations safely, comfortably, affordably and cost-effectively.[18] The policy also sets priorities for BART resources by identifying access goals for the system and each station. The policy created a station access mode hierarchy, which is illustrated in Figure 3.B-7.

The policy created a station access investment framework that categorizes stations by type, shown in Figure 3.B-8. The Dublin/Pleasanton Station is designated as an auto-dependent station, and the proposed Isabel Station would also have that designation. For auto-dependent stations, the primary investment mode is walking, and the secondary investment modes are biking, drop-off, auto parking and transit.

Being auto-dependent stations, both Dublin/Pleasanton and the potential Isabel Station would have access mode splits reflecting much lower pedestrian and bicycle access and much higher drive-and-park access.

To support the Station Access Policy goal, BART has created Station Access Guidelines to describe design elements and principles that support enhanced bicycle and pedestrian access to new stations. Relevant BART Station Access Guidelines for bicycle access include the following:

[16] Ibid.
[17] City of Livermore, 2014. City of Livermore General Plan: 2003-2025, Circulation Element. Adopted 2004, amended 2014.
[18] San Francisco Bay Area Rapid Transit District (BART), 2016. Station Access Policy.

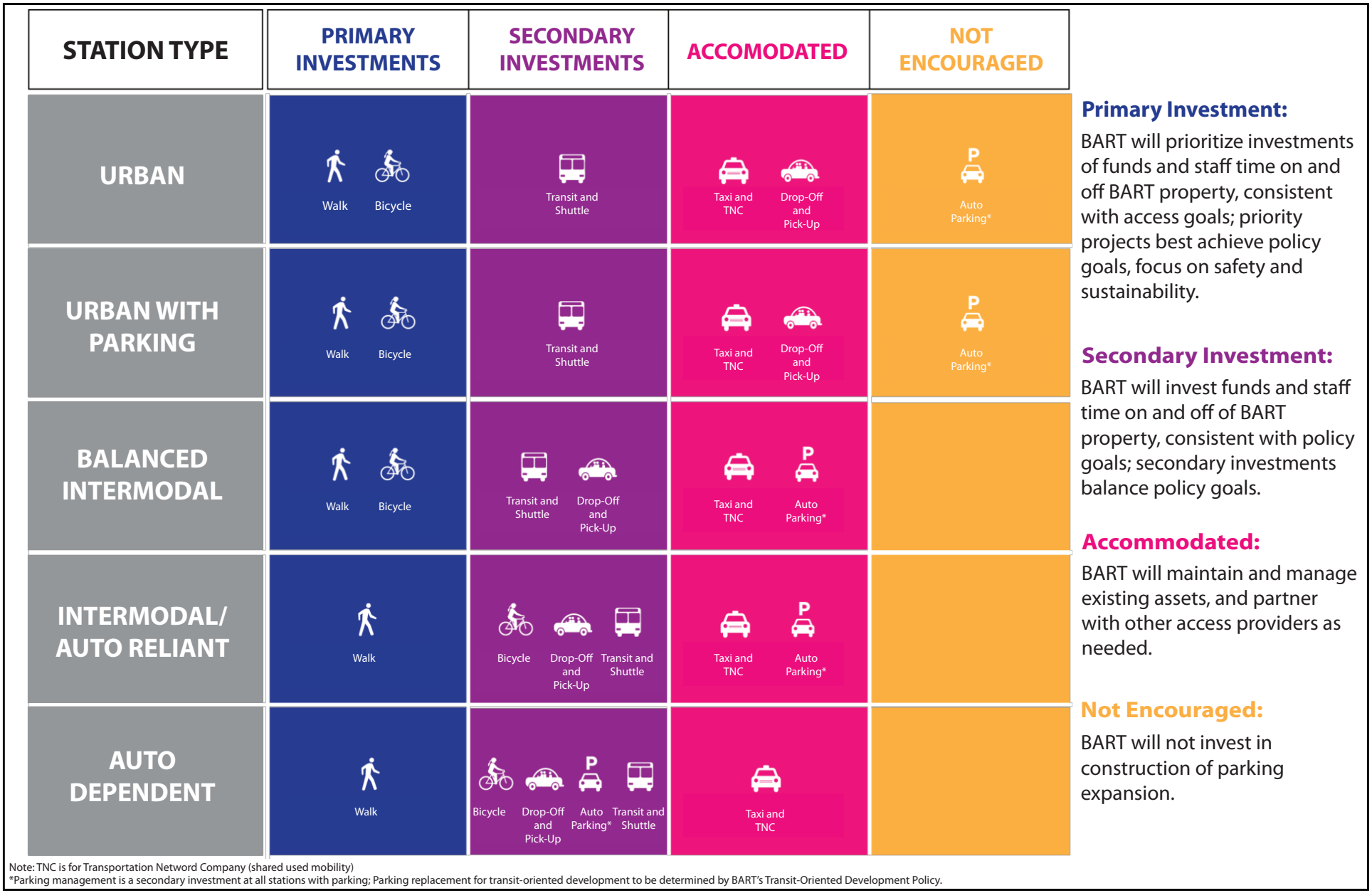



Note: All stations must always remain readily accessible to and usable by persons with disabilities.
*All stations must be paratransit accessible.

Source: BART, 2003.

BART to Livermore Extension Project EIR

Figure 3.B-7
Transportation
BART Station Access Hierarchy




Note: TNC is for Transportation Netword Company (shared used mobility)
*Parking management is a secondary investment at all stations with parking; Parking replacement for transit-oriented development to be determined by BART's Transit-Oriented Development Policy.

Source: BART, 2003.



Figure 3.B-8
Transportation
BART Station Access Types

- Ensure that routes to and from BART stations have bicycle lanes, if possible, or wide curb lanes at a minimum, and that all actuated traffic signals near the BART station can be activated by bicycles.
- Ensure that routes to and from BART stations are attractive to the "design bicyclist"—an inexperienced cyclist who is uncomfortable cycling on arterials with high traffic volumes, even where bicycle lanes are provided.
- Work with local jurisdictions to provide signage to the BART station from adjoining streets and bikeways.
- Work with local jurisdictions to ensure that actuated traffic signals at vehicle entrances to the BART station are bicycle-sensitive for all movements leading into and exiting the station, and that the location of bicycle-sensitive loop detectors are identified with bicycle loop detector pavement markings.
- Ensure that bicycle routes through station property minimize conflicts between bicyclists, pedestrians, automobiles, and buses. The provision of alternative routes means that cycling on the sidewalk should not be necessary. Sidewalks shall be used as bicycle routes only when no alternative options are available, and only when they have been designed to safely accommodate the expected volumes of bicycle and pedestrian traffic.
- Design parking garages to avoid major conflicts with bicycle traffic at structure entrances and exits. Where bicycle routes must cross garage entrances or exits, provide additional traffic control or calming devices to alert motorists to the bicycle crossings.
- During periods of construction, maintain direct and safe access routes from adjoining communities to the BART station.

The BART Bicycle Plan: Modeling Access to Transit (2012) supports BART'S commitment to encouraging bicycle travel to stations, including the goal to double BART's bicycle access modal split to 8 percent of all trips by 2022.[19]

BART has also identified pedestrian access design guidelines for its stations. The relevant guidelines are as follows:

- Wherever possible, provide multiple access routes.
- Introduce traffic calming measures as necessary to control vehicle speed in the station area.

[19] San Francisco Bay Area Rapid Transit District (BART), 2012. BART Bicycle Plan, Modeling Access to Transit. Available at: https://www.bart.gov/sites/default/files/docs/BART_Bike_Plan_Final_083012.pdf.

- Minimize the need for wayfinding signage by providing direct line-of-sight connections along pedestrian desire lines where possible, particularly to bus stops, connecting rail platforms and parking areas.
- Pedestrians should be able to exit directly from the BART station onto the street sidewalk. Where this is not possible, pedestrian routes and crossing points should be clearly marked and be as direct as possible.
- Provide boldly marked crosswalks along routes with highest pedestrian volumes. Signalization should be considered on major streets. Signalized crosswalks should preferably include countdown-style indicators and audible signals. Median refuges should be provided where appropriate.
- Pedestrian safety should not be compromised to accommodate greater automobile volumes. Double right-turn lanes and free right-turn lanes should be avoided throughout the station area and particularly along primary pedestrian routes.
- Provide lighting at a pedestrian scale.
- Provide sidewalks that are wide enough to cater for expected pedestrian volumes, particularly around bus stops.
- All pedestrian routes that arrive at the station should continue past the BART property line to the faregates.
- Bus stops should not be located where they will block crosswalks, obstruct traffic signals or be obscured from motorists, bicyclists, and pedestrians.
- Design parking garages to avoid major conflicts with bicycle and pedestrian traffic at structure entrances and exits. Where bicycle routes must cross garage entrances/ exits, provide additional traffic control or calming devices to alert motorists to the bicycle crossings.
- Pedestrian crossings of the drop-off lane should include a stop sign and a marked crosswalk, to allow pedestrians to cross easily and safely.
- Pedestrian pathways through the parking lots should be indicated with sidewalks, trees, and/or surface markings.

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, describes the analysis scenarios, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purpose of this EIR, impacts on transportation are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- Conflict with an applicable plan, ordinance, or policy that establishes measures of effectiveness for the performance of the circulation system—taking into account all modes of transportation (including mass transit and non-motorized travel) as well as relevant components of the system (e.g., intersections, streets, highways, pedestrian and bicycle paths, mass transit)
- Conflict with an applicable Congestion Management Program, including but not limited to LOS standards and travel demand measures and other standards established by the county congestion management agency for designated roads and highways
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities
- Cause a significant delay, safety hazard, or diminished access

Applicable criteria related to the standards of significance above are described below.

#### (a) Freeway Segments

BART does not maintain its own standards of significance for freeway operations. Therefore, for this analysis, in consideration of the criteria previously used by the City of Dublin, City of Pleasanton, City of Livermore, and Alameda CTC, as well as of the current congestion conditions in the I-580 corridor, this EIR uses the following criteria to identify impacts to freeway facilities:

- If a freeway segment is projected to operate at LOS E or better without the project and the project is expected to cause the segment to operate at LOS F, the project impact is considered significant.
- If a freeway segment is projected to operate at LOS F without the project and the project is expected to increase the volume-to-capacity (V/C) ratio on the freeway segment by more than 2 percent, the project impact is considered significant.

### (b) Local Roadway Intersections

BART does not maintain its own standards of significance for intersection operations. Therefore, for this analysis, standards from the local jurisdictions are used, and the determination of significance for project intersection traffic impacts is based on applicable LOS standards defined by the City of Dublin, City of Pleasanton, and City of Livermore (depending on the individual intersection's location and jurisdiction). Performance standards for traffic for each applicable local jurisdiction are described below.

#### City of Dublin

A significant adverse impact would occur if, for either peak hour, the Proposed Project or an Alternative resulted in the following:

- An intersection operating at LOS D or better under No Project Conditions degraded to LOS E or F under Project Conditions, unless the intersection is within the boundaries of the Downtown Dublin Specific Plan.[20]
- An intersection operating at LOS E or F under No Project Conditions had to serve 50 or more additional vehicle trips.

#### City of Pleasanton

A significant adverse impact would occur if, in either peak hour, the Proposed Project resulted in the following:

- An intersection operating at LOS D or better under No Project Conditions degraded to LOS E or F under Project Conditions.
- An intersection operating at LOS E or F under No Project Conditions had to serve 10 or more additional vehicle trips.

Downtown intersections and the city gateway intersections are allowed to operate at an LOS worse than the LOS D standard if no reasonable mitigation exists or if the necessary mitigation is contrary to other goals and policies of the City of Pleasanton.

#### City of Livermore

An intersection impact would occur if, in either the AM or PM peak hour, the Proposed Project or an Alternative resulted in the following:

[20] The Downtown Dublin Specific Plan states that LOS levels lower than D are acceptable for intersections that fall within the downtown area defined by the Specific Plan.

- An intersection operating at an acceptable mid-level LOS D or better (corresponding to an average delay of 50 seconds per vehicle) under No Project Conditions degraded to an unacceptable high of LOS D or worse under Project Conditions.
- An intersection near the freeway[21] operating at an acceptable LOS E or better (80 seconds per vehicle) under No Project Conditions degraded to an unacceptable LOS F under Project Conditions.
- An intersection operating at substandard LOS under No Project Conditions increased average delays by more than 5 seconds per vehicle.

### (c) Transit

The primary policy goals of the transit agencies in the study area emphasize increasing ridership, improving access to BART, and reducing system inefficiencies. A significant impact would result if the Proposed Project were to directly impede any of the relevant transit agencies from implementing planned improvements and/or their ability to meet these goals. Therefore, a significant impact would occur if the Proposed Project or an Alternative resulted in the following:

- Impeded connecting transit services from increasing ridership
- Impeded connecting transit services from improving their access to BART
- Impeded connecting transit services from reducing system inefficiencies

### (d) Bicyclists

There are no established criteria for the assessment of bicycle impacts. For this EIR, an impact on bicycles would occur if the Proposed Project or an Alternative performs substantially worse than No Project Conditions in the bicycle study area in terms of bicycle LTS, circulation and access, and safety hazards.

### (e) Pedestrians

There are no established criteria for the assessment of pedestrian impacts. For this EIR, an impact on pedestrians would occur if the Proposed Project or an Alternative performs substantially worse than No Project Conditions in terms of pedestrian crossing distance at study intersections, crossing delay at study intersections, circulation and access within the study area, and safety hazards within the study area.

[21] The City of Livermore General Plan identifies a total of 27 intersections near the freeway.

### (f) Construction Impacts to Transportation

A significant impact would occur if construction activities of the Proposed Project or an Alternative resulted in a substantial delay, safety hazard, or diminished access.

#### b. Impact Methodology

The transportation analysis described in this section involved a multi-step process to generate the performance analysis metrics necessary to quantify the Proposed Project or an Alternative's impact. This process used a set of land use and transportation network assumptions in a travel demand model to generate projections of transit ridership, vehicle trip demand, roadway link volumes, and BART station parking demand and access by various modes (buses, bicycles, pedestrians, etc.). The process then used these outputs in freeway segment and intersection operations analysis methodologies to generate estimates of freeway and intersection performance, as described in the sections below.

The EMU Option would result in the same impacts as the DMU Alternative; therefore, the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

#### (1) BART Ridership Forecast

The BLVX Travel Demand Model,[22] a version of the Alameda CTC travel demand model customized for the BART to Livermore Extension Project, was used to forecast station-to-station origin-destination ridership for the Proposed Project and Alternatives under each analyzed scenario. These ridership forecasts were used in an operations analysis to determine peak-hour passenger loads and fleet requirements for each BART line. The average of all of the peak line loads was used to determine the systemwide peak load. The analysis used assumptions for future BART operations plans that adhered to practical constraints such as the capacity limit of the Transbay Tube, but also were designed specifically to prevent passenger peak loads on any one line from deviating substantially from the systemwide average.

Ridership and demand projections were made for multiple scenarios, as follows:

- 2025 No Project Conditions
- 2025 Project Conditions, for the Proposed Project and each Alternative
- 2025 Cumulative Conditions, for the Proposed Project and each Alternative – reflecting land use growth as summarized in Section 3.A, Introduction to Environmental Analysis
- 2040 No Project Conditions

[22] Cambridge Systematics, 2017. BART to Livermore Ridership Projections (Draft). July.

- 2040 Project Conditions, for the Proposed Project and each Alternative
- 2040 Cumulative Conditions, for the Proposed Project and each Alternative – reflecting land use growth as summarized in Section 3.A, Introduction to Environmental Analysis

The methodologies used to evaluate the significance of transportation impacts are described below for freeway segments, local roadway intersections, transit, bicycles, and pedestrians.

The BLVX Travel Demand Model was also used to generate the VMT differences between No Project and the Proposed Project and all of the Alternatives. The analysis forecasted total BART trips in the Tri-Valley for the opening year (2025) and horizon year (2040), including the West Dublin/Pleasanton Station, the Dublin/Pleasanton Station, and the proposed Isabel Station. Comparing total BART trips under the No Project Conditions to BART trips under the Proposed Project and Build Alternatives, the analysis determined the differences in the number of related passenger vehicle trips for 2025 and 2040. The analysis then used the model's calculation of trip distances to produce VMT reductions for the Proposed Project and Build Alternatives compared with No Project Conditions. The calculation included the following VMT differences for each scenario:

- VMT decrease from patrons traveling on BART instead of driving to their destination
- VMT increase from additional park-and-ride trips to BART
- VMT increase from additional trips to drop off or pick up BART passengers, referred to as kiss-and-ride trips
- VMT increase from ACE patrons switching to driving to the Isabel Station

### (2) Freeway Segments

This EIR uses a modified version of Alameda CTC's Countywide Travel Demand Model to generate future-year peak-period volumes. These volumes are used to calculate V/C ratios according to the 1985 HCM,[23] to be consistent with Alameda CTC's Congestion Management Program.[24] The peak-hour volume on a segment in each direction is compared to the segment's vehicle carrying capacity (i.e., the V/C ratio is calculated). Segment capacity is calculated as 2,000 vehicles per hour per lane multiplied by the number of lanes.

[23] Transportation Research Board, 1985. Highway Capacity Manual. Transportation Research Board Special Report 209, Third Edition, Washington, DC.

[24] Alameda County Transportation Commission (Alameda CTC), 2015. Congestion Management Program, Chapter 3, Level of Service Standards. October.

Table 3.B-8 summarizes the LOS and V/C thresholds for freeway segments in Alameda County. Results for general-purpose lanes and high-occupancy vehicle (HOV)/express lanes are shown separately.

**TABLE 3.B-8 LEVEL OF SERVICE CRITERIA – FREEWAY SEGMENTS**

| Level of Service | Average Travel Speed | Volume/Capacity Ratio |
|---|---|---|
| A | ≥ 60 | 0.35 |
| B | ≥ 55 | 0.58 |
| C | ≥ 49 | 0.75 |
| D | ≥ 41 | 0.90 |
| E | ≥ 30 | 1.00 |
| F | < 30 | - |

Source: Transportation Research Board, 1985.

### (3) Local Roadway Intersections

For signalized intersections in the study area, the analysis calculated the average delay per vehicle using the HCM 2000 methodology, via Synchro 7 traffic analysis software, to determine LOS, as shown in Table 3.B-9. If the V/C ratio was found to exceed 1.0, regardless of the delay, the analysis assigned LOS F.

**TABLE 3.B-9 LEVEL OF SERVICE CRITERIA – SIGNALIZED INTERSECTIONS**

| Average Control Delay (sec/veh) | Level of Service |
|---|---|
| ≤ 10 | A |
| >10–20 | B |
| >20–35 | C |
| >35–55 | D |
| >55–80 | E |
| >80 | F |

Note: sec/veh = seconds per vehicle
Source: Transportation Research Board, 2000.

For unsignalized intersections in the study area, the analysis used HCM 2000 methodology, determining the LOS by calculating the weighted average control delay, expressed in seconds per vehicle, as illustrated in Table 3.B-10. Control delay includes the sum of all individual movements that a vehicle might make at an unsignalized intersection, including initial deceleration delay, queue move-up time, stopped delay, and final acceleration. At two-way stop-controlled intersections, LOS was calculated for each

controlled movement, as opposed to the intersection as a whole. If the V/C ratio of a lane was found to exceed 1.0, regardless of the control delay, the analysis assigned LOS F.

**TABLE 3.B-10 LEVEL OF SERVICE CRITERIA – UNSIGNALIZED INTERSECTIONS**

| Average Control Delay (sec/veh) | Level of Service |
|---|---|
| ≤ 10 | A |
| >10–15 | B |
| >15–25 | C |
| >25–35 | D |
| >35–50 | E |
| >50 | F |

Note: sec/veh = seconds per vehicle
Source: Transportation Research Board, 2000.

### (4) Impacts on other Transit Services

To quantify the effect of the Proposed Project and Build Alternatives on transit operators' ability to meet their efficiency and ridership goals, the study analyzed daily ridership for key selected transit providers near the Proposed Project and Build Alternatives. The BLVX Travel Demand Model generated daily ridership forecasts for the relevant transit providers under each project scenario and alternative.

The analysis assumed modified bus service under the Proposed Project and Build Alternatives, adjusted to enable more efficient service at key BART system access points (including, for example, moving the bus transfer location from the Dublin/Pleasanton Station to the Isabel Station). Please see Chapter 2, Project Description for more details on specific route changes and bus service improvements.

### (5) Bicycles

The analysis evaluated bikeway segments within a 15-minute bicycle ride to the proposed Isabel Station with regard to bicycle circulation and access, bicycle safety hazards, and the bicycle LTS method.

The LTS method is an evaluation model that identifies streets with high traffic stress experience by people biking in or adjacent to high vehicle traffic streets. As shown in Table 3.B-11 below, the method classifies streets and intersections from LTS 1 (suitable for children) through LTS 4 (suitable for riders who are comfortable sharing the road with automobiles traveling at 35 mph or more). Bikeways are considered low stress if they are on low-traffic/low-speed streets or, as roadways volumes and speeds increase, the

physical separation between bikeways and traffic lanes also increases, such as with bike lanes and protected bike lanes.

**TABLE 3.B-11 LEVEL OF TRAFFIC STRESS CRITERIA – BICYCLE SEGMENTS**

| LTS 1 | LTS 2 | LTS 3 | LTS 4 |
|---|---|---|---|
| ▪ Physically separated from traffic or low-volume, mixed-flow traffic at 25 mph or less<br>▪ Bicycle lanes 6 feet wide or more<br>▪ Intersections easy to approach and cross<br>▪ Comfortable for children | ▪ Bicycle lanes 5.5 feet wide or less, next to 30-mph auto traffic<br>▪ Unsignalized crossings of up to five lanes at 30 mph<br>▪ Comfortable for most adults | ▪ Bicycle lanes next to 35-mph auto traffic, or mixed-flow traffic at 30 mph or less<br>▪ Comfortable for most current U.S. bicycle riders | ▪ No dedicated bicycle facilities<br>▪ Traffic speeds of 40 mph or more<br>▪ Comfortable for vehicular cyclists |

Note: LTS = level of traffic stress; mph = miles per hour.
Source: Mineta Transportation Institute, 2012.

### (6) Pedestrians

The analysis selected important pedestrian facilities—such as sidewalks, trails, crosswalks, and plazas—within a 15-minute walk from the proposed Isabel Station. Pedestrian conditions are evaluated compared to the No Project Conditions. The pedestrian analysis evaluated crossing distance, pedestrian delay, pedestrian access (i.e., sidewalk gaps), and potential pedestrian safety hazards (i.e., uncontrolled crossings of vehicle traffic).

For pedestrian crossing delay, the analysis used the Transportation Research Board HCM 2000 methodology, with LOS delay thresholds, as shown in Table 3.B-12 below.

## c. No Project Conditions

This subsection describes the future year No Project Conditions for the opening year (2025) and the horizon year (2040) for the freeway segments, local roadway intersections, transit, bicycles, and pedestrians. Please see Section 3.A, Introduction to Environmental Analysis, for more detail on the purpose and use of the No Project Conditions.

**TABLE 3.B-12 PEDESTRIAN DELAY THRESHOLDS FOR SIGNALIZED INTERSECTIONS**

| Level of Service | Average Delay in Seconds |
|---|---|
| A | < 10 |
| B | 10.1–20 |
| C | 20.1–30 |
| D | 30.1–40 |
| E | 40.1–60 |
| F | > 60 |

Source: Transportation Research Board, 2000.

### (1) Freeway Segments

This section summarizes the known completed and planned improvements for I-580 between 2014 and 2025 and 2040, as follows:

- Construct auxiliary lanes on I-580 eastbound between Isabel Avenue and North Livermore Avenue, and between North Livermore Avenue and First Street (includes widening the Arroyo Las Positas Bridge at two locations and providing additional improvements to accommodate future express lanes)
- Modify the I-580/Vasco Road interchange, including widening the I-580 overcrossing to provide eight lanes (plus bike lanes/shoulders), constructing auxiliary lanes on I-580 between Vasco Road and First Street, and widening Vasco Road to eight lanes between Northfront Road and Las Positas Road
- Reconstruct the I-580/First Street interchange
- Reconstruct the I-580/Greenville Road interchange
- Improve the I-580/San Ramon Road/Foothill Road interchange, including elimination of the eastbound diagonal off-ramp and eastbound loop off-ramp and construction of a new signalized intersection at the off-ramp

The lane configuration for I-580 changes significantly between Existing Conditions (2014) and 2025 and 2040 Project Conditions. Table 3.B-13 shows the freeway configuration for I-580 for 2014 and 2025/2040.

**TABLE 3.B-13 I-580 LANE CONFIGURATION IN 2014 AND 2025/2040, NO PROJECT CONDITIONS**

| | | | 2014 General Purpose Lanes | | 2014 Express Lanes | | 2025/2040 General-Purpose Lanes | | 2025/2040 Express Lanes | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | WB | EB | WB | EB | WB | EB | WB | EB |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | 5 | 7 | 0 | 0 | 5 | 7 | 1 | 0 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | 5 | 5 | 0 | 1 | 5 | 5 | 1 | 1 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/El Charro Road | 5 | 5 | 0 | 1 | 5 | 5 | 1 | 1 |
| 4 | Fallon Road/El Charro Road | Airway Boulevard | 4 | 5 | 0 | 1 | 5 | 5 | 1 | 2 |
| 5 | Airway Boulevard | Isabel Avenue | 4 | 5 | 0 | 1 | 5 | 5 | 1 | 2 |
| 6 | Isabel Avenue | Livermore Avenue | 4 | 4 | 0 | 1 | 5 | 5 | 1 | 2 |
| 7 | Livermore Avenue | Springtown Boulevard/First Street | 4 | 4 | 0 | 1 | 5 | 5 | 1 | 2 |
| 8 | Springtown Boulevard/First Street | Vasco Road | 4 | 5 | 0 | 1 | 5 | 5 | 1 | 2 |
| 9 | Vasco Road | Greenville Road | 4 | 4 | 0 | 1 | 4 | 4 | 1 | 1 |
| 10 | Greenville Road | Carroll Road/Flynn Road | 4 | 4 | 0 | 0 | 4 | 5 | 0 | 0 |

Notes: EB = eastbound; WB = westbound.
Current and future freeway configuration assumptions were agreed upon by BART and Alameda CTC.
Source: Alameda CTC, BART, and City of Livermore, 2016.

Lastly, express lanes management on I-580 is expected to change by 2040. The express lane currently allows carpool users, defined as two or more people per vehicle, to access the lanes without paying a toll. By 2040, to manage the travel demand on the lanes, only carpoolers with three or more people per vehicle are expected to be allowed to use the lane without paying a toll.

### (a) No Project 2025 Conditions

Tables 3.B-14 and 3.B-15 presents freeway LOS results for 2025, for general-purpose and HOT/express lanes. Most general-purpose lane segments in the study area are expected to experience congested conditions, with conditions at LOS E or F in at least one direction in one peak period. In general, the westbound direction sees heavier volumes in the AM

**TABLE 3.B-14 I-580 PERFORMANCE IN AM, 2025 NO PROJECT CONDITIONS**

| | | | General-Purpose Westbound | | General-Purpose Eastbound | | Express Lane Westbound | | Express Lane Eastbound | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | E | 0.97 | B | 0.47 | E | 0.98 | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | **F** | **1.00** | B | 0.53 | **F** | **1.01** | A | 0.29 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/El Charro Road | **F** | **1.00** | B | 0.57 | **F** | **1.02** | A | 0.29 |
| 4 | Fallon Road/El Charro Road | Airway Boulevard | E | 0.97 | B | 0.55 | E | 0.99 | A | 0.15 |
| 5 | Airway Boulevard | Isabel Avenue | **F** | **1.04** | B | 0.49 | **F** | **1.04** | A | 0.15 |
| 6 | Isabel Avenue | Livermore Avenue | **F** | **1.05** | B | 0.54 | **F** | **1.06** | A | 0.15 |
| 7 | Livermore Avenue | Springtown Boulevard/First Street | E | 0.98 | B | 0.52 | E | 0.99 | A | 0.15 |
| 8 | Springtown Boulevard/First Street | Vasco Road | E | 0.98 | B | 0.57 | E | 0.98 | A | 0.15 |
| 9 | Vasco Road | Greenville Road | D | 0.87 | B | 0.51 | D | 0.87 | A | 0.00 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | **F** | **1.04** | B | 0.44 | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-15 I-580 PERFORMANCE IN PM, 2025 NO PROJECT CONDITIONS**

| | | | General-Purpose Westbound | | General-Purpose Eastbound | | Express Lane Westbound | | Express Lane Eastbound | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | C | 0.63 | C | 0.71 | B | 0.45 | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | C | 0.63 | D | 0.90 | B | 0.45 | D | 0.83 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | C | 0.66 | E | 0.95 | B | 0.47 | D | 0.85 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | C | 0.62 | E | 0.97 | B | 0.47 | B | 0.44 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.55 | E | 0.95 | B | 0.43 | B | 0.40 |
| 6 | Isabel Avenue | Livermore Avenue | C | 0.64 | **F** | **1.04** | B | 0.42 | B | 0.40 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.51 | E | 0.92 | B | 0.37 | B | 0.40 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | C | 0.59 | D | 0.90 | B | 0.36 | B | 0.36 |
| 9 | Vasco Road | Greenville Road | B | 0.51 | D | 0.79 | A | 0.18 | C | 0.62 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | C | 0.60 | D | 0.82 | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

peak period and lighter volumes in the PM peak period; the eastbound direction has the inverse trend. These trends reflect land use and commute patterns, with AM travelers going from points east to employment centers in the west such as San Francisco and Silicon Valley, and then returning in the PM peak period. HOT/express lanes reflect similar trends, with performance falling to LOS E and F in the peak direction and period, based on the forecasted increase in vehicle occupancy trends with two-occupant vehicles expected to take up much of the HOT/express lane capacity by 2025.

### (b) No Project 2040 Conditions

Tables 3.B-16 and 3.B-17 show freeway LOS results under 2040 No Project Conditions. The general-purpose lanes are expected to experience greater volumes, with most segments in the peak travel direction in the study area showing LOS E or F. The trends remain unchanged from 2025, with westbound lanes seeing the greatest volumes in the AM peak period and eastbound lanes seeing the greatest volumes in the PM peak period. The HOT/express lanes improve notably from 2025 to 2040, the result of a change in the HOT policy assumption from two occupants to three occupants. The number of forecasted three-occupant vehicles is sufficiently low that HOT/express lane performance improves to LOS A or B.

### (2) Local Roadway Intersections

Multiple local roadway network improvements are planned within Livermore, Dublin, and Pleasanton by 2025 and 2040. The Livermore General Plan specifies improvements for local highway segments and interchanges and details roadway segments and intersections requiring improvement in the future, as described in Table 3.B-18 and in the text below. The Livermore General Plan also details how truck routes in the area will be affected by upcoming construction.

**TABLE 3.B-16 I-580 PERFORMANCE IN AM, 2040 NO PROJECT CONDITIONS**

| | | | General-Purpose Westbound | | General-Purpose Eastbound | | Express Lane Westbound | | Express Lane Eastbound | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | E | 0.98 | B | 0.55 | B | 0.47 | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | **F** | **1.00** | C | 0.65 | B | 0.45 | A | 0.19 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | **F** | **1.02** | C | 0.67 | B | 0.45 | A | 0.20 |
| 4 | Fallon Road/El Charro Road | Airway Boulevard | E | 0.99 | C | 0.65 | B | 0.44 | A | 0.10 |
| 5 | Airway Boulevard | Isabel Avenue | **F** | **1.06** | C | 0.59 | B | 0.40 | A | 0.10 |
| 6 | Isabel Avenue | Livermore Avenue | **F** | **1.10** | C | 0.63 | B | 0.40 | A | 0.10 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | **F** | **1.03** | C | 0.63 | B | 0.38 | A | 0.10 |
| 8 | Springtown Boulevard/First Street | Vasco Road | **F** | **1.04** | D | 0.77 | A | 0.35 | A | 0.10 |
| 9 | Vasco Road | Greenville Road | E | 0.95 | C | 0.60 | A | 0.28 | A | 0.17 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | **F** | **1.06** | B | 0.57 | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-17 I-580 PERFORMANCE IN PM, 2040 NO PROJECT CONDITIONS**

| | | | General-Purpose Westbound | | General-Purpose Eastbound | | Express Lane Westbound | | Express Lane Eastbound | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/Hopyard Road | Hacienda Drive | C | 0.75 | C | 0.68 | A | 0.21 | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.76 | E | 0.94 | A | 0.22 | A | 0.23 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | D | 0.78 | E | 0.98 | A | 0.22 | A | 0.24 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | D | 0.75 | E | 0.97 | A | 0.22 | A | 0.13 |
| 5 | Airway Boulevard | Isabel Avenue | C | 0.66 | E | 0.99 | A | 0.20 | A | 0.12 |
| 6 | Isabel Avenue | Livermore Avenue | D | 0.77 | **F** | **1.08** | A | 0.20 | A | 0.13 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | C | 0.74 | **F** | **1.01** | A | 0.18 | A | 0.12 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | D | 0.83 | **F** | **1.02** | A | 0.17 | A | 0.11 |
| 9 | Vasco Road | Greenville Road | C | 0.69 | D | 0.85 | A | 0.13 | A | 0.17 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.75 | D | 0.82 | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-18 LOCAL ROADWAY IMPROVEMENTS, 2025 AND 2040 NO PROJECT CONDITIONS**

| Street | Limits | Improvement | Relevant Analysis Year | Relevant Study Intersection # |
|---|---|---|---|---|
| **Livermore** | | | | |
| Isabel Avenue | I-580 EB Ramps | Widen overpass | 2040 | #30 |
| Isabel Avenue | I-580 WB Ramps | Widen overpass | 2025 and 2040 | #28 and #29 |
| Isabel Avenue | Stanley Boulevard to Ruby Hill Drive | Widen to four lanes | 2040 | #33 |
| Isabel Avenue | Isabel and Jack London Boulevard | Intersection improvements | 2025 and 2040 | #36 |
| Vasco Road | Northfront Road to Las Positas Road | Widen to eight lanes | 2040 | #43 and #44 |
| Greenville Road | Interchange improvements | Widen underpass to six lanes | 2025 and 2040 | #48 |
| Greenville Road | Las Positas Road to Paterson Pass Road | Widen to four lanes | 2025 and 2040 | #48 |
| Greenville Road | Westbound ramp | Signalize intersection and add westbound left-turn pocket and eastbound right-turn pocket | 2025 and 2040 | #46 |
| Greenville Road | Greenville Road and Altamont Pass Road | Signalize intersection | 2025 and 2040 | #48 |
| Greenville Road | Greenville Road and Patterson Pass Road | Signalize intersection | 2025 and 2040 | #50 |
| **Pleasanton** | | | | |
| El Charro Road | Stoneridge Drive to Jack London Boulevard | Extension | 2040 | #23 |
| El Charro Road | Jack London to Stanley Boulevard | Extension | After 2040 | N/A |
| **Dublin** | | | | |
| Dublin Boulevard | Brannigan Street to Fallon Road | Widen to eight lanes | 2025 and 2040 | #19 |
| Dublin Boulevard | Dougherty Road to North Canyons Parkway | Extension | 2040 | N/A |
| Fallon Road | Connect to Tassajara Road | Extension | 2040 | N/A |
| Gleason Drive | To Fallon Road | Extension | 2040 | N/A |
| Fallon Road Interchange | N/A | Upgrade | 2040 | #20 |
| Dublin Boulevard | To Schaefer Ranch Road | Extension | 2040 | N/A |

**TABLE 3.B-18 LOCAL ROADWAY IMPROVEMENTS, 2025 AND 2040 NO PROJECT CONDITIONS**

| Street | Limits | Improvement | Relevant Analysis Year | Relevant Study Intersection # |
|---|---|---|---|---|
| Tassajara Road | Dublin Boulevard to I-580 | Widen to eight lanes | 2025 and 2040 | #14 |
| Tassajara Road | Fallon to Dublin | Widen to six lanes | 2040 | #14 |
| Hacienda Road | Dublin Boulevard to Central Parkway | Widen to six lanes | 2040 | #9 |
| Dougherty Road | Sierra Court to City Limits | Widen to eight lanes | 2025 and 2040 | #1 |

Notes: EB = eastbound; WB = westbound; N/A = not applicable.
Local roadway improvement assumptions were made with input from the Cities of Livermore, Dublin, and Pleasanton.
Sources:
City of Livermore, 2009; City of Pleasanton, 2009; City of Dublin, 2013.

The Pleasanton General Plan has identified major roadway improvements. Table 3.B-18 summarizes the intersection and roadway lane improvements near the study area. 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.

In addition to these improvements, the Triangle Study[25] identified projects required for a strategic approach to relieving traffic congestion in the Tri-Valley Area. The Tri-Valley Triangle Study Final Plan Recommendations were approved in February 2011. This included an agreement on the sequencing of projects, specifically that the Stoneridge Drive extension be completed before construction can begin on State Route 84 as a four-lane facility between west of Ruby Hill Drive and I-680.

Table 3.B-19 presents the No Project Conditions in 2025 and 2040.

[25] Alameda County Transportation Commission (Alameda CTC), 2007. Tri-Valley Triangle Study.

**TABLE 3.B-19 LOCAL ROADWAY INTERSECTION PERFORMANCE, 2025 AND 2040 NO PROJECT CONDITIONS**

| | | 2025 No Project AM | | 2025 No Project PM | | 2040 No Project AM | | 2040 No Project PM | |
|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1 | Dougherty Road & Amador Valley Road | 30.4 | C | 35.0 | D | **98.1** | **F** | 32.6 | C |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard | 43.5 | D | **106.9** | **F** | **101.6** | **F** | **147.9** | **F** |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps | 11.0 | B | 17.4 | B | 18.1 | B | 19.1 | B |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | 37.8 | D | 33.5 | C | 42.5 | D | 46.3 | D |
| 5 | Hopyard Road & Owens Road | 33.0 | C | **108.7** | **F** | 32.1 | C | **100.7** | **F** |
| 6 | Hopyard Road & Stoneridge Drive | 30.1 | C | 37.0 | D | 32.4 | C | 39.3 | D |
| 7 | Hopyard Road & Las Positas Boulevard | 24.1 | C | 27.2 | C | 25.9 | C | 32.4 | C |
| 8 | Willow Road & Owens Road | 11.7 | B | 22.7 | C | 12.4 | B | 22.4 | C |
| 9 | Hacienda Drive & Dublin Boulevard | 24.0 | C | 29.1 | C | 37.4 | D | 31.7 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings | 19.2 | B | 25.5 | C | 20.2 | C | 28.8 | C |
| 11 | Hacienda Drive & I-580 WB Ramps | 7.4 | A | 8.5 | A | 7.7 | A | 8.9 | A |
| 12 | Hacienda Drive & I-580 EB Ramps | 17.4 | B | 20.3 | C | 18.9 | B | 20.7 | C |
| 13 | Hacienda Drive & Owens Road | 27.5 | C | 32.5 | C | 23.4 | C | 30.5 | C |
| 14 | Tassajara Road & Dublin Boulevard | 43.0 | D | 42.0 | D | 50.5 | D | 46.2 | D |
| 15 | Tassajara Road & I-580 WB Ramps | 8.8 | A | 9.5 | A | 11.5 | B | 11.8 | B |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | 17.8 | B | 30.6 | C | 19.5 | B | 32.8 | C |
| 17 | Santa Rita Road & Valley Avenue | 21.7 | C | **45.8** | **D** | 24.0 | C | **77.5** | **E** |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | 37.4 | D | 32.8 | C | 38.5 | D | 32.6 | C |

**TABLE 3.B-19 LOCAL ROADWAY INTERSECTION PERFORMANCE, 2025 AND 2040 NO PROJECT CONDITIONS**

| | | 2025 No Project AM | | 2025 No Project PM | | 2040 No Project AM | | 2040 No Project PM | |
|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 19 | Fallon Road & Dublin Boulevard/Croak Road | **48.2** | **D** | 21.4 | C | 35.1 | D | 30.1 | C |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps | 8.0 | A | 9.4 | A | 10.8 | B | 9.5 | A |
| 21 | El Charro Road & I-580 EB Ramps | 8.2 | A | 8.2 | A | 11.3 | B | 12.0 | B |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | 26.8 | C | 18.3 | B | 26.5 | C | 28.6 | C |
| 23 | Stanley Boulevard & El Charro Road | N/A[a] | N/A[a] | N/A[a] | N/A[a] | 38.9 | D | 31.6 | C |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | **78.7** | **E** | 13.6 | B | **98.8** | **F** | 35.7 | D |
| 25 | Airway Boulevard & I-580 WB Ramps | 20.8 | C | 5.4 | A | 16.4 | B | 5.5 | A |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | 28.6 | C | 27.9 | C | 30.8 | C | 39.4 | D |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | 22.9 | C | 25.6 | C | 24.0 | C | 22.3 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | 27.9 | C | 25.0 | C | 27.7 | C | 27.5 | C |
| 29 | Isabel Avenue & I-580 WB Ramps | 10.8 | B | 9.9 | A | 11.5 | B | 14.4 | B |
| 30 | Isabel Avenue & I-580 EB Ramps | 6.6 | A | 6.6 | A | 6.1 | A | 6.4 | A |
| 31 | Isabel Avenue & Airway Boulevard | 26.7 | C | 31.7 | C | 34.3 | C | 36.4 | D |
| 32 | Isabel Avenue & Jack London Boulevard | 37.1 | D | 43.1 | D | **50.6** | **D** | **79.8** | **E** |
| 33 | Isabel Avenue Connector & Stanley Boulevard | 15.7 | B | 15.8 | B | 40.5 | D | **73.8** | **E** |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | 14.1 | B | 20.2 | C | 14.5 | B | 33.7 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | 17.9 | B | 20.5 | C | 25.0 | C | **100.7** | **F** |
| 36 | Murrieta Boulevard & Stanley Boulevard | 40.3 | D | 29.3 | C | **98.3** | **F** | **45.8** | **D** |

**TABLE 3.B-19 LOCAL ROADWAY INTERSECTION PERFORMANCE, 2025 AND 2040 NO PROJECT CONDITIONS**

| | | 2025 No Project AM | | 2025 No Project PM | | 2040 No Project AM | | 2040 No Project PM | |
|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 37 | Livermore Avenue & I-580 WB Ramps | 21.4 | C | 39.3 | D | 23.5 | C | 27.8 | C |
| 38 | Livermore Avenue & I-580 EB Ramps | 17.5 | B | **108.2** | **F** | 17.5 | B | **74.3** | **E** |
| 39 | Livermore Avenue & Portola Avenue | 39.3 | D | 37.3 | D | 43.8 | D | **52.6** | **D** |
| 40 | First Street/Springtown Boulevard & I-580 WB Ramps | 16.3 | B | 7.5 | A | 16.3 | B | 14.1 | B |
| 41 | First Street & I-580 EB Ramps | 9.8 | A | 30.4 | C | 14.5 | B | **47.1** | **D** |
| 42 | First Street & Mines Road | 24.2 | C | **48.6** | **D** | 26.2 | C | **52.1** | **D** |
| 43 | Vasco Road/I-580 WB Ramps | 1.0 | A | 1.1 | A | 0.7 | A | 1.7 | A |
| 44 | Vasco Road/I-580 EB Ramps | 0.3 | A | 0.7 | A | N/A[b] | N/A[b] | N/A[b] | N/A[b] |
| 45 | Vasco Road & East Avenue | 18.8 | B | 42.2 | D | 20.9 | C | **87.4** | **F** |
| 46 | Altamont Pass Road /Greenville Road & I-580 WB Ramps | **123.8** | **F** | 7.0 | A | 8.8 | A | 5.3 | A |
| 47 | Southfront Road/ Greenville Road & I-580 EB Ramps | 10.0 | A | 13.8 | B | 4.2 | A | 9.2 | A |
| 48 | Greenville Road/Altamont Pass Road | 35.1 | D | **79.8** | **E** | 7.1 | A | **96.1** | **F** |
| 49 | Greenville Road & Southfront Road | 8.9 | A | 14.2 | B | 14.3 | B | 13.9 | B |
| 50 | Greenville Road/ Patterson Pass Road | **61.7** | **E** | **132.2** | **F** | 40.6 | D | **156.3** | **F** |

Notes: LOS = level of service; EB = eastbound; WB = westbound; N/A = not applicable.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
[a] Future planned intersection, to be constructed by 2040, with extension of El Charro Road to Stanley Boulevard.
[b] Intersection to be eliminated in 2040 with planned interchange reconfiguration.
Source: Cambridge Systematics, 2017.

In 2025, intersection operations are expected to worsen compared with Existing Conditions, the result of projected land use growth in the study area. Under 2025 No Project Conditions, the following ten intersections would operate at unacceptable levels:

- Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)
- Hopyard Road & Owens Road (Intersection #5)
- Santa Rita Road & Valley Avenue (Intersection #17)
- Fallon Road & Dublin Boulevard/Croak Road (Intersection #19)
- Airway Boulevard/Driveway & North Canyons Parkway (Intersection #24)
- Livermore Avenue & I-580 EB Ramps (Intersection #38)
- First Street & Mines Road (Intersection #42)
- Altamont Pass Road/Greenville Road & I-580 WB Ramps (Intersection #46)
- Greenville Road/Altamont Pass Road (Intersection #48)
- Greenville Road/Patterson Pass Road (Intersection #50)

In 2040, intersection operations are expected to worsen even further with projected growth in the study area. Under 2040 No Project Conditions, the following 16 intersections would operate at unacceptable levels:

- Dougherty Road & Amador Valley Road (Intersection #1)
- Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)
- Hopyard Road & Owens Road (Intersection #5)
- Santa Rita Road & Valley Avenue (Intersection #17)
- Airway Boulevard/Driveway & North Canyons Parkway (Intersection #24)
- Isabel Avenue & Jack London Boulevard (Intersection #32)
- Isabel Avenue Connector & Stanley Boulevard (Intersection #33)
- Murrieta Boulevard & Jack London Boulevard (Intersection #35)
- Murrieta Boulevard & Stanley Boulevard (Intersection #36)
- Livermore Avenue & I-580 EB Ramps (Intersection #38)
- Livermore Avenue & Portola Avenue (Intersection #39)
- First Street & I-580 EB Ramps (Intersection #41)
- First Street & Mines Road (Intersection 42)
- Vasco Road & East Avenue (Intersection #45)
- Greenville Road/Altamont Pass Road (Intersection #48)
- Greenville Road/Patterson Pass Road (Intersection #50)

### (3) Transit

#### (a) BART

BART has outlined several near-term and long-term major investments to increase its ability to meet demand by providing more trains and more service. BART's Transbay Core

Capacity project will reduce crowding and improve service with the following four elements:

- Fleet of the Future – Expansion of BART's current fleet from 669 cars to as many as 1116 cars
- Train Control Modernization Project – An updated train control system that will allow BART to run trains more frequently and reliably
- Hayward Maintenance Complex – To ensure that BART has sufficient capacity to repair and maintain fleet for its expanded system
- Traction Power Improvements – Upgrading or installation of five traction power substations serving the congested corridor to adequately power additional BART service

Together, these projects will allow BART to run up to 30 trains per hour per direction through the Transbay Tube to alleviate the existing pinch point and increase capacity from the current 24,000 to 35,000 passengers per hour per direction. At some point after 2025, BART intends to improve weekday train headways from 15 minutes to 12 minutes, which will be in effect by 2040.

In addition, BART and its project partners are in the process of advancing several system extension projects, including the BART to Silicon Valley Extension Project (extension from Fremont to Berryessa in north San Jose) and the East Contra Costa County Extension Project, known as eBART (extension from Pittsburg/Bay Point to Antioch). BART is also implementing improvements at several stations.

**(b) Other Transit**

This EIR uses a programmatic approach to address future LAVTA bus service. To accurately estimate ridership, travel, and related impacts resulting from the Proposed Project, the EIR analysis made assumptions that represent potential future LAVTA bus service to support passenger access from key study area destinations to BART. Assumed bus service plans under future No Project Conditions are the same as under Existing Conditions.

LAVTA is the local bus service provider for connecting routes. LAVTA's Short Range Transit Plan highlights several initiatives that include tailoring transit service to be responsive to local land use, eliminating or reducing service along inefficient routes, exploring express and rapid service options, and increasing the service frequency and coverage along the most productive routes. LAVTA is also in the process of planning and implementing improvements to its bus stop locations to better address safety concerns, Americans With Disabilities Act issues, and accessibility. Finally, LAVTA recently

implemented its Wheels Forward Plan—a framework designed to help the agency achieve the above summarized goals by strategically modifying its service.[26]

At the route level, these analysis assumptions differ from the route modifications proposed under the Wheels Forward Plan. Despite these route-specific differences, the future bus service assumptions provide similar systemwide bus service coverage and operations to Wheels Forward, albeit under different route names.

Under 2025 and 2040 No Project Conditions, the analysis assumed that other surrounding transit service would remain identical to existing conditions.

In the future, the surrounding transit services are expected to experience ridership gains, due to land use growth in the region. ACE ridership within the Bay Area and San Joaquin County is expected to increase by 20 percent from 2013 to 2025, and another 20 percent from 2025 to 2040 (see Table 3.B-20). The greatest increases are expected for LAVTA bus routes—80 percent from 2013 to 2025 and another 40 percent from 2025 to 2040.

ACE is currently conducting environmental review of its ACEforward program, which is a series of improvement projects and service upgrades to be implemented through 2022. The following two phases of the ACEforward program are included in the BLVX transportation analysis. The first phase of ACE improvements includes the extension of service to Modesto, and would increase daily round trips to San Jose from four trains to six. The second phase improvements would include extension of service to Merced and the expansion of service to 10 round-trip trains daily.

The ACEforward Draft EIR also includes ridership projections for the ACE system in 2025 and 2040. These projections differ from the values shown in Table 3.B-20 because different ridership forecasting methodologies were used in the BART to Livermore Extension and ACEforward Draft EIRs. Whereas the primary focus of the BART to Livermore Extension ridership analysis is on BART ridership, the primary focus of the ACEforward ridership analysis is on ACE ridership.

### (4) Bicycles and Pedestrians

Planned on-street bicycle facilities as defined at the city, county, and/or regional level in the vicinity of the proposed station sites are identified below:

[26] Livermore Amador Valley Transit Authority (LAVTA), 2016. Existing Schedules. Available at: http://www.wheelsbus.com/routes-and-schedules/.

**TABLE 3.B-20 SURROUNDING TRANSIT SERVICES RIDERSHIP (WEEKDAY BOARDINGS), EXISTING AND 2025/2040 NO PROJECT CONDITIONS**

| | 2013 | 2025 | 2040 |
|---|---|---|---|
| ACE | 4,700 | 5,600 | 6,900 |
| LAVTA | 5,700 | 10,400 | 14,700 |
| RTD | 180[a] | 360 | 340 |

Notes: ACE = Altamont Corridor Express; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District.
ACE ridership numbers only include boardings in San Joaquin County and the Bay Area. These numbers do not reflect boarding along potential future ACE extensions into Stanislaus and Merced Counties.
2013 data shown in the table are output from the BLVX Travel Demand Model intended to reflect existing conditions.
[a] RTD has indicated that the current ridership is 225.
Source: Cambridge Systematics, 2017.

- Olivina Avenue – Infill of a short segment of bicycle lanes between Hageman Drive and Murrieta Boulevard
- East Airway Boulevard – Eastern extension of bicycle lane from Isabel Avenue to Rutan Drive

The City of Livermore is currently updating its 2001 Bikeways and Trails Master Plan. The updated plan—called the Bicycle, Pedestrian, and Trails Active Transportation Plan—will call for several proposed bicycle facility improvements within the study area, including proposed Class II lane extensions at the following locations:

- Airway Boulevard between Isabel Avenue and Portola Avenue
- North Canyons Parkway to Dublin Boulevard
- Constitution Drive connection to North Canyons Parkway
- Collier Canyon Road north of Campus Loop
- Isabel Avenue along Campus Hill Drive, providing a connection to the proposed North Livermore Connector Trail

The plan will also call for extensive updates to the Class I bike trail network within the study area, as follows:

- Filling in crucial gaps along the Isabel Trail
- Extending the trail along North Canyons Parkway
- Extension of the College Trail near Las Positas College
- New trail networks along Doolan Road, the North Livermore Connector Trail, and the Cayetano Creek Trail

Planned trails in the study area that would provide bicycle and pedestrian access in the vicinity of the proposed Isabel Station are as follows:

- Jack London Trail – Extension of the proposed Jack London Trail from Isabel Parkway east along Jack London Boulevard and then north to connect ultimately with the Las Positas Trail
- 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 Station site
- Cayetano Creek Trail – Segment in the city of Livermore along the tributary of Las Positas Creek from Portola Avenue to I-580

### d. BART System Performance in 2025 and 2040 under Project Conditions

This section describes BART system performance under the Proposed Project and Build Alternatives in the opening year (2025) and horizon year (2040). Quantitative metrics of BART system performance discussed here include ridership levels and station access mode trends, passenger loads, fleet requirements, and BART station parking.

The 2025 BART Operations Plan used in this analysis assumes the completion of near-term and long-term investments outlined under No Project Conditions and assumes that the BART extensions from Pittsburg/Bay Point to Antioch (eBART) and from Fremont to Berryessa (north San Jose) will be in service.[27] In addition, the 2040 BART Operation Plan and Plan Bay Area assume that the full BART extension beyond Berryessa to the city of Santa Clara will be in service.[28, 29] Future BART service will run more frequently systemwide, with 10-car trains running on each line at 15-minute headways (i.e., one train every 15 minutes) in 2025 and at 12-minute headways in 2040 in the peak direction during the peak period, along with additional rush hour trains along some routes.

#### (1) Ridership, Station Access, and Reductions in Vehicle Miles Traveled

This section describes BART system ridership, Tri-Valley ridership and station access modes, and reductions in VMT attributable to implementation of the Proposed Project and Build Alternatives.

Table 3.B-21 summarizes estimates current daily ridership in 2013, as well as under 2025 and 2040 Project Conditions. Systemwide ridership is expected to grow 18 percent from

[27] San Francisco Bay Area Rapid Transit District (BART), 2016. Station Access Policy.
[28] Ibid.
[29] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), 2013. Plan Bay Area 2013. Available at: http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf

2013 to 2025, and then to accelerate to nearly 40 percent from 2025 to 2040, a trend that reflects land use growth expectations and an extension of the BART system to the cities of San Jose and Santa Clara.

**TABLE 3.B-21 BART SYSTEMWIDE DAILY RIDERSHIP (WEEKDAY), EXISTING AND 2025/2040**

| Year | No Project | Conventional BART Project | DMU Alternative | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|---|
| 2013 Existing Conditions | 400,400 | N/A | N/A | N/A | N/A |
| 2025 Conditions | 472,200 | 478,800 *(+6,600)* | 477,200 *(+5,000)* | 473,900 *(+1,700)* | 472,200 *(+0)* |
| 2025 Cumulative Conditions | -- | 479,600 *(+7,400)* | 478,000 *(+5,800)* | 475,100 *(+2,900)* | 474,000 *(+1,800)* |
| 2040 Conditions | 657,300 | 669,200 *(+11,900)* | 664,300 *(+7,000)* | 660,800 *(+3,500)* | 657,700 *(+400)* |
| 2040 Cumulative Conditions | -- | 670,700 *(+13,400)* | 665,600 *(+8,300)* | 662,100 *(+4,800)* | 659,100 *(+1,800)* |

Notes: -- = Not Modeled; N/A = not applicable.
Ridership refers to the number of linked trips on the BART system; a theoretical passenger boarding the Dublin/Pleasanton-Daly City line at the Dublin/Pleasanton Station and transferring to the Richmond-Fremont line at the Coliseum Station would count as one trip.
Values in parentheses indicate change from No Project. Positive values indicate increase.
2013 data shown in the table are output from the BLVX Travel Demand Model intended to reflect existing conditions.
Source: Cambridge Systematics, 2017.

The Proposed Project results in the highest systemwide ridership in both 2025 and 2040, reflecting the relatively high appeal of a direct connection to the BART system from the Isabel area that eliminates the need for additional transfers. In 2040 the Proposed Project generates 11,900 more BART trips than would occur without the project. The DMU Alternative is less attractive as a rail option due to the required transfer at the Dublin/Pleasanton Station, and adds fewer new trips (7,000) in 2040. The Express Bus/BRT Alternative adds even fewer trips (3,500). While the express lane on I-580 and the proposed bus-only ramps enable faster travel times than buses traveling with other traffic, the bus service is still less attractive than rail and requires a transfer at the Dublin/Pleasanton Station for entrance into the BART system. Finally, the Enhanced Bus Alternative generates the fewest additional trips (400), a reflection of the lower reliability and speed of bus service on surface streets compared with exclusive travel-ways. Ridership comparisons of different alternatives for 2025 yield similar trends to those for 2040.

As described in Section 3.A, Introduction to Environmental Analysis, cumulative scenarios for 2025 and 2040 feature the Dublin/Pleasanton Station Parking Expansion, and for the Proposed Project and DMU Alternative, transit-oriented development that increases both housing and employment around the proposed Isabel Station, under the Isabel Neighborhood Plan (INP). These two changes cause the cumulative scenarios to produce higher BART ridership than the corresponding project scenarios. For instance, the Proposed Project generates 13,400 net new BART trips, or 1,500 more when cumulative projects are considered. The same trend applies to all alternatives in both 2025 and 2040.

Ridership effects of the Proposed Project and Build Alternatives are largely focused in the Tri-Valley Area. Table 3.B-22 shows the number of daily boardings for all alternatives, under 2025 and 2040 Project and Cumulative Conditions at the West Dublin/Pleasanton Station, the Dublin/Pleasanton Station, and the proposed Isabel Station, and total number of boardings for the Tri-Valley Area.

**TABLE 3.B-22 TRI-VALLEY BART BOARDINGS (WEEKDAY), EXISTING AND 2025/2040**

| | West Dublin/ Pleasanton | Dublin/ Pleasanton | Proposed Isabel Station | Total Tri-Valley |
|---|---|---|---|---|
| **Existing (2013)** | | | | |
| | 3,000 | 7,300 | N/A | 10,300 |
| **2025** | | | | |
| No Project Conditions | 3,100 | 8,300 | N/A | 11,400 |
| **Project Conditions** | | | | |
| Conventional BART Project | 3,100 *(+0)* | 7,200 *(-1,100)* | 4,700 | 15,000 *(+3,600)* |
| DMU Alternative | 3,100 *(+0)* | 7,900 *(-400)* | 3,100 | 14,100 *(+2,700)* |
| Express Bus/BRT Alternative | 3,100 *(+0)* | 9,300 *(+1,000)* | N/A | 12,400 *(+1,000)* |
| Enhanced Bus Alternative | 3,100 *(+0)* | 8,300 *(+0)* | N/A | 11,400 *(+0)* |
| **Cumulative Conditions** | | | | |
| Conventional BART Project | 3,100 *(+0)* | 8,000 *(-300)* | 4,300 | 15,400 *(+4,000)* |
| DMU Alternative | 3,100 *(+0)* | 8,700 *(+400)* | 2,700 | 14,500 *(+3,100)* |
| Express Bus/BRT Alternative | 3,100 *(+0)* | 9,900 *(+1,600)* | N/A | 13,000 *(+1,600)* |
| Enhanced Bus Alternative | 3,100 *(+0)* | 9,200 *(+900)* | N/A | 12,300 *(+900)* |

**TABLE 3.B-22 TRI-VALLEY BART BOARDINGS (WEEKDAY), EXISTING AND 2025/2040**

| | West Dublin/ Pleasanton | Dublin/ Pleasanton | Proposed Isabel Station | Total Tri-Valley |
|---|---|---|---|---|
| 2040 | | | | |
| No Project Conditions | 3,400 | 10,800 | N/A | 14,200 |
| **Project Conditions** | | | | |
| Conventional BART Project | 3,600 *(+200)* | 9,000 *(-1,800)* | 8,100 | 20,700 *(-6,500)* |
| DMU Alternative | 3,500 *(+100)* | 9,800 *(-1,000)* | 4,800 | 18,100 *(-3,900)* |
| Express Bus/BRT Alternative | 3,400 *(+0)* | 12,700 *(+1,900)* | N/A | 16,100 *(+1,900)* |
| Enhanced Bus Alternative | 3,500 *(+100)* | 10,900 *(+100)* | N/A | 14,400 *(+200)* |
| **Cumulative Conditions** | | | | |
| Conventional BART Project | 3,600 *(+200)* | 10,000 *(-800)* | 7,900 | 21,500 *(+7,300)* |
| DMU Alternative | 3,500 *(+100)* | 10,500 *(-300)* | 4,700 | 18,700 *(+4,500)* |
| Express Bus/BRT Alternative | 3,500 *(+100)* | 13,300 *(+2,500)* | N/A | 16,800 *(+2,600)* |
| Enhanced Bus Alternative | 3,500 *(+100)* | 11,600 *(+800)* | N/A | 15,100 *(+900)* |

Notes: N/A = not applicable.
Values in parentheses indicate change from No Project Conditions. Positive values indicate increase; negative values indicate decrease.
Existing (2013) data reflect the existing conditions from the BLVX Travel Demand Model and are not empirical data.
Source: Cambridge Systematics, 2017.

For total Tri-Valley boardings, trends are similar to those for the BART systemwide ridership. Boardings are expected to grow by 25 percent from 2025 to 2040 under No Project Conditions. Among the alternatives, the Proposed Project increases the number of boardings by the largest number over the No Project Conditions, followed by the DMU Alternative, Express Bus/BRT Alternative, and finally the Enhanced Bus Alternative.

Among the individual BART stations in the Tri-Valley Area, trends are not the same across alternatives. Boardings at the West Dublin/Pleasanton Station remain largely constant across all alternatives in the same analysis year; the station is parking-constrained and no other station access changes are proposed, so station access there remains relatively

unchanged. The Dublin/Pleasanton Station, however, loses boardings under alternatives in which the proposed Isabel Station is available (i.e., the Proposed Project and the DMU Alternative). The Isabel Station attracts park-and-ride BART passengers away from the Dublin/Pleasanton Station who find the Isabel Station to be more convenient. Also, major connecting bus services are routed to connect at the Isabel Station instead of the Dublin/Pleasanton Station under those alternatives. Under the Express Bus/BRT and Enhanced Bus Alternatives, the Dublin/Pleasanton Station gains boardings because the Isabel Station is not available to attract park-and-ride customers, and because more connecting buses serve the Dublin/Pleasanton Station.

Table 3.B-23 describes station access mode share at the Dublin/Pleasanton Station under Existing Conditions and in 2040. Mode of access reflects how BART riders arrive at the station—i.e., driving and parking, dropped off by private vehicle, via bus, or by walking or biking. The modes of access differ between the stations and reflect the travel and land use characteristics of the stations and station areas. For example, stations close to residential and employment population centers typically have a higher walk mode share. Also, end-of-line stations, such as the Dublin/Pleasanton Station in 2013, typically have higher vehicle and bus access than walk access, as they attract BART travelers from farther away. Boardings by mode are provided in the tables below for 2040 only. For 2025, overall ridership is lower than in 2040 for all alternatives, but the patterns are similar to those in 2040.

**TABLE 3.B-23 DUBLIN/PLEASANTON STATION ACCESS MODES AND DAILY BOARDINGS (WEEKDAY), 2040 CONDITIONS**

| | Park-and-Ride | Other | Total |
|---|---|---|---|
| 2013 | 4,600 | 2,700 | 7,300 |
| 2040 No Project | 4,600 | 6,200 | 10,800 |
| **2040 Project Conditions** | | | |
| Conventional BART Project | 4,600 | 4,400 | 9,000 |
| DMU Alternative | 4,600 | 5,200 | 9,800 |
| Express Bus/BRT Alternative | 4,600 | 8,100 | 12,700 |
| Enhanced Bus Alternative | 4,600 | 6,300 | 10,900 |
| **2040 Cumulative Conditions** | | | |
| Conventional BART Project | 5,500 | 4,500 | 10,000 |
| DMU Alternative | 5,300 | 5,200 | 10,500 |
| Express Bus/BRT Alternative | 5,500 | 7,800 | 13,300 |
| Enhanced Bus Alternative | 5,400 | 6,200 | 11,600 |

Note: 2013 data shown in the table are output from the BLVX Travel Demand Model intended to reflect existing conditions.
Source: Cambridge Systematics, 2017.

In 2013, most of the BART patrons accessing the Dublin/Pleasanton Station do so by car. From 2013 to 2040 No Project Conditions, boardings at the Dublin/Pleasanton Station are expected to increase. Park-and-ride access is projected to remain the same due to limited parking facilities. To accommodate the increased usage of the station, access by other modes is projected to increase.

In 2040, under Project Conditions, boardings at the Dublin/Pleasanton Station—as discussed earlier—are expected to decrease compared to No Project Conditions with the Proposed Project and DMU Alternative and increase with the Express Bus/BRT and Enhanced Bus Alternatives. Park-and-ride access to the Dublin/Pleasanton Station under all alternatives is expected to be similar to 2013, dictated by the constrained parking supply. Access by other modes is forecast to increase or decrease depending on the overall boardings at the station under each alternative.

Under 2040 Cumulative Conditions, which includes a net expansion of the Dublin/Pleasanton Station parking by 540 spaces, that station attracts a large number of additional park-and-ride BART patrons—a higher number than the increase in supply, as some spaces are used more than once during the day or serve multiple patrons who are carpooling together. All other access modes remain similar in usage to Project Conditions (i.e., without expansion of Dublin/Pleasanton Station parking).

Table 3.B-24 shows similar access mode information for the proposed Isabel Station in 2040 (there are no existing or 2040 No Project Conditions data because the Isabel Station does not exist under those scenarios).

Similar to Dublin/Pleasanton in 2013, the dominant mode of access to the Isabel Station in 2040 is expected to be park-and-ride. This is because the Isabel Station in 2040 takes over the role that the Dublin/Pleasanton plays in 2013 as the end-of-line station.

Modes of access change for the Isabel Station under 2040 Cumulative Conditions compared to Project Conditions. Access by other modes (i.e., walking and biking) increases due to the increase in employment and housing in the INP area near the station. However, that increase is offset by a decrease in park-and-ride access, a result of the expanded parking supply at the Dublin/Pleasanton Station, which draws some BART patrons who otherwise would park at the Isabel Station.

**TABLE 3.B-24 PROPOSED ISABEL STATION ACCESS MODE AND DAILY BOARDINGS (WEEKDAY), 2040 CONDITIONS**

| | Park-and-Ride | Other | Total |
|---|---|---|---|
| 2013 | NA | NA | NA |
| 2040 No Project | NA | NA | NA |
| **2040 Project Conditions** | | | |
| Conventional BART Project | 4,300 | 3,800 | 8,100 |
| DMU Alternative | 2,300 | 2,500 | 4,800 |
| Express Bus/Bus Rapid Transit Alternative | NA | NA | NA |
| Enhanced Bus Alternative | NA | NA | NA |
| **2040 Cumulative Conditions** | | | |
| Conventional BART Project | 3,600 | 4,300 | 7,900 |
| DMU Alternative | 1,800 | 2,900 | 4,700 |
| Express Bus/Bus Rapid Transit Alternative | NA | NA | NA |
| Enhanced Bus Alternative | NA | NA | NA |

Note: 2013 data shown in the table are output from the BLVX Travel Demand Model intended to reflect existing conditions.
Source: Cambridge Systematics, 2017.

### (2) Passenger Loads and Fleet Requirements

This section describes forecasted passenger loads on BART vehicles, as well as the number of BART vehicles required to meet the future passenger capacity needs.

Table 3.B-25 below shows the average systemwide peak hour passenger loads on BART cars under Existing Conditions, as well as under 2040 No Project, Proposed Project-only, and Cumulative Conditions, based on projections from the BLVX Travel Demand Model. Conventional BART Project is discussed here because it would generate the largest number of riders and would have the greatest effect on the BART system. Other alternatives would also generate ridership, but would have lesser effects on the system.

From 2013 to 2040 No Project Conditions, a modified BART service plan is expected to increase peak-period service on all lines, increasing passenger capacity throughout the system in the peak hour to address anticipated increases in demand.

**TABLE 3.B-25 BART SYSTEMWIDE AVERAGE PEAK-HOUR LOAD AT MAXIMUM LOAD POINTS (PASSENGERS PER CAR), 2040 CONDITIONS**

| | AM | PM |
|---|---|---|
| 2013 | 107 | 109 |
| 2040 No Project | 106 | 108 |
| **2040 Project Conditions** | | |
| Conventional BART Project | 106 | 107 |
| DMU Alternative | 105 | 106 |
| Express Bus/Bus Rapid Transit Alternative | 104 | 105 |
| Enhanced Bus Alternative | 106 | 108 |
| **2040 Cumulative Conditions** | | |
| Conventional BART Project | 106 | 108 |
| DMU Alternative | Not Available | Not Available |
| Express Bus/Bus Rapid Transit Alternative | Not Available | Not Available |
| Enhanced Bus Alternative | Not Available | Not Available |

Sources:
Arup, 2013; Cambridge Systematics, 2017; Connetics Transportation Group, 2017.

Under 2040 Project Conditions, the analysis assumed further service increases on the Dublin/Pleasanton-Daly City line, specifically to accommodate the additional BART ridership attracted by the Proposed Project and to keep the passenger peak load on the Dublin/Pleasanton-Daly City line from deviating substantially from the systemwide average (for a description of the BART operating plan under the Proposed Project, please see Chapter 2, Project Description). Due to these service adjustments, average systemwide loads remain similar to those under 2040 No Project Conditions.

Under 2040 Cumulative Conditions, the analysis forecasts slightly higher ridership along the Dublin/Pleasanton-Daly City line (and as a result along the Fremont-Daly City and Fremont-Richmond lines), with the same level of BART service envisioned under the Proposed Project. Average systemwide loads under Cumulative Conditions remain similar to those under 2040 No Project Conditions and 2040 Project Conditions.

Table 3.B-26 below shows the morning peak hour loads at select stations along the Dublin/Pleasanton-Daly City line the westbound direction for future baseline conditions based on the BLVX Travel Demand Model.

Passenger loads for BART in 2040 were generated based on the BLVX Travel Demand Model's station-to-station origin-destination trip forecasts and a BART Operations Model. For each alternative, the analysis adjusted the inputs regarding the BART operation plan and number of BART cars to reduce passenger crowding.

**TABLE 3.B-26 PEAK-HOUR TRAIN LOADS AT SELECTED STATIONS, DUBLIN/PLEASANTON-DALY CITY LINE (PASSENGERS PER CAR), EXISTING AND 2040**

| | Existing 2013 | 2040 No Project Conditions | 2040 Conventional BART Project | 2040 Cumulative Conditions, Conventional BART Project |
|---|---|---|---|---|
| **AM, Peak (Westbound) Direction, Arriving Train** | | | | |
| Bay Fair | 82 | 93 | 96 | 99 |
| Coliseum/OAK | 98 | 90 | 89 | 92 |
| West Oakland | 104 | 107 | 101 | 104 |
| Embarcadero | 110 | 112 | 105 | 108 |

Sources:
Arup, 2013; Cambridge Systematics, 2017; Connetics Transportation Group, 2017.

Due to the service increases on the Dublin/Pleasanton-Daly City line under the Proposed Project, most stations presented in Table 3.B-26 experience modestly decreased passenger loads under Project Conditions. Under all scenarios, trains continue to experience maximum passenger loads at the Embarcadero BART Station in the AM and PM peak hour. The Bay Fair BART Station is the only location where peak hour passenger loads increase under the Proposed Project. A possible cause is Bay Fair's function as a transfer point between the future Isabel-Daly City line and the future Santa Clara-Daly City and Santa Clara-Richmond lines.

The resulting BART fleet requirements from the anticipated service increases and passenger loads under the Proposed Project and each Alternative in 2025 and 2040 are noted in Table 3.B-27.

Fleet requirements increase substantially between Existing Conditions and 2025 and 2040 No Project Conditions. This increase in required fleet is due to more frequent BART service, and other BART extensions and projects. For both 2025 and 2040 Conditions, the Proposed Project (compared with the Build Alternatives) would lead to the highest increase in fleet requirements over No Project Conditions. The DMU Alternative and Express Bus/BRT Alternative lead to a smaller increase in fleet requirements over No Project

Conditions for 2025 and 2040, while the Enhanced Bus Alternative would require no additional fleet over No Project Conditions.

**TABLE 3.B-27 PROJECTED BART FLEET REQUIREMENTS**

| | Number of Cars Needed |
|---|---|
| **2025** | |
| **No Project Conditions** | 1,008 |
| **Project Conditions** | |
| Conventional BART Project | 1,038 (+30) |
| DMU Alternative | 1,026 (+18) |
| Express Bus/BRT Alternative | 1,014 (+6) |
| Enhanced Bus Alternative | 1,008 (+0) |
| **2040** | |
| **No Project Conditions** | 1,134 |
| **Project Conditions** | |
| Conventional BART Project | 1,170 (+36) |
| DMU Alternative | 1,158 (+24) |
| Express Bus/BRT Alternative | 1,146 (+12) |
| Enhanced Bus Alternative | 1,134 (+0) |

Notes: Cumulative Conditions fleet requirements are identical to those for Project Conditions.
2013 data shown in the table are output from the BLVX Travel Demand Model intended to reflect existing conditions.
The 2040 No Project fleet requirement shown here is similar to the BART Fleet of the Future plan for 1,116 vehicles.
Sources:
Cambridge Systematics, 2017; Connetics Transportation Group, 2017.

### (3) Station Parking

BART operates parking facilities at the Dublin/Pleasanton Station and a park-and-ride lot at Airway Boulevard and Rutan Drive. These facilities, whose capacities are noted in Table 3.B-28, serve as parking for patrons of surrounding transit and the BART system.

Current parking demand at the Dublin/Pleasanton Station is high, with more patrons attempting to park at the station than are spaces.

**TABLE 3.B-28 BART PARKING FACILITIES, EXISTING**

| Location | Number of Spaces |
|---|---|
| West Dublin Pleasanton Station | 1,190 |
| Dublin/Pleasanton Station | 2,890 |
| Park & Ride Lot on Airway Boulevard at Rutan Drive | 150 |

The analysis used the BLVX Travel Demand Model to estimate parking demand based on projected park-and-ride passengers for each BART facility. The analysis indicated that future parking demand at the Dublin/Pleasanton Station would continue to be high under the Proposed Project and Build Alternatives, with Dublin/Pleasanton Station spaces continuing to be fully occupied by BART patrons. Elsewhere, the alternatives would provide new parking facilities to support demand for parking created by the proposed changes to transit infrastructure and service, as indicated in Chapter 2, Project Description.

Consistent with the BART Board adopted Station Access Policy (2016) for an Auto Dependent Station Access Type at Isabel, the Proposed Project and Build Alternatives sized these proposed parking facilities based on projected demand, as shown in Table 3.B-29 below. While the quantity of station parking has been designed to accommodate the anticipated demand, unanticipated demand for parking could exceed supply. This could result in BART patrons parking on local streets. If any of the cities were to request assistance in managing overflow parking by BART patrons, BART would work with that city to implement the BART Parking Management Toolkit, which provides recommended strategies for addressing parking overflow onto city streets (a copy of the Parking Management Toolkit is provided in Appendix D). In addition, the Isabel Station garage would be designed to accommodate the potential future construction of two additional levels of parking.

Both the Proposed Project and the DMU Alternative include a new parking structure at the proposed Isabel Station. The Express Bus/BRT Alternative relies on a combination of the existing small park-and-ride lot at Airway Boulevard near Isabel Avenue and a new park-and-ride lot to be built at the intersection of Laughlin Road and North Front Road. The Express Bus/BRT Alternative also features a new parking facility near the Dublin/Pleasanton Station, to replace existing surface parking at that location that would be eliminated because of the relocation of the I-580 freeway travel lanes necessary to accommodate the proposed Express Bus/BRT station platform. The Enhanced Bus Alternative provides no additional parking facilities.

**TABLE 3.B-29 PARKING DEMAND AT EXISTING AND PROPOSED BART PARKING FACILITIES, 2025 AND 2040**

| | No Project Conditions | Conventional BART Project | DMU Alternative | Express Bus/BRT Alternative | Enhanced Bus Alternative |
|---|---|---|---|---|---|
| **2025** | | | | | |
| Existing Airway Boulevard Park-and-Ride Lot | 40 | N/A | N/A | 110 | 150 |
| Proposed Isabel Station Parking Structure | N/A | 1,600 | 1,200 | N/A | N/A |
| Proposed Laughlin Road Park-and-Ride Lot | N/A | N/A | N/A | 180 | N/A |
| **2040** | | | | | |
| Existing Airway Boulevard Park-and-Ride Lot | 100 | N/A | N/A | 170 | 220 |
| Proposed Isabel Station Parking Structure | N/A | 3,200 | 2,100 | N/A | N/A |
| Proposed Laughlin Road Park-and-Ride Lot | N/A | N/A | N/A | 230 | N/A |

Note: N/A = not applicable.
Source: Cambridge Systematics, 2017.

### (4) Vehicle Miles Traveled

This section describes projected changes in VMT as a result of the Proposed Project and Build Alternatives. VMT is defined as the number of all road VMT on a typical weekday, including all private vehicles and all public bus vehicles.

The Proposed Project and Build Alternatives result in VMT reductions compared with No Project Conditions, except for the Enhanced Bus Alternative in 2025, as presented in Table 3.B-30. The Proposed Project results in the highest VMT reductions; by attracting the most new BART riders, it reduces vehicle trips the most. The DMU Alternative has the second-highest amount of VMT reductions—a smaller reduction than under the Proposed Project—because this alternative requires passengers starting at the Isabel DMU station to transfer at the Dublin/Pleasanton Station, whereas under the Proposed Project, passengers have direct entry into the BART system at the Isabel Station. Express Bus/BRT provides the next highest VMT reduction, as bus service is less attractive to transit riders than rail service.

**TABLE 3.B-30 VMT REDUCTIONS SUMMARY (AVERAGE WEEKDAY)**

| Scenario | Passenger VMT Reduction | Bus VMT Increase Relative to No Project Conditions | Total VMT Reduction |
|---|---|---|---|
| **2025 Project** | | | |
| Conventional BART | 127,500 | 1,900 | 125,600 |
| DMU Alternative | 95,300 | 1,900 | 93,400 |
| Express Bus/BRT Alternative | 44,500 | 2,700 | 41,800 |
| Enhanced Bus Alternative | 300 | 2,600 | (2,400) |
| **2025 Cumulative** | | | |
| Conventional BART | 108,800 | 1,900 | 106,900 |
| DMU Alternative | 72,900 | 1,900 | 71,000 |
| Express Bus/BRT Alternative | 65,000 | 2,700 | 62,300 |
| Enhanced Bus Alternative | 29,000 | 2,600 | 26,400 |
| **2040 Project** | | | |
| Conventional BART | 245,900 | 1,900 | 244,000 |
| DMU Alternative | 142,500 | 1,900 | 140,600 |
| Express Bus/BRT Alternative | 95,300 | 2,700 | 92,600 |
| Enhanced Bus Alternative | 9,100 | 2,600 | 6,500 |
| **2040 Cumulative** | | | |
| Conventional BART | 274,600 | 1,900 | 272,700 |
| DMU Alternative | 166,400 | 1,900 | 164,500 |
| Express Bus/BRT Alternative | 115,600 | 2,700 | 112,900 |
| Enhanced Bus Alternative | 29,400 | 2,600 | 26,800 |

Note: VMT = vehicle miles traveled.
Source: Cambridge Systematics, 2017.

The Enhanced Bus Alternative results in negligible changes to VMT. The difference in VMT reduction under the Express Bus/BRT Alternative and the Enhanced Bus Alternative may be because while the Enhanced Bus Alternative includes improvements to bus service, it does not entail any major capital improvements to improve bus operations, and thus results in fewer additional transit riders. VMT reductions under the Enhanced Bus Alternative for 2025 Project Conditions are especially minor, eclipsed by the increase in the bus VMT (due to the bus service improvements proposed under the Alternative)—overall leading to a small increase in VMT for 2025 Project Conditions. It is the only scenario under which there is an increase in VMT.

The cumulative analysis for 2025 results in smaller VMT reductions for the Proposed Project and DMU Alternative than the VMT reductions for the Proposed Project and DMU Alternative in the 2025 project analysis. This is due to the level of parking supply assumed for the Proposed Project and the DMU Alternative under the cumulative analysis in comparison to the project analysis. The Proposed Project and DMU Alternative provide enough parking supply at the Isabel Station to meet the parking demand projected for the station, as well as to absorb a substantial portion of the latent parking demand originating from areas relatively close to the Dublin/Pleasanton Station. The presence of new parking at the Dublin/Pleasanton Station under the cumulative analysis—in addition to the significant proposed supply of parking at the Isabel Station—in total offers enough parking to attract park-and-ride trips to the station from greater distances, ultimately resulting in an increase in auto VMT under the cumulative analysis relative to the project analysis. The Express Bus/BRT Alternative and Enhanced Bus Alternative do not feature any parking at the Isabel Station, and thus do not lead to an increase in VMT under the cumulative analysis relative to the project analysis.

Unlike 2025, the cumulative analysis in 2040 results in higher VMT reductions for all alternatives—including the Proposed Project and the DMU Alternative—than VMT reductions under the project analysis for 2040. This is because 2040 features more jobs and housing in the INP area than 2025, resulting in more trips that shift from driving to using the Proposed Project and Build Alternatives. The VMT reductions from these shifts in 2040 overtake the increase in auto trips due to the addition of parking at the Dublin/Pleasanton Station. Therefore, VMT reductions are higher for the Proposed Project and Build Alternatives under the 2040 cumulative analysis compared to the 2040 project analysis.

VMT is reasonably expected to increase from 2025 to 2040 under No Project Conditions, consistent with projections based on continued regional land use development and planned and programmed transportation improvements. At the same time, if BART selects the No Project Alternative, the reductions in passenger VMT described above would not occur. As a result, as discussed in Sections 3.L, Greenhouse Gas Emissions and 3.M, Energy, the No Project Alternative is anticipated to result in significant impacts related to greenhouse gas emissions and energy consumption, without the benefit of VMT reductions attributable to Proposed Project or Build Alternatives offsetting a portion of the effects of VMT growth, as a consequence of BART's decision not to adopt a project.

### e. Summary of Impacts

Table 3.B-31 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.B-31 SUMMARY OF TRANSPORTATION IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project** | **DMU Alternative (with EMU Option)** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| **Project Analysis** | | | | | |
| Impact TRAN-1: Result in a significant delay, safety hazard, or diminished access during construction | NI | LSM | LSM | LSM | LS |
| **Cumulative Analysis** | | | | | |
| Impact TRAN-2(CU): Result in a significant delay, safety hazard, or diminished access during construction under Cumulative Conditions | NI | NI | NI | NI | NI |
| **Operational** | | | | | |
| **Project Analysis (2025 and 2040)** | | | | | |
| Impact TRAN-3: General-purpose lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions | NI | SU | SU | SU | LS |
| Impact TRAN-4: General-purpose lane freeway segments operating at unacceptable LOS, under 2040 Project Conditions | NI | SU | SU | NI | NI |

**TABLE 3.B-31 SUMMARY OF TRANSPORTATION IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project** | **DMU Alternative (with EMU Option)** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| Impact TRAN-5: HOV/express lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions | NI | LS | SU | LS | LS |
| Impact TRAN-6: HOV/express lane freeway segments operating at unacceptable LOS, under 2040 Project Conditions | NI | NI | NI | NI | NI |
| Impact TRAN-7: Intersections operating at unacceptable LOS, under 2025 Project Conditions | NI | SU | SU | LSM | NI |
| Impact TRAN-8: Intersections operating at unacceptable LOS, under 2040 Project Conditions | NI | SU | SU | SU | NI |
| Impact TRAN-9: Impede surrounding transit services from improving access to BART, reducing system inefficiencies, or increasing ridership, under 2025 or 2040 Project Conditions | NI | LS | LS | LS | NI |
| Impact TRAN-10: Worsen bicycle LTS, circulation and access, or safety hazards, under 2025 or 2040 Project Conditions | NI | B | B | NI | NI |

**TABLE 3.B-31 SUMMARY OF TRANSPORTATION IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project** | **DMU Alternative (with EMU Option)** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| Impact TRAN-11: Worsen pedestrian crossing distance or delay, circulation and access, or safety hazards, under 2025 or 2040 Project Conditions | NI | B | B | LS | NI |
| Impact TRAN-12: Result in a change in air traffic patterns, under 2025 or 2040 Project Conditions | NI | NI | NI | NI | NI |
| Impact TRAN-13: Increase hazards due to a design feature or incompatible uses, under 2025 or 2040 Project Conditions | NI | NI | NI | NI | NI |
| Impact TRAN-14: Result in inadequate emergency access, under 2025 or 2040 Project Conditions | NI | NI | NI | NI | NI |
| **Cumulative Analysis (2025 and 2040)** | | | | | |
| Impact TRAN-15(CU): General-purpose lane freeway segments operating at unacceptable LOS, under 2025 Cumulative Conditions | NI | LS | LS | LS | LS |
| Impact TRAN-16(CU): General-purpose lane freeway segments operating at unacceptable LOS, under 2040 Cumulative Conditions | NI | SU | SU | NI | NI |

**TABLE 3.B-31 SUMMARY OF TRANSPORTATION IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project** | **DMU Alternative (with EMU Option)** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| Impact TRAN-17(CU): HOV/express lane freeway segments operating at unacceptable LOS, under 2025 Cumulative Conditions | NI | NI | NI | NI | NI |
| Impact TRAN-18(CU): HOV/express lane freeway segments operating at unacceptable LOS, under 2040 Cumulative Conditions | NI | NI | NI | NI | NI |
| Impact TRAN-19(CU): Intersections operating at unacceptable LOS, under 2025 Cumulative Conditions | NI | SU | SU | LSM | LSM |
| Impact TRAN-20(CU): Intersections operating at unacceptable LOS, under 2040 Cumulative Conditions | NI | SU | SU | SU | SU |
| Impact TRAN-21(CU): Impede surrounding transit services from improving access to BART, reducing system inefficiencies, or increasing ridership, under 2025 or 2040 Cumulative Conditions | NI | LS | LS | LS | NI |
| Impact TRAN-22(CU): Worsen bicycle level of traffic stress, circulation and access, or safety hazards, under 2025 or 2040 Cumulative Conditions | NI | B | B | NI | NI |

**TABLE 3.B-31 SUMMARY OF TRANSPORTATION IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project** | **DMU Alternative (with EMU Option)** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| Impact TRAN-23(CU): Worsen pedestrian crossing distance or delay, circulation and access, or safety hazards, under 2025 or 2040 Cumulative Conditions | NI | NI | NI | NI | NI |

Notes: DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit; LTS = level of traffic stress.
NI=No impact; B=Beneficial impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation; SU=Significant and unavoidable, even with mitigation or no feasible mitigation available.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.

### f. Environmental Analysis

Impacts related to project construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts related to project construction are described below, followed by cumulative construction impacts.

#### (a) Construction – Project Analysis

***Impact TRAN-1: Result in a significant delay, a safety hazard, or diminished access during construction.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for

segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. Construction of these improvements and development projects could generate traffic delays, safety hazards, or diminished access during construction. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related delay, safety hazards, or diminished access during construction. **(NI)**

**Conventional BART Project.** Construction under the Proposed Project would require the relocation of I-580 lanes, as detailed in Chapter 2, Project Description. The relocation process would include building a replacement lane in each direction on the outside edge of the existing freeway, then closing the center lanes to construct the new tracks and the Isabel Station. The process would include relocation of frontage roads, relocation of interchange on- and off-ramps, shifting of freeway travel lanes, and reconstruction of one of the existing bridges constituting the Airway Boulevard freeway overpass. The discussion below describes potential impacts to vehicle traffic, transit, pedestrians, and bicycles, in turn.

**Vehicle Traffic**

Construction vehicles and equipment would use I-580 and local roadways to access construction sites and staging areas along the project corridor. Trucks and equipment traffic could temporarily disrupt existing freeway traffic patterns during construction of the project. Construction traffic would include heavy equipment such as bulldozers, dump trucks, cranes, and excavators. The project corridor would allow much 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 the lane closures, disruption to regular traffic circulation could be significant. Lane closures could also be necessary along I-580 for certain construction activities and material deliveries.

The Proposed Project has identified six potential construction staging areas, as noted in Chapter 2, Project Description. The Arnold Road Staging Area is between I-580 and Martinelli Way and between Campus Drive and Arnold Road; access from I-580 to this staging area would be from the Hacienda Drive interchange. The North Canyons Parkway Staging Area would be between I-580 and North Canyons Parkway, between Airway

Boulevard and Doolan Road; access from I-580 to this staging area would be from the Airway Boulevard interchange. The Isabel North Staging Area is north of I-580 at Isabel Avenue (potentially on either side of Isabel Avenue prior to development); access from I-580 to this staging area would be from the Isabel Avenue interchange. The Isabel South Staging Area under the Proposed Project would be north of I-580 and northeast of Campus Hill Drive, and serve the storage yard; access from I-580 would be from Isabel Avenue to Campus Hill Drive. The Kitty Hawk Road Staging Area, West of Isabel Avenue and north of Kitty Hawk Road, would serve construction of the wayside facility; access from I-580 would be from the Isabel Avenue interchange and the Airway interchange. The Storage and Maintenance Facility Staging Area, north of I-580 and northeast of Campus Hill Drive, would serve construction of the storage yard; access from I-580 would be from Isabel Avenue to Campus Hill Drive. The movement of hauling trucks to and from the staging areas would likely add a minor amount of delay to traffic along these streets.

Some temporary lane closures and lane shifts of I-580 would be required. Depending on the locations and times of day of lane closures, disruption to regular traffic circulation could be significant. Lane closures could also be necessary along I-580 for certain construction activities and material deliveries. Freeway travel would also be impeded by traffic from construction vehicles and equipment that would use I-580 to access and deliver materials to construction sites along the project corridor. Trucks and equipment traffic could temporarily disrupt existing freeway traffic patterns during the construction of the project. Construction traffic would include heavy equipment such as bulldozers, dump trucks, cranes, and excavators.

The Proposed Project's construction activities, as noted above, have the potential to create traffic safety hazards, which could be minimized if construction were accompanied by activities to manage its effects on vehicle traffic, as discussed further below. The Proposed Project would modify some local roads, including realigning frontage roads and interchange ramps that provide access in the local roadway network. These realignments would be completed while at least one travel lane remained open during construction, and access from the frontage roads to adjoining land uses would be retained at all times.

**BART Transit**

Construction of new BART tracks in the freeway median would begin after the relocation of I-580. The existing BART tail tracks would be converted into mainline tracks to enable these tracks to accommodate higher train speeds as they tie into the mainline extension to Livermore. There would be two options for maintaining existing train storage capacity at the Dublin/Pleasanton Station tail tracks as they are modified into mainline tracks for the BART extension, as follows:

- One of the existing BART tail tracks could be extended to the I-580/Santa Rita Road interchange and be used for train storage, while the remaining tail track is upgraded to mainline track.
- Train storage could be temporarily moved to tail tracks between the Castro Valley BART Station and the West Dublin/Pleasanton Station.

Both of the above options would ensure that BART operations and existing storage capacity is not impacted during construction. Therefore, construction related to the Proposed Project would have a less-than-significant impact on the BART system.

**Surrounding Transit**

Transit routes using the interchange ramps that would be relocated could experience delays from slower traffic. Transit routes traveling along this segment of Airway Boulevard, such as the current LAVTA Route 12, could experience delays caused by slower traffic resulting from closure of one of the Airway Boulevard bridges over I-580. The majority of the freeway ramp modifications would likely occur at off-peak times and result in minimal disruption to transit. Additional traffic from vehicles hauling materials between the construction sites and the staging areas could also pose a potential risk to the quality of transit service and operations. Construction along facilities in the study area and the movement of construction vehicles near staging areas would be planned and managed to minimize disruption to general traffic and transit operations. However, there would likely be some temporary added delay to local and express bus routes traveling on I-580 and the local streets near construction staging areas, due to construction under the Proposed Project.

**Bicycles and Pedestrians**

Construction of the Proposed Project would not result in significant temporary impacts to bicycle access, circulation, or safety around the proposed station area, as construction would not involve blocking any bicycle facilities.

Construction of the Proposed Project would not result in significant temporary impacts to pedestrian access, circulation, or safety, as construction would not involve blocking any sidewalks or walking paths in the study area.

Overall, the Proposed Project's construction activities would have a less-than-significant impact on traffic delays, with implementation of **Mitigation Measure TRAN-1**, discussed further below, which includes creation of a Construction Phasing and Traffic Management Plan to minimize construction-related impacts on transportation. **(LSM)**

**DMU Alternative.** The DMU Alternative is similar to the Proposed Project in its construction method for I-580, but would affect a longer stretch of I-580 west of where the Proposed Project would end, to accommodate the DMU station and added BART car storage needs for the DMU Alternative. The I-580 lane relocations would begin approximately 2,000 feet west of the Dougherty Road interchange for the DMU Alternative. The DMU Alternative would have a similar impact to the Proposed Project for vehicle traffic during construction but would impact a longer segment of I-580.

For impacts to the BART system during construction, the DMU Alternative would also be similar to the Proposed Project, except for the portion near the Dublin/Pleasanton Station. The new DMU track, and the new DMU transfer platform, would be built north of the existing northern BART track and could be done without affecting existing BART operations. The existing BART tracks at the existing platform would remain in place. Construction would therefore cause minimal interruptions to existing BART service.

The DMU Alternative is identical to the Proposed Project in its construction impact to surrounding transit services.

The DMU Alternative is identical to the Proposed Project in its construction impact to bicycles and pedestrians.

Overall, the DMU Alternative's construction activities would have a less-than-significant impact on traffic delays with implementation of **Mitigation Measure TRAN-1**, discussed further below, which includes creation of a Construction Phasing and Traffic Management Plan to minimize construction-related impacts on transportation. **(LSM)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would require the construction of a bus-to-rail transfer platform in the I-580 median, next to the existing BART platform at the Dublin/Pleasanton Station. This alternative would entail freeway relocation and lane construction sequences, similar to the Proposed Project, although for a short stretch of I-580 in the vicinity of the Dublin/Pleasanton Station to accommodate the bus transfer platforms, express bus lanes, and additional BART car storage track, approximately from the Dougherty Road to Tassajara Road interchanges.

The Arnold Road Staging Area would be used for construction staging under the Express Bus/BRT Alternative. This staging area is at the western end of the project corridor, northeast of the Dublin/Pleasanton Station. Access from I-580 to this staging area would be from the Hacienda Drive interchanges.

Construction along the BART ROW under this alternative includes new bus platforms in the I-580 median that connect to the existing Dublin/Pleasanton Station. The construction would prioritize keeping all lanes of the freeway open during construction. However, temporary lane closures would be required. Depending on the locations and times of day

of lane closures, disruption to regular traffic circulation could be significant. Lane closures may also be necessary along I-580 for certain construction activities and material deliveries.

Construction along streets used by transit routes in the study area and the movement of construction vehicles near staging areas would be planned and managed to minimize disruption to general traffic and transit operations. However, there would likely be some temporary added delay to local and express bus routes traveling on I-580 and Hacienda Drive, due to construction under the Express Bus/BRT Alternative.

Freeway travel would also be impeded by traffic from construction vehicles and equipment that would use I-580 to access construction sites along the project corridor. Trucks and equipment traffic could temporarily disrupt existing freeway traffic patterns during construction of the project. Construction traffic would include heavy equipment such as bulldozers, dump trucks, cranes, and excavators.

Construction along the BART ROW under this alternative for the new bus platform would require no modifications to BART tracks. Therefore, construction related to the Express Bus/BRT Alternative would have no significant impact on the BART system.

Construction of the Express Bus/BRT Alternative would have a similar impact to surrounding transit services as the Proposed Project, but that impact would be less pronounced because of the shorter segment of I-580 that would be affected by the necessary relocation.

Similar to the Proposed Project, the Express Bus/BRT Alternative would not have impacts to bicycle or pedestrian travel in the area.

Overall, construction activities under the Express Bus/BRT Alternative would have a less-than-significant impact on traffic delays, with implementation of **Mitigation Measure TRAN-1**, discussed further below, which includes creation of a Construction Phasing and Traffic Management Plan to minimize construction-related impacts on transportation. **(LSM)**

**Enhanced Bus Alternative.** There would be no major construction required under this alternative, besides the construction of bus bulbs and bus stop improvements in existing ROWs. Therefore, the Enhanced Bus Alternative would have less-than-significant impacts related to delays, safety hazards, or diminished access during construction, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant construction-related impacts to delays, safety, and access. However, with the implementation of **Mitigation**

**Measure TRAN-1**, which would require the development and implementation of a construction phasing and traffic management plan, potential impacts would be reduced to a less-than-significant level.

As described above, the Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for this alternative.

**Mitigation Measure TRAN-1: Develop and Implement a Construction Phasing and Traffic Management Plan (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative).**

BART shall ensure that a Construction Phasing and Traffic Management Plan is developed and implemented by the construction contractor. The plan shall define how traffic operations, including construction equipment and worker traffic, will be managed and maintained during each phase of construction. The plan shall be developed in consultation with the Cities of Dublin, Pleasanton, and Livermore; local police, fire, and emergency service providers; Caltrans; Alameda CTC; Alameda County; and local transit providers, including LAVTA. The contractor shall also consult with Caltrans and the highway patrol in the development of the plan to address any issues and minimize disruption to the flow of traffic along I-580. This plan shall also be coordinated with plans to maintain access and parking for adjacent businesses and residences that may be affected.

To the maximum practical extent, the plan shall include the following measures:

1. Identify traffic control devices and actions that are needed to maintain traffic safety during the construction period, including traffic control personnel and clear road striping and signage, to facilitate movement of construction vehicles and communicate to vehicles where traffic patterns have shifted.
2. Specify predetermined haul routes from staging areas to construction sites and disposal areas by agreement with the Cities of Dublin, Pleasanton, and Livermore prior to construction. The routes shall follow streets and highways that provide the safest route and have the least possible impact on traffic.
3. Identify construction activities that, due to concerns regarding traffic safety or congestion, must take place during off-peak hours.
4. Provide a plan for any lane closures and require information be provided to the public and police, fire and emergency service providers on lane closures using signs, press releases, and other media tools.
5. 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 and at the construction sites.

6. Provide safe access and circulation routes for vehicles, bicycles, pedestrians, and emergency response vehicles during construction of the project components that would affect the local road network.
7. Provide parking replacement where construction results in temporary displacement of parking.

**(b) Construction – Cumulative Analysis**

***Impact TRAN-2(CU): Result in a significant delay, a safety hazard, or diminished access during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact TRAN-1** above, the No Project Alternative would have no impacts associated with a significant delay, safety hazard, or diminished access during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** The cumulative projects described in Section 3.A, Introduction to Environmental Analysis and Appendix E, Cumulative Projects List would be constructed at locations not directly on the regional transportation system, and therefore would have no significant impact on safety hazards or diminished access for the system. The construction activities for these land developments, including delivery of materials and movement of construction equipment, would likely cause minor delays on adjacent local roadways. The Proposed Project's construction activities could contribute to those delays if they affected the same local roadways as the land development projects. The local roadways that would be affected by the Proposed Project are the I-580 frontage roads, interchange ramps, and overpasses between Hacienda Drive and Isabel Avenue, none of which are at the same locations as the cumulative land development projects that might be under construction at the same time. Therefore, the Proposed Project would not contribute further to cumulative impacts to traffic delays, safety hazards, or diminished access from the cumulative land developments.

The cumulative transportation projects that might be under construction at the same time as the Proposed Project and Build Alternatives include the ACEforward Program, the North Canyon Parkway/Dublin Boulevard Extension project, and the I-580 Vasco Road interchange improvements project. The locations of these projects are sufficiently far from the Proposed Project and Build Alternatives such that construction activities would not contribute to significant cumulative impacts to traffic delays, safety hazards, or diminished access from the cumulative transportation projects. Therefore, the Proposed Project and Build Alternatives would have no significant impacts related to delays, safety

hazards, or diminished access during construction, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to delays, safety, or access, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operations impacts. Impacts are presented in the following order: (1) freeway segments; (2) local roadway intersections; (3) transit; (4) bicycles; (5) pedestrians; (6) air traffic patterns; (7) hazards; and (8) emergency access.

### (a) Operations – Project Analysis

Potential impacts related to project operations are described below, followed by cumulative operations impacts.

#### Freeway Segments

***Impact TRAN-3: General-purpose lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: LS)***

Tables 3.B-32 through 3.B-35 below present the results of the general-purpose lane freeway segment LOS analysis for 2025, for the Proposed Project and Build Alternatives.

**No Project Alternative.** The 2025 No Project Alternative is the same as baseline conditions (i.e., 2025 No Project Conditions). Therefore, the 2025 No Project Alternative would have no impacts related to general-purpose freeway segments operating at unacceptable levels. **(NI)**

**Conventional BART Project.** With the implementation of the Proposed Project in 2025, regional traffic volumes will differ from traffic volumes that would exist under the No Project Alternative. In the peak periods, some corridors are expected to experience notable increases in traffic volumes while decreases are expected with other corridors. Figure 3.B-9 below shows the general change in traffic patterns for the Proposed Project compared with No Project conditions, as projected by the analysis.

**TABLE 3.B-32 AM WESTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.971 | E | 0.974 | E | 0.976 | E | 0.974 | E | 0.977 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | E | 0.995 | E | 0.996 | E | 0.995 | **F** | **1.001** | E | 0.998 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.004 | F | 1.003 | E | 0.999 | F | 1.008 | F | 1.005 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.975 | E | 0.969 | E | 0.968 | E | 0.976 | E | 0.974 |
| 5 | Airway Boulevard | Isabel Avenue | F | 1.037 | E | 0.993 | F | 1.017 | F | 1.038 | F | 1.037 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.051 | F | 1.051 | F | 1.061 | F | 1.054 | F | 1.052 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.984 | E | 0.992 | E | 0.995 | E | 0.989 | E | 0.984 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.978 | E | 0.999 | E | 0.989 | E | 0.978 | E | 0.977 |
| 9 | Vasco Road | Greenville Road | E | 0.977 | E | 0.996 | E | 0.995 | E | 0.980 | E | 0.976 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | F | 1.038 | **F** | **1.061** | **F** | **1.065** | F | 1.040 | F | 1.043 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels as the result of the Proposed Project or Alternatives.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-33 PM WESTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.634 | C | 0.639 | C | 0.636 | C | 0.636 | C | 0.637 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | C | 0.630 | C | 0.614 | C | 0.623 | C | 0.631 | C | 0.632 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | C | 0.659 | C | 0.643 | C | 0.652 | C | 0.660 | C | 0.661 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | C | 0.623 | C | 0.606 | C | 0.614 | C | 0.623 | C | 0.625 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.545 | B | 0.520 | B | 0.533 | B | 0.550 | B | 0.550 |
| 6 | Isabel Avenue | Livermore Avenue | C | 0.636 | C | 0.611 | C | 0.629 | C | 0.638 | C | 0.637 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.513 | B | 0.515 | B | 0.517 | B | 0.513 | B | 0.512 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | C | 0.586 | C | 0.598 | C | 0.595 | C | 0.589 | C | 0.589 |
| 9 | Vasco Road | Greenville Road | B | 0.578 | B | 0.579 | B | 0.578 | B | 0.577 | B | 0.578 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | C | 0.603 | C | 0.621 | C | 0.618 | C | 0.608 | C | 0.603 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio
Source: Cambridge Systematics, 2017.

**TABLE 3.B-34 AM EASTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

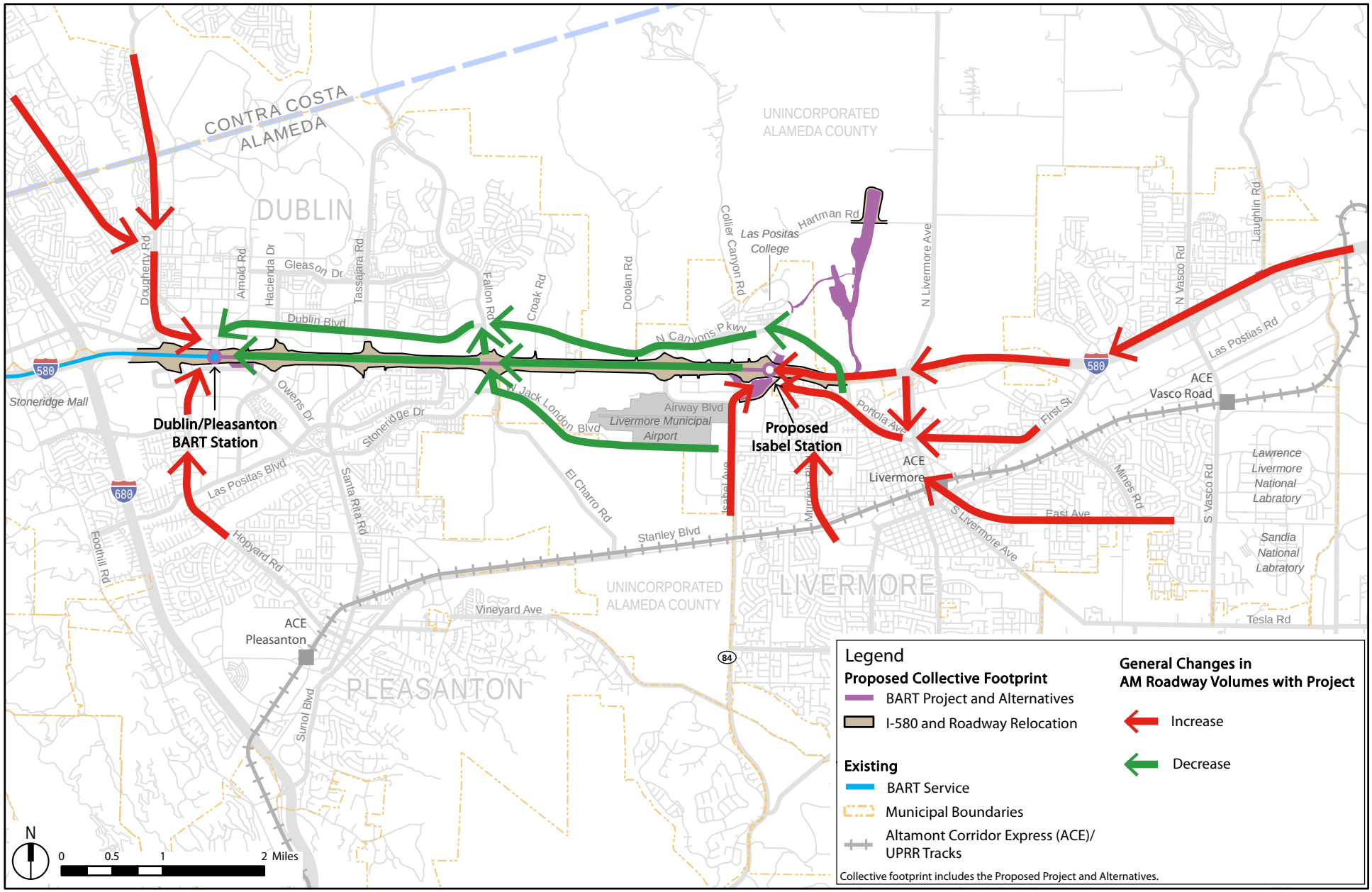
| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.471 | B | 0.469 | B | 0.470 | B | 0.470 | B | 0.471 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.532 | B | 0.523 | B | 0.527 | B | 0.531 | B | 0.532 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.567 | B | 0.558 | B | 0.562 | B | 0.565 | B | 0.567 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.547 | B | 0.536 | B | 0.542 | B | 0.545 | B | 0.547 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.488 | B | 0.462 | B | 0.477 | B | 0.487 | B | 0.487 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.537 | B | 0.535 | B | 0.535 | B | 0.536 | B | 0.538 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.519 | B | 0.533 | B | 0.526 | B | 0.519 | B | 0.520 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.567 | C | 0.591 | C | 0.581 | B | 0.569 | B | 0.568 |
| 9 | Vasco Road | Greenville Road | B | 0.571 | B | 0.579 | C | 0.580 | B | 0.572 | B | 0.571 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | B | 0.444 | B | 0.452 | B | 0.452 | B | 0.446 | B | 0.445 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels as the result of the Proposed Project or Alternatives.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-35 PM EASTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.714 | C | 0.714 | C | 0.712 | C | 0.712 | C | 0.712 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.899 | D | 0.892 | D | 0.896 | D | 0.896 | D | 0.895 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | E | 0.954 | E | 0.934 | E | 0.946 | E | 0.949 | E | 0.948 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.970 | E | 0.943 | E | 0.951 | E | 0.963 | E | 0.963 |
| 5 | Airway Boulevard | Isabel Avenue | E | 0.953 | E | 0.927 | E | 0.943 | E | 0.949 | E | 0.949 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.037 | F | 1.039 | F | 1.050 | F | 1.031 | F | 1.034 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.922 | E | 0.939 | E | 0.938 | E | 0.915 | E | 0.920 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.903 | E | 0.916 | E | 0.919 | D | 0.893 | E | 0.902 |
| 9 | Vasco Road | Greenville Road | D | 0.892 | E | 0.911 | E | 0.908 | D | 0.888 | D | 0.886 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.817 | D | 0.838 | D | 0.834 | D | 0.817 | D | 0.813 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-9
Transportation
Traffic Patttern Changes, AM Peak Period

As shown in the tables above and figure below, two corridors are expected to see increases in traffic volumes in the AM peak period, as follows:

- **Roadways north and south of the Dublin/Pleasanton Station (Dougherty Road and Hopyard Road).** A portion of existing BART passengers currently driving generally from the east to the Dublin/Pleasanton Station and parking would instead drive to and park at the proposed Isabel Station because it is more convenient for them. Parking facilities at the Dublin/Pleasanton Station are currently capacity-constrained, with unmet demand for parking. With fewer passengers originating from the east consuming parking capacity at the Dublin/Pleasanton Station, new park-and-ride auto trips from the north and south of the Dublin/Pleasanton Station are expected to consume the freed station parking capacity.
- **Roadways east of the Isabel Station (I-580, Altamont Pass roads, and Livermore local streets).** The new availability of BART service at the Isabel Station would attract new park-and-ride auto trips from the San Joaquin Valley and from within Livermore.

One corridor is expected to see decreases in traffic volumes in the AM peak period, as follows:

- **Roadways between the Dublin/Pleasanton Station and the Isabel Station (I-580, Dublin Boulevard, and Jack London Boulevard).** The new availability of BART service at the Isabel Station allows people to access BART service without driving west as far as the Dublin/Pleasanton Station.

In 2025, under the Proposed Project, one general-purpose freeway segment would have significant impacts compared to No Project Alternative. Impacts would occur at the following segments:

- **Greenville Road to Carroll Road General-Purpose (Segment 10)**. Under 2025 with Proposed Project Conditions, this freeway segment would operate at a V/C ratio of 1.061 and LOS F during the AM peak hour in the westbound direction. The V/C ratio for this segment increases by more than 2 percent compared with No Project Conditions, resulting in a significant impact.

Typical mitigation measures that would address this type of significant impact entail operational improvements to the freeway, such as adding or modifying ramp metering, adding express lanes, and constructing other capacity enhancements such as additional travel lanes. The transportation analysis already accounts for these types of planned and programed operational improvements along the study area segments of I-580, as described in the No Project Conditions subsection above.

No additional improvements would be feasible to address this significant impact. Specifically, while adding travel lanes to I-580 would increase the capacity of the freeway and reduce this impact, physical constraints and the existing ROW along the affected

freeway segment make this infeasible. For example, widening I-580 would conflict with bridge columns at Vasco Road and would impact homes, businesses, and/or an existing park (Northfront Park). Furthermore, adding travel lanes can lead to additional social and environmental impacts such as induced travel demand (e.g., increased passenger vehicles on the roadway because of greater freeway capacity). The additional passenger vehicles would have adverse environmental impacts, including degradation of air quality, increased noise from vehicles, and reductions in transit use, as less congestion or reduced driving time may make driving more attractive than transit.

Therefore, impacts under the Proposed Project related to general-purpose lane freeway segments in 2025 would be significant and unavoidable, and no mitigation measures are feasible. **(SU)**

**DMU Alternative.** The DMU Alternative would result in similar travel shifts as the Proposed Project in 2025, but with a smaller magnitude.

Under the DMU Alternative in 2025, one general-purpose freeway segments would have a significant impact compared to No Project Conditions. Impacts would occur at the following segments:

- **Greenville Road to Carroll Road General-Purpose (Segment 10)**. Under 2025 with DMU Alternative Conditions, this freeway segment would operate at a V/C ratio of 1.065 and LOS F during the AM peak hour in the westbound direction. The V/C ratio for this segment increases by more than 2 percent than it would under No Project Conditions, resulting in a significant impact.

Potential mitigation measures for this significant impact would include capacity enhancements and operational improvements. As described in the No Project Conditions subsection above, this analysis already accounts for planned and programmed operational improvements along the study area segments of I-580. Additional improvements, such as capacity enhancement, are infeasible for the affected freeway segments. As described for the Proposed Project above, adding general-purpose lanes to I-580 is infeasible due to physical constraints and would have adverse impacts to existing uses along the affected freeway segments. In addition, social and environmental impacts from induced travel demand, including degradation of air quality, increased noise, and reductions in transit use would result from adding capacity to I-580. Therefore, in 2025, the DMU Alternative would have a significant and unavoidable impact on general-purpose lane freeway segments, similar to the Proposed Project, and no mitigation measures are feasible. **(SU)**

**Express Bus/BRT Alternative.** Traffic volumes estimated on roadway links would be similar under this alternative to those under No Project Conditions. However, in 2025, one general-purpose freeway segment would have a significant impact compared to No Project Conditions. An impact would occur at the following segment:

- **Hacienda Drive to Tassajara/Santa Rita Road General-Purpose (Segment 2)**. Under 2025 with Express Bus Alternative Conditions, this freeway segment would operate at a V/C ratio of 1.001 and LOS F during the AM peak hour in the westbound direction. The V/C ratio for this segment increases by more than 2 percent than it would under No Project Conditions, resulting in a significant impact.

Potential mitigation measures for this significant impact would include capacity enhancements and operational improvements. As described in the No Project Conditions subsection above, this analysis already accounts for planned and programmed operational improvements along the study area segments of I-580. Additional improvements, such as capacity enhancement, are infeasible for the affected freeway segment. As described for the Proposed Project above, adding general-purpose lanes to I-580 is infeasible due to physical constraints and would have adverse impacts to existing uses along the affected freeway segments. In addition, social and environmental impacts from induced travel demand, including degradation of air quality, increased noise, and reductions in transit use would result from adding capacity to I-580. Therefore, in 2025, the Enhanced Bus/BRT Alternative would have a significant and unavoidable impact on general-purpose lane freeway segments, similar to the Proposed Project, and no mitigation measures are feasible. **(SU)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would not meaningfully affect traffic patterns; in general, traffic volumes estimated on roadway links would be nearly the same as those under No Project Conditions. The Enhanced Bus Alternative in 2025 would have a smaller effect on freeway travel patterns than the other alternatives, as the Enhanced Bus Alternative would provide the least improvement over existing transit options, and thus attract the fewest additional travelers.

The Enhanced Bus Alternative would increase the V/C ratio of one general-purpose freeway segment already operating at unacceptable LOS. However, compared with No Project Conditions, the Enhanced Bus Alternative would not increase the V/C ratio of that segment by more than 2 percent. Therefore, impacts under the Express Bus/BRT Alternative related to general-purpose lane freeway segments in 2025 would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have significant and unavoidable effects on general-purpose lane freeway segments in 2025; for the reasons described above, no freeway mitigation measures are feasible.

The Enhanced Bus Alternative would not result in any significant impacts related to general-purpose lane freeway segments in 2025, and no mitigation measures are required for this alternative.

***Impact TRAN-4: General-purpose lane freeway segments operating at unacceptable LOS, under 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Tables 3.B-36, 3.B-37, 3.B-38, and 3.B-39 below present the results of the general-purpose lane freeway segment LOS analysis for 2040.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to general purpose lane freeway segments. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to general purpose lane freeway segments. **(NI)**

**Conventional BART Project.** Similar to 2025, the Proposed Project in 2040 would reduce the number of vehicle trips using I-580 as a travel route from points east to the Dublin/Pleasanton Station and to park, drop off, or pick up BART passengers, as such vehicles would instead be drawn to the proposed facilities near Isabel Avenue. The shifting of vehicles from the Dublin/Pleasanton Station to the Isabel Station would cause small volume reductions on I-580 and parallel roadways between Isabel Avenue and Hacienda Drive. The shifting of vehicles from the Dublin/Pleasanton Station to the Isabel Station would also cause small volume increases on roadways north and south of the Dublin/Pleasanton Station stemming from new park-and-ride trips from the north and south, which is expected to consume the freed station parking capacity. The shifting from auto travel to transit would also cause small volume reductions on I-580 and parallel roadways west of Isabel. However, east of Isabel Avenue, a small increase of vehicles on I-580 and local Livermore roadways would result from travelers driving to the Isabel Station.

**TABLE 3.B-36 AM WESTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.981 | E | 0.979 | E | 0.979 | E | 0.981 | E | 0.983 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | **F** | **1.004** | E | 0.995 | E | 0.998 | F | 1.008 | F | 1.007 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.020 | F | 1.014 | F | 1.012 | F | 1.019 | F | 1.022 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.995 | E | 0.967 | E | 0.973 | E | 0.995 | E | 0.997 |
| 5 | Airway Boulevard | Isabel Avenue | **F** | **1.064** | F | 1.033 | F | 1.060 | F | 1.066 | F | 1.068 |
| 6 | Isabel Avenue | Livermore Avenue | **F** | **1.103** | **F** | **1.147** | **F** | **1.142** | F | 1.104 | F | 1.104 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | **F** | **1.026** | **F** | **1.067** | **F** | **1.063** | F | 1.027 | F | 1.024 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | **F** | **1.037** | **F** | **1.069** | **F** | **1.086** | F | 1.035 | F | 1.037 |
| 9 | Vasco Road | Greenville Road | **F** | **1.071** | **F** | **1.097** | F | 1.090 | F | 1.070 | F | 1.069 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | F | 1.056 | **F** | **1.078** | F | 1.072 | F | 1.061 | F | 1.060 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-37 PM WESTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.748 | D | 0.750 | D | 0.751 | C | 0.747 | C | 0.749 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.758 | C | 0.746 | C | 0.745 | D | 0.755 | D | 0.757 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | D | 0.780 | D | 0.774 | D | 0.775 | D | 0.777 | D | 0.780 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | D | 0.754 | C | 0.730 | C | 0.737 | D | 0.752 | D | 0.756 |
| 5 | Airway Boulevard | Isabel Avenue | C | 0.664 | C | 0.656 | C | 0.651 | C | 0.664 | C | 0.667 |
| 6 | Isabel Avenue | Livermore Avenue | D | 0.771 | D | 0.753 | D | 0.754 | D | 0.769 | D | 0.772 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | C | 0.738 | C | 0.729 | C | 0.735 | C | 0.737 | C | 0.737 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | D | 0.826 | D | 0.835 | D | 0.834 | D | 0.826 | D | 0.827 |
| 9 | Vasco Road | Greenville Road | D | 0.776 | D | 0.788 | D | 0.785 | D | 0.775 | D | 0.776 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.750 | D | 0.762 | D | 0.759 | D | 0.751 | D | 0.750 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-38 AM EASTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.548 | B | 0.546 | B | 0.547 | B | 0.545 | B | 0.548 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | C | 0.651 | C | 0.633 | C | 0.633 | C | 0.648 | C | 0.652 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | C | 0.668 | C | 0.650 | C | 0.651 | C | 0.665 | C | 0.669 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | C | 0.653 | C | 0.636 | C | 0.637 | C | 0.651 | C | 0.655 |
| 5 | Airway Boulevard | Isabel Avenue | C | 0.588 | B | 0.541 | B | 0.558 | C | 0.584 | C | 0.591 |
| 6 | Isabel Avenue | Livermore Avenue | C | 0.633 | C | 0.615 | C | 0.618 | C | 0.634 | C | 0.637 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | C | 0.628 | C | 0.635 | C | 0.635 | C | 0.629 | C | 0.631 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | D | 0.766 | D | 0.772 | D | 0.770 | D | 0.763 | D | 0.765 |
| 9 | Vasco Road | Greenville Road | C | 0.674 | C | 0.685 | C | 0.681 | C | 0.673 | C | 0.674 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | B | 0.567 | B | 0.576 | B | 0.573 | B | 0.567 | B | 0.567 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-39 PM EASTBOUND GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.684 | C | 0.684 | C | 0.680 | C | 0.685 | C | 0.686 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | E | 0.940 | E | 0.931 | E | 0.935 | E | 0.942 | E | 0.941 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | E | 0.976 | E | 0.961 | E | 0.971 | E | 0.977 | E | 0.979 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.970 | E | 0.957 | E | 0.967 | E | 0.971 | E | 0.970 |
| 5 | Airway Boulevard | Isabel Avenue | E | 0.992 | E | 0.969 | E | 0.983 | E | 0.994 | E | 0.995 |
| 6 | Isabel Avenue | Livermore Avenue | **F** | **1.083** | **F** | **1.121** | **F** | **1.130** | F | 1.084 | F | 1.085 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | **F** | **1.013** | **F** | **1.043** | **F** | **1.064** | F | 1.011 | F | 1.011 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | **F** | **1.016** | **F** | **1.049** | **F** | **1.067** | F | 1.017 | F | 1.020 |
| 9 | Vasco Road | Greenville Road | E | 0.957 | E | 0.993 | **F** | **1.011** | E | 0.957 | E | 0.958 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.816 | D | 0.846 | D | 0.859 | D | 0.817 | D | 0.817 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

Under the Proposed Project in 2040, significant impacts would occur on five general-purpose freeway segments, compared to No Project Conditions. Impacts would occur at the following segments:

- **Isabel Avenue to Livermore Avenue General-Purpose (Segment #6)**. This segment would operate at a V/C ratio of 1.147 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.121 and LOS F during the PM peak hour in the eastbound direction.
- **Livermore Avenue to Springtown Boulevard General-Purpose (Segment #7)**. This segment would operate at a V/C ratio of 1.06 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.043 and LOS F during the PM peak hour in the eastbound direction.
- **Springtown Boulevard to Vasco Road General-Purpose (Segment #8)**. This segment would operate at a V/C ratio of 1.069 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.049 and LOS F during the PM peak hour in the eastbound direction.
- **Vasco Road to Greenville Road General-Purpose (Segment #9)**. This segment would operate at a V/C ratio of 1.097 and LOS F during the AM peak hour in the westbound direction.
- **Greenville Road to Carroll Road General-Purpose (Segment #10)**. This segment would operate at a V/C ratio of 1.078 and LOS F during the AM peak hour in the westbound direction.

Typical mitigation measures that would address this type of significant impact entail operational improvements to the freeway, such as adding or modifying ramp metering, adding express lanes, and constructing other capacity enhancements such as additional travel lanes. The transportation analysis already accounts for these types of planned and programmed operational improvements along the study area segments of I-580, as described in the No Project Conditions subsection above.

No additional improvements would be feasible to address this significant impact. Specifically, while adding travel lanes to I-580 would increase the capacity of the freeway and reduce this impact, physical constraints and the existing ROW along the affected freeway segment make this infeasible. For example, widening I-580 would conflict with bridge columns at Vasco Road and would impact homes, businesses, and/or an existing park (Northfront Park). Furthermore, adding travel lanes can lead to additional social and environmental impacts such as induced travel demand (e.g., increased passenger vehicles on the roadway because of greater freeway capacity). The additional passenger vehicles would have adverse environmental impacts, including degradation of air quality, increased noise from vehicles, and reductions in transit use, as less congestion or reduced driving time may make driving more attractive than transit.

Therefore, impacts under the Proposed Project related to general-purpose lane freeway segments in 2040 would be significant and unavoidable, and no mitigation measures are feasible. **(SU)**

**DMU Alternative.** The DMU Alternative in 2040 would result in similar travel shifts as the Proposed Project, but with a smaller magnitude.

Under the DMU Alternative in 2040, four general-purpose freeway segments would have a significant impact compared to No Project Conditions. Impacts would occur at the following segments:

- **Isabel Avenue to Livermore Avenue General-Purpose (Segment #6)**. This segment would operate at a V/C ratio of 1.142 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.130 and LOS F during the PM peak hour in the eastbound direction.
- **Livermore Avenue to Springtown Boulevard General-Purpose (Segment #7)**. This segment would operate at a V/C ratio of 1.063 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.064 and LOS F during the PM peak hour in the eastbound direction.
- **Springtown Boulevard to Vasco Road General-Purpose (Segment #8)**. This segment would operate at a V/C ratio of 1.086 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.067 and LOS F during the PM peak hour in the eastbound direction.
- **Vasco Road to Greenville Road General-Purpose (Segment #9)**. This segment would operate at a V/C ratio of 1.011 and LOS F during the PM peak hour in the eastbound direction.

Potential mitigation measures for this significant impact would include capacity enhancements and operational improvements. As described in the No Project Conditions subsection above, this analysis already accounts for planned and programed operational improvements along the study area segments of I-580.

Additional improvements, such as capacity enhancement, are infeasible for the affected freeway segments. As described for the Proposed Project above, adding general-purpose lanes to I-580 is infeasible due to physical constraints and would have adverse impacts to existing uses along the affected freeway segments. In addition, social and environmental impacts from induced travel demand, including degradation of air quality, increased noise, and reductions in transit use would result from adding capacity to I-580. Therefore, in 2040, the DMU Alternative would have a significant and unavoidable impact on general-purpose lane freeway segments, similar to the Proposed Project, and no mitigation measures are feasible. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative in 2040, eight general-purpose freeway segments would operate at unacceptable levels during the AM or PM peak period. However, all segments would operate at an LOS equal to or better than the No Project Conditions. Therefore, the Express Bus/BRT Alternative would have no impacts related to general-purpose lane freeway segments in 2040, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative in 2040, eight general-purpose freeway segments would operate at unacceptable levels during the AM or PM peak period. However, all segments would operate at an LOS equal to or better than the No Project Conditions. Therefore, the Enhanced Bus Alternative would have no impacts related to general-purpose lane freeway segments in 2040, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have significant and unavoidable effects on general-purpose lane freeway segments in 2040; for the reasons described above no freeway mitigations are feasible.

The Express Bus/BRT Alternative and Enhanced Bus Alternative would not result in any significant impacts related to general-purpose lane freeway segments, and no mitigation measures are required for these alternatives.

***Impact TRAN-5: HOV/Express lane freeway segments operating at unacceptable LOS, under 2025 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: SU; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

Tables 3.B-40, 3.B-41, 3.B-42, and 3.B-43 below presents the results of the HOV/express lane freeway segment LOS analysis for 2025, for the Proposed Project and Alternatives.

**No Project Alternative.** The 2025 No Project Alternative is the same as baseline conditions (i.e., 2025 No Project Conditions). Therefore, the 2025 No Project Alternative would have no impacts related to HOV/express lane freeway segments operating at unacceptable levels. **(NI)**

**Conventional BART Project.** Under the Proposed Project in 2025, four HOV/express lane freeway segments would operate at unacceptable levels during both peak periods. However, these segments are expected to operate similarly to No Project Conditions. HOV/express lane operations would not degrade past the threshold of significance. Therefore, impacts under the Proposed Project related to HOV/express lane freeway segments would be less than significant, and no mitigation measures are required. **(LS)**

**TABLE 3.B-40 AM WESTBOUND HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.978 | E | 0.978 | E | 0.977 | E | 0.968 | E | 0.984 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | F | 1.014 | F | 1.012 | F | 1.013 | F | 1.013 | F | 1.014 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.024 | F | 1.020 | F | 1.019 | F | 1.020 | F | 1.026 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.990 | E | 0.979 | E | 0.988 | E | 0.983 | E | 0.995 |
| 5 | Airway Boulevard | Isabel Avenue | F | 1.044 | E | 0.999 | F | 1.034 | F | 1.036 | F | 1.041 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.055 | F | 1.049 | F | 1.065 | F | 1.051 | F | 1.058 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.994 | E | 0.990 | **F** | 1.003 | E | 0.984 | E | 0.993 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.981 | E | 0.990 | E | 0.996 | E | 0.971 | E | 0.985 |
| 9 | Vasco Road | Greenville Road | D | 0.866 | D | 0.872 | D | 0.839 | D | 0.844 | D | 0.859 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-41 PM WESTBOUND HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.449 | B | 0.428 | B | 0.446 | B | 0.451 | B | 0.445 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.448 | B | 0.427 | B | 0.444 | B | 0.449 | B | 0.443 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.474 | B | 0.446 | B | 0.467 | B | 0.474 | B | 0.470 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.473 | B | 0.446 | B | 0.467 | B | 0.473 | B | 0.469 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.426 | B | 0.418 | B | 0.423 | B | 0.428 | B | 0.423 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.421 | B | 0.412 | B | 0.418 | B | 0.423 | B | 0.416 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.366 | B | 0.364 | B | 0.366 | B | 0.368 | B | 0.361 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.356 | B | 0.356 | B | 0.357 | B | 0.358 | B | 0.351 |
| 9 | Vasco Road | Greenville Road | A | 0.180 | A | 0.227 | A | 0.220 | A | 0.201 | A | 0.187 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-42 AM EASTBOUND HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.291 | A | 0.215 | A | 0.266 | A | 0.283 | A | 0.287 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.293 | A | 0.217 | A | 0.267 | A | 0.284 | A | 0.289 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.147 | A | 0.109 | A | 0.134 | A | 0.143 | A | 0.145 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.147 | A | 0.109 | A | 0.134 | A | 0.143 | A | 0.145 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.147 | A | 0.109 | A | 0.135 | A | 0.143 | A | 0.145 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.147 | A | 0.109 | A | 0.134 | A | 0.142 | A | 0.145 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.146 | A | 0.108 | A | 0.133 | A | 0.142 | A | 0.143 |
| 9 | Vasco Road | Greenville Road | A | 0.000 | A | 0.000 | A | 0.000 | A | 0.000 | A | 0.000 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-43 PM EASTBOUND HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.827 | D | 0.812 | D | 0.813 | D | 0.834 | D | 0.819 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | D | 0.846 | D | 0.831 | D | 0.835 | D | 0.854 | D | 0.837 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.442 | B | 0.430 | B | 0.434 | B | 0.445 | B | 0.436 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.398 | B | 0.390 | B | 0.391 | B | 0.402 | B | 0.394 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.433 | B | 0.426 | B | 0.428 | B | 0.437 | B | 0.429 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.402 | B | 0.389 | B | 0.394 | B | 0.408 | B | 0.397 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.364 | B | 0.357 | B | 0.357 | B | 0.370 | B | 0.360 |
| 9 | Vasco Road | Greenville Road | C | 0.624 | C | 0.614 | C | 0.610 | C | 0.637 | C | 0.618 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**DMU Alternative.** Under the DMU Alternative in 2025, one express lane freeway segment would have a significant impact compared to No Project Conditions. Impacts would occur at the following segment:

- **Tassajara/Santa Rita Road to Fallon/El Charro Road Express Lane (Segment #7).** Under 2025 with DMU Alternative Conditions, this express lane freeway segment would operate at a V/C ratio of 1.003 and LOS F during the AM peak hour in the westbound direction. The V/C ratio for this segment increases by more than 2 percent than it would under No Project Conditions, resulting in a significant impact.

Typical mitigation measures that would address this type of significant impact entail operational improvements to the freeway, such as adding or modifying ramp metering, adding express lanes, and constructing other capacity enhancements such as additional travel lanes. The transportation analysis already accounts for these types of planned and programmed operational improvements along the study area segments of I-580, as described in the No Project Conditions subsection above.

No additional improvements would be feasible to address this significant impact. Specifically, while adding travel lanes to I-580 would increase the capacity of the freeway and reduce this impact, physical constraints and the existing ROW along the affected freeway segment make this infeasible. For example, widening I-580 would conflict with bridge columns at Vasco Road and would impact homes, businesses, and/or an existing park (Northfront Park). Furthermore, adding travel lanes can lead to additional social and environmental impacts such as induced travel demand (e.g., increased passenger vehicles on the roadway because of greater freeway capacity). The additional passenger vehicles would have adverse environmental impacts, including degradation of air quality, increased noise from vehicles, and reductions in transit use, as less congestion or reduced driving time may make driving more attractive than transit.

Therefore, impacts under the DMU Alternative related to express lane freeway segments in 2025 would be significant and unavoidable, and no mitigation measures are feasible. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative in 2025, four HOV/express lane freeway segments would operate at unacceptable levels during both peak periods. However, these segments are expected to operate similarly to No Project Conditions. HOV/express lane operations would not degrade past the threshold of significance. Therefore, impacts under the Express Bus/BRT Alternative related to HOV/express lane freeway segments in 2025 would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative in 2025, four HOV/express lane freeway segments would operate at unacceptable levels during both peak periods. However, these segments are expected to operate similarly to No Project

conditions. HOV/express lane operations would not degrade past the threshold of significance. Therefore, impacts under the Enhanced Bus Alternative related to HOV/express lane freeway segments in 2025 would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the DMU Alternative would have significant and unavoidable effects to express lane freeway segments in 2025, as no freeway mitigations are feasible.

The Proposed Project, Express Bus/BRT Alternative, and Enhanced Bus Alternative would not result in significant impacts related to express lane freeway segments in 2025, and no mitigation measures are required for these alternatives.

***Impact TRAN-6: HOV/express lane freeway segments operating at unacceptable LOS, under 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Under 2040 Project Conditions, the HOV policy is expected to be three persons per vehicle as opposed to the current two persons per vehicle. The analysis showed that, under this policy, fewer vehicles would qualify to use the HOV/express lanes, causing them to operate at an improved LOS in 2040 compared with 2025.

Tables 3.B-44, 3.B-45, 3.B-46, and 3.B-47 below present the results of the HOV/express lane freeway segment LOS analysis for 2040, for the Proposed Project and Alternatives.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to HOV/express lane freeway segments. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to HOV/express lane freeway segments. **(NI)**

**TABLE 3.B-44 AM WESTBOUND I-580 HOV/EXPRESS LANE LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.466 | B | 0.454 | B | 0.460 | B | 0.460 | B | 0.465 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.450 | B | 0.438 | B | 0.445 | B | 0.444 | B | 0.450 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.446 | B | 0.434 | B | 0.441 | B | 0.440 | B | 0.446 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.435 | B | 0.421 | B | 0.432 | B | 0.431 | B | 0.436 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.399 | B | 0.389 | B | 0.396 | B | 0.393 | B | 0.398 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.396 | B | 0.386 | B | 0.394 | B | 0.388 | B | 0.394 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.378 | B | 0.372 | B | 0.377 | B | 0.371 | B | 0.378 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.349 | A | 0.342 | A | 0.345 | A | 0.343 | B | 0.356 |
| 9 | Vasco Road | Greenville Road | A | 0.280 | A | 0.279 | A | 0.279 | A | 0.280 | A | 0.275 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-45 PM WESTBOUND I-580 HOV/EXPRESS LANE LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | A | 0.214 | A | 0.210 | A | 0.215 | A | 0.210 | A | 0.215 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.221 | A | 0.218 | A | 0.222 | A | 0.218 | A | 0.223 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.222 | A | 0.220 | A | 0.221 | A | 0.222 | A | 0.222 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.216 | A | 0.211 | A | 0.214 | A | 0.216 | A | 0.216 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.202 | A | 0.202 | A | 0.201 | A | 0.201 | A | 0.202 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.199 | A | 0.193 | A | 0.195 | A | 0.199 | A | 0.198 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.181 | A | 0.178 | A | 0.179 | A | 0.181 | A | 0.181 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.174 | A | 0.173 | A | 0.174 | A | 0.174 | A | 0.174 |
| 9 | Vasco Road | Greenville Road | A | 0.131 | A | 0.130 | A | 0.130 | A | 0.131 | A | 0.131 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-46 AM EASTBOUND I-580 HOV/EXPRESS LANE LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.192 | A | 0.183 | A | 0.186 | A | 0.184 | A | 0.191 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.198 | A | 0.188 | A | 0.192 | A | 0.191 | A | 0.197 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.105 | A | 0.100 | A | 0.101 | A | 0.102 | A | 0.104 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.102 | A | 0.097 | A | 0.098 | A | 0.099 | A | 0.101 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.098 | A | 0.097 | A | 0.097 | A | 0.098 | A | 0.098 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.098 | A | 0.098 | A | 0.098 | A | 0.098 | A | 0.098 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.096 | A | 0.096 | A | 0.096 | A | 0.095 | A | 0.096 |
| 9 | Vasco Road | Greenville Road | A | 0.174 | A | 0.174 | A | 0.174 | A | 0.173 | A | 0.173 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-47 PM EASTBOUND I-580 HOV/EXPRESS LANE LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.232 | A | 0.225 | A | 0.224 | A | 0.231 | A | 0.232 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.239 | A | 0.232 | A | 0.231 | A | 0.238 | A | 0.238 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.129 | A | 0.127 | A | 0.129 | A | 0.129 | A | 0.128 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.124 | A | 0.123 | A | 0.123 | A | 0.123 | A | 0.122 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.128 | A | 0.128 | A | 0.128 | A | 0.128 | A | 0.128 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.119 | A | 0.118 | A | 0.120 | A | 0.119 | A | 0.119 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.109 | A | 0.108 | A | 0.110 | A | 0.109 | A | 0.109 |
| 9 | Vasco Road | Greenville Road | A | 0.167 | A | 0.165 | A | 0.166 | A | 0.167 | A | 0.167 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**Conventional BART Project and Build Alternatives.** For the Proposed Project and Build Alternatives, all HOV/express lane freeway segments would operate at acceptable levels during both peak periods in 2040. Therefore, the Proposed Project and Build Alternatives would have no impacts related to HOV/express lane freeway segments in 2040, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to HOV/express lane freeway segments in 2040, and no mitigation measures are required.

**Local Roadway Intersections**

***Impact TRAN-7: Intersections operating at an unacceptable LOS, under 2025 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: NI)***

Table 3.B-48 below presents the results of the intersection LOS analysis for 2025, for the Proposed Project and Build Alternatives and Figures 3.B-10 through 3.B-17 present the intersection LOS results under 2025 conditions.

**TABLE 3.B-48 INTERSECTION DELAY AND LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1 | Dougherty Road & Amador Valley Road[a] | AM | 30.4 | C | 33.7 | C | 38.6 | D | 30.2 | C | 30.2 | C |
| | | PM | 35.0 | D | 38.4 | D | 43.9 | D | 35.3 | D | 35.0 | C |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard[a] | AM | 43.5 | D | 46.4 | D | 50.4 | D | 43.7 | D | 47.4 | D |
| | | PM | 106.9 | F | **109.8** | **F** | **111.2** | **F** | 98.6 | F | 106.7 | F |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps[a] | AM | 11.0 | B | 10.5 | B | 10.9 | B | 10.9 | B | 10.9 | B |
| | | PM | 17.4 | B | 14.2 | B | 18.6 | B | 22.2 | C | 17.7 | B |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | AM | 37.8 | D | 38.7 | D | 40.8 | D | 37.9 | D | 37.6 | D |
| | | PM | 33.5 | C | 32.2 | C | 34.4 | C | 26.8 | C | 34.0 | C |
| 5 | Hopyard Road & Owens Road | AM | 33.0 | C | 34.5 | C | 33.8 | C | 33.0 | C | 33.1 | C |
| | | PM | 108.7 | F | *115.1* | *F* | *115.2* | *F* | 107.6 | F | 109.1 | F |

**TABLE 3.B-48 INTERSECTION DELAY AND LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 6 | Hopyard Road & Stoneridge Drive | AM | 30.1 | C | 28.9 | C | 30.4 | C | 30.3 | C | 30.3 | C |
| | | PM | 37.0 | D | 39.1 | D | 38.4 | D | 37.1 | D | 37.1 | D |
| 7 | Hopyard Road & Las Positas Boulevard | AM | 24.1 | C | 24.0 | C | 24.0 | C | 24.0 | C | 24.1 | C |
| | | PM | 27.2 | C | 27.3 | C | 27.3 | C | 27.2 | C | 27.8 | C |
| 8 | Willow Road & Owens Road | AM | 11.7 | B | 21.8 | C | 11.3 | B | 11.7 | B | 11.7 | B |
| | | PM | 22.7 | C | 20.0 | C | 16.5 | B | 13.1 | B | 22.7 | C |
| 9 | Hacienda Drive & Dublin Boulevard[a] | AM | 24.0 | C | 24.0 | C | 24.0 | C | 24.0 | C | 23.9 | C |
| | | PM | 29.1 | C | 28.9 | C | 29.0 | C | 29.1 | C | 29.1 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings[a] | AM | 19.2 | B | 19.2 | B | 19.2 | B | 19.2 | B | 19.2 | B |
| | | PM | 25.5 | C | 23.6 | C | 24.3 | C | 34.8 | C | 24.7 | C |
| 11 | Hacienda Drive & I-580 WB Ramps[a] | AM | 7.4 | A | 7.2 | A | 7.4 | A | 7.3 | A | 7.4 | A |
| | | PM | 8.5 | A | 7.3 | A | 7.3 | A | 10.4 | B | 8.1 | A |
| 12 | Hacienda Drive & I-580 EB Ramps | AM | 17.4 | B | 21.1 | C | 17.4 | B | 21.1 | C | 18.9 | B |
| | | PM | 20.3 | C | 20.3 | C | 20.5 | C | 32.9 | C | 20.3 | C |
| 13 | Hacienda Drive & Owens Road | AM | 27.5 | C | 26.5 | C | 27.3 | B | 24.7 | C | 28.0 | B |
| | | PM | 32.5 | C | 31.1 | C | 31.8 | C | 30.5 | C | 33.5 | C |
| 14 | Tassajara Road & Dublin Boulevard[a] | AM | 43.0 | D | 41.1 | D | 41.3 | D | 41.6 | D | 42.1 | D |
| | | PM | 42.0 | D | 41.6 | D | 41.7 | D | 41.9 | D | 42.3 | D |
| 15 | Tassajara Road & I-580 WB Ramps[a] | AM | 8.8 | A | 9.5 | A | 8.7 | A | 8.8 | A | 8.8 | A |
| | | PM | 9.5 | A | 9.4 | A | 9.5 | A | 9.5 | A | 9.5 | A |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | AM | 17.8 | B | 18.3 | B | 17.8 | B | 17.9 | B | 17.8 | B |
| | | PM | 30.6 | C | 26.4 | C | 30.6 | C | 32.8 | C | 30.5 | C |
| 17 | Santa Rita Road & Valley Avenue | AM | 21.7 | C | 21.9 | C | 21.9 | C | 21.7 | C | 21.8 | C |
| | | PM | 45.8 | D | 46.9 | D | 48.6 | D | 46.6 | D | 45.5 | D |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | AM | 37.4 | D | 40.5 | D | 37.5 | D | 37.4 | D | 37.4 | D |
| | | PM | 32.8 | C | 32.7 | C | 32.8 | C | 32.7 | C | 32.8 | C |
| 19 | Fallon Road & Dublin Boulevard[a] | AM | 48.2 | D | 43.6 | D | 41.2 | D | 45.2 | D | 47.1 | D |
| | | PM | 21.4 | C | 20.4 | C | 20.8 | C | 25.8 | C | 21.2 | C |

**TABLE 3.B-48 INTERSECTION DELAY AND LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps[a] | AM | 8.0 | A | 8.6 | A | 8.1 | A | 8.0 | A | 8.0 | A |
| | | PM | 9.4 | A | 9.3 | A | 9.5 | A | 9.2 | A | 9.4 | A |
| 21 | El Charro Road & I-580 EB Ramps | AM | 8.2 | A | 8.3 | A | 8.6 | A | 8.2 | A | 8.3 | A |
| | | PM | 8.2 | A | 8.2 | A | 8.2 | A | 8.1 | A | 8.2 | A |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | AM | 26.8 | C | 16.5 | B | 16.5 | B | 26.8 | C | 26.7 | C |
| | | PM | 18.3 | B | 18.1 | B | 18.1 | B | 16.6 | B | 18.3 | B |
| 23 | Stanley Boulevard & El Charro Road | AM | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] |
| | | PM | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | AM | 78.7 | E | 38.3 | D | 63.2 | E | 74.0 | E | 75.5 | E |
| | | PM | 13.6 | B | 11.9 | B | 12.6 | B | 13.1 | B | 13.8 | B |
| 25 | Airway Boulevard & I-580 WB Ramps | AM | 20.8 | C | 13.7 | B | 25.5 | C | 20.4 | C | 17.7 | B |
| | | PM | 5.4 | A | 5.0 | A | 4.9 | A | 4.2 | A | 5.0 | A |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | AM | 28.6 | C | 38.3 | D | 25.5 | C | 31.1 | C | 31.0 | C |
| | | PM | 27.9 | C | 25.6 | C | 25.8 | C | 23.0 | C | 24.4 | C |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | AM | 22.9 | C | 25.4 | C | 22.5 | C | 23.4 | C | 25.4 | C |
| | | PM | 25.6 | C | 24.6 | C | 24.7 | C | 23.1 | C | 25.7 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | AM | 27.9 | C | 27.6 | C | 27.8 | C | 28.1 | C | 28.0 | C |
| | | PM | 25.0 | C | 23.9 | C | 24.1 | C | 24.7 | C | 25.1 | C |
| 29 | Isabel Avenue & I-580 WB Ramps | AM | 10.8 | B | 17.9 | B | 17.2 | B | 11.3 | B | 11.3 | B |
| | | PM | 9.9 | A | 9.9 | A | 9.9 | A | 13.0 | B | 9.9 | A |
| 30 | Isabel Avenue & I-580 EB Ramps | AM | 6.6 | A | 8.0 | A | 7.3 | A | 5.9 | A | 5.9 | A |
| | | PM | 6.6 | A | 8.1 | A | 6.5 | A | 5.1 | A | 6.7 | A |

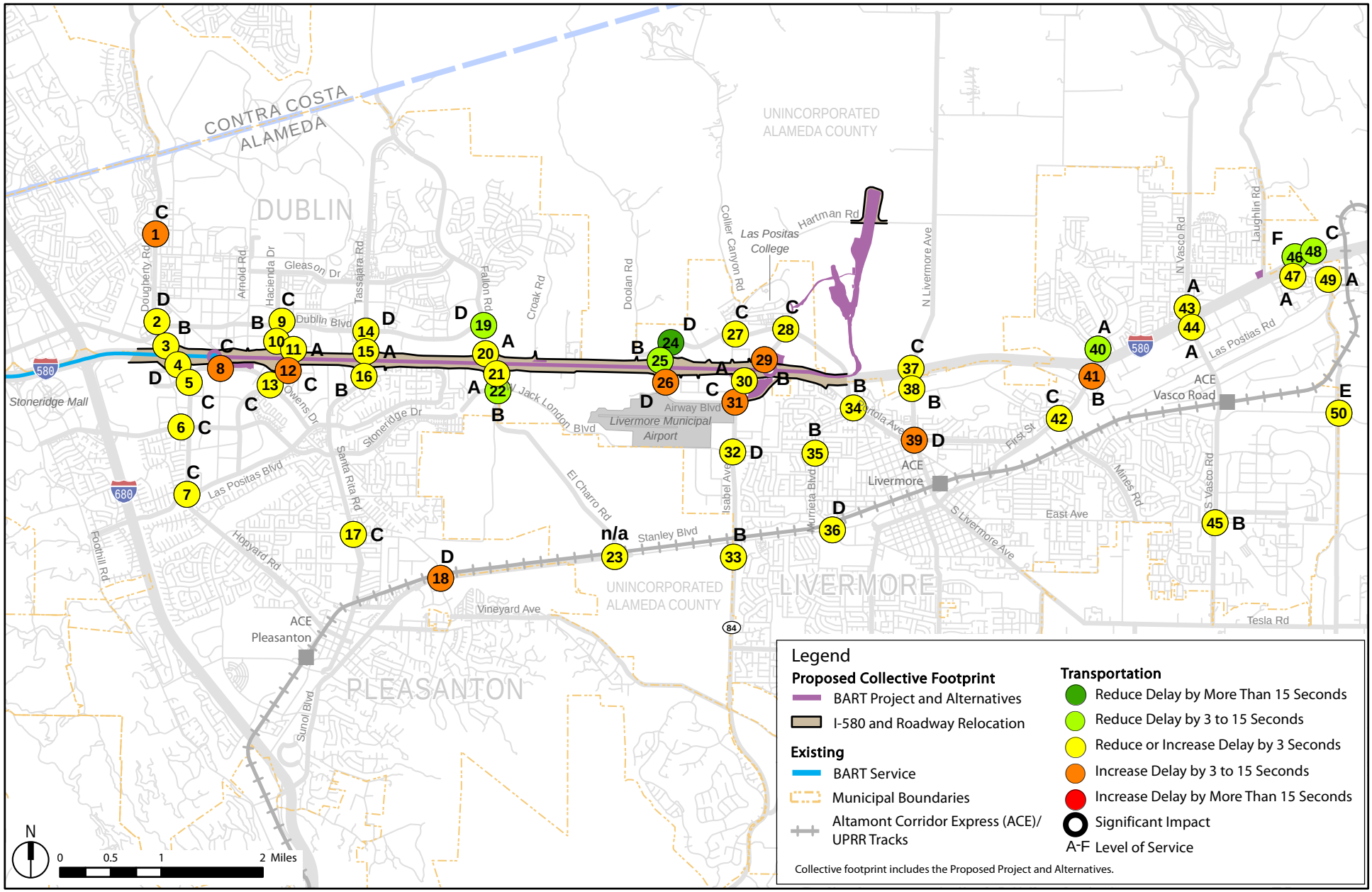
**TABLE 3.B-48 INTERSECTION DELAY AND LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 31 | Isabel Avenue & Airway Boulevard | AM | 26.7 | C | 32.9 | C | 30.5 | C | 27.2 | C | 27.4 | C |
| | | PM | 31.7 | C | *72.8* | *E* | *70.9* | *E* | 30.6 | C | 30.2 | C |
| 32 | Isabel Avenue & Jack London Boulevard | AM | 37.1 | D | 36.6 | D | 34.0 | C | 34.0 | C | 34.1 | C |
| | | PM | 43.1 | D | 45.8 | D | 47.0 | D | 43.4 | D | 45.8 | D |
| 33 | Isabel Avenue Connector & Stanley Boulevard | AM | 15.7 | B | 16.3 | B | 15.7 | B | 15.8 | B | 16.0 | B |
| | | PM | 15.8 | B | 15.2 | B | 15.2 | B | 15.2 | B | 15.2 | B |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | AM | 14.1 | B | 16.8 | B | 16.1 | B | 14.1 | B | 14.1 | B |
| | | PM | 20.2 | C | 29.0 | C | 30.1 | C | 19.5 | B | 20.3 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | AM | 17.9 | B | 17.9 | B | 17.9 | B | 17.8 | B | 17.8 | B |
| | | PM | 20.5 | C | 27.4 | C | 26.4 | C | 19.5 | B | 20.5 | C |
| 36 | Murrieta Boulevard & Stanley Boulevard | AM | 40.3 | D | 37.7 | D | 37.3 | D | 38.0 | D | 38.4 | D |
| | | PM | 29.3 | C | 29.2 | C | 29.2 | C | 29.1 | C | 29.3 | C |
| 37 | Livermore Avenue & I-580 WB Ramps | AM | 21.4 | C | 23.6 | C | 21.5 | C | 21.4 | C | 21.4 | C |
| | | PM | 39.3 | D | 13.7 | B | 26.3 | C | 11.4 | B | 12.3 | B |
| 38 | Livermore Avenue & I-580 EB Ramps | AM | 17.5 | B | 18.8 | B | 21.1 | C | 17.5 | B | 17.5 | B |
| | | PM | 108.2 | F | 112.8 | F | 101.4 | F | 110.0 | F | 107.9 | F |
| 39 | Livermore Avenue & Portola Avenue | AM | 39.3 | D | 43.4 | D | 41.1 | D | 39.4 | D | 39.3 | D |
| | | PM | 37.3 | D | **54.1** | **D** | 43.3 | D | 35.6 | D | 36.8 | D |
| 40 | First Street/ Springtown Boulevard & I-580 WB Ramps | AM | 16.3 | B | 9.2 | A | 11.6 | B | 16.3 | B | 16.3 | B |
| | | PM | 7.5 | A | 7.5 | A | 7.4 | A | 5.2 | A | 10.6 | B |
| 41 | First Street & I-580 EB Ramps | AM | 9.8 | A | 16.6 | B | 10.4 | B | 9.8 | A | 9.8 | A |
| | | PM | 30.4 | C | 31.7 | C | 32.8 | C | 33.8 | C | 34.0 | C |
| 42 | First Street & Mines Road | AM | 24.2 | C | 24.5 | C | 24.4 | C | 24.6 | C | 24.2 | C |
| | | PM | 48.6 | D | *56.4* | *E* | *54.8* | *D* | 45.3 | D | 52.0 | D |
| 43 | Vasco Road / I-580 WB Ramps | AM | 1.0 | A | 1.0 | A | 1.0 | A | 1.0 | A | 1.0 | A |
| | | PM | 1.1 | A | 1.1 | A | 1.1 | A | 1.1 | A | 1.1 | A |

**TABLE 3.B-48 INTERSECTION DELAY AND LEVEL OF SERVICE, 2025 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 44 | Vasco Road / I-580 EB Ramps | AM | 0.3 | A | 0.3 | A | 0.3 | A | 0.3 | A | 0.3 | A |
| | | PM | 0.7 | A | 0.7 | A | 0.7 | A | 0.7 | A | 0.7 | A |
| 45 | Vasco Road & East Avenue | AM | 18.8 | B | 17.6 | B | 19.0 | B | 18.9 | B | 18.8 | B |
| | | PM | 42.2 | D | 42.5 | D | 39.8 | D | 44.5 | D | 41.6 | D |
| 46 | Altamont Pass Road & I-580 WB Ramps | AM | 123.8 | F | 118.3 | F | 102.2 | F | 110.2 | F | 112.3 | F |
| | | PM | 7.0 | A | 6.8 | A | 6.8 | A | 6.3 | A | 6.4 | A |
| 47 | Southfront Road & I-580 EB Ramps | AM | 10.0 | A | 9.8 | A | 9.9 | A | 10.0 | A | 10.0 | A |
| | | PM | 13.8 | B | 13.8 | B | 13.7 | B | 14.3 | B | 14.6 | B |
| 48 | Greenville Road /Altamont Pass Road | AM | 35.1 | D | 32.1 | C | 37.1 | D | 32.6 | C | 32.3 | C |
| | | PM | 79.8 | E | **81.0** | **F** | **81.0** | **F** | **80.2** | **F** | 79.6 | E |
| 49 | Greenville Road & Southfront Road | AM | 8.9 | A | 9.9 | A | 8.9 | A | 8.9 | A | 8.9 | A |
| | | PM | 14.2 | B | 15.8 | B | 15.2 | B | 14.7 | B | 14.2 | B |
| 50 | Greenville Road / Patterson Pass Road | AM | 61.7 | E | 63.6 | E | 55.2 | E | 58.7 | E | 58.6 | E |
| | | PM | 132.2 | F | 136.6 | F | 129.1 | F | 127.4 | F | 137.1 | F |

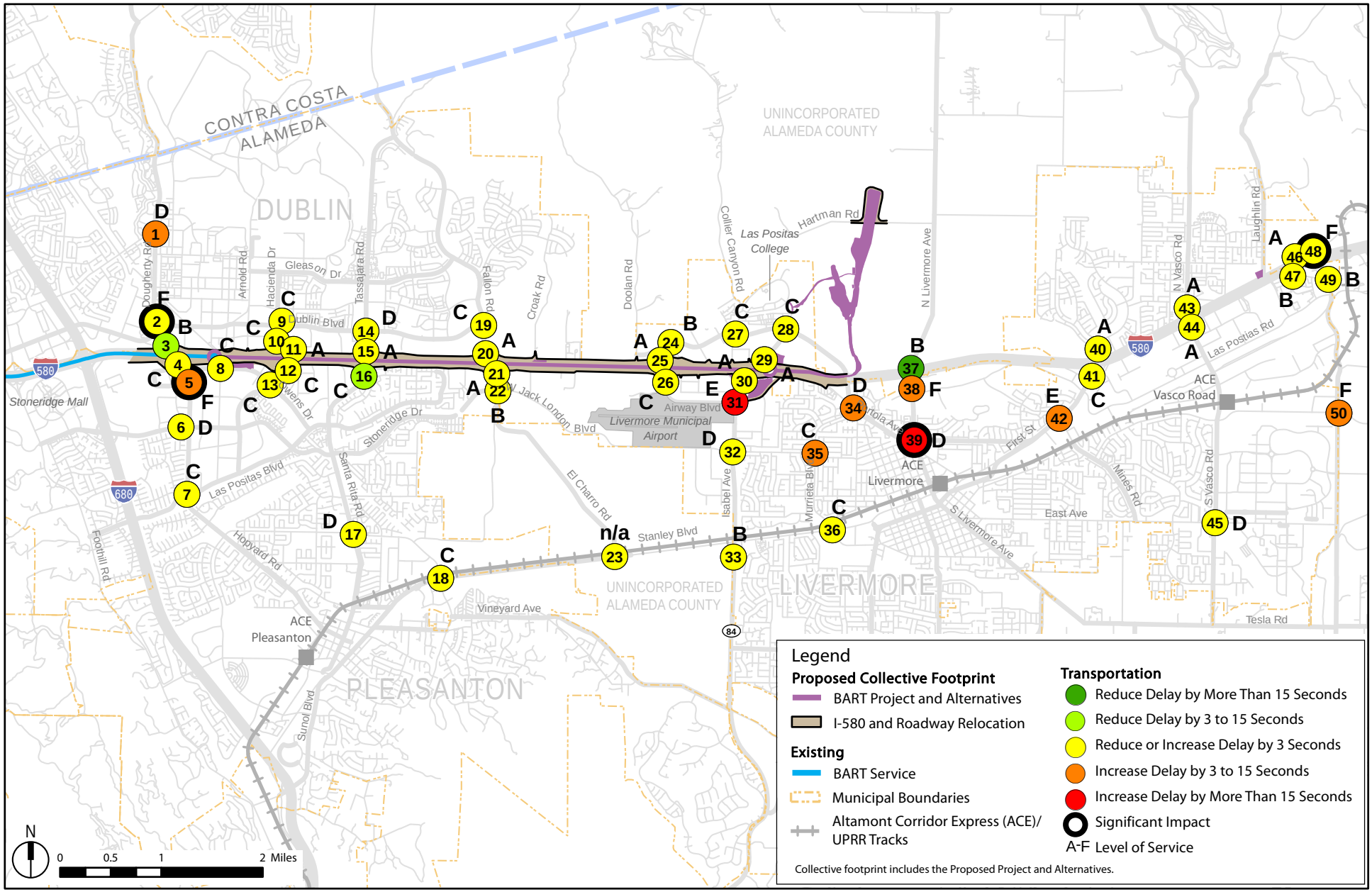
Notes: EB = eastbound; WB = westbound; LOS = level of service.
**Bold**/gray shading indicates intersections having a significant impact; i*talic*/gray shading indicates policy-exempt intersections having a less-than-significant impact.
[a] The significant impact criteria of the Cities of Dublin and Pleasanton use added vehicle trips as a metric rather than increased delay.
Source: Cambridge Systematics, 2017.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

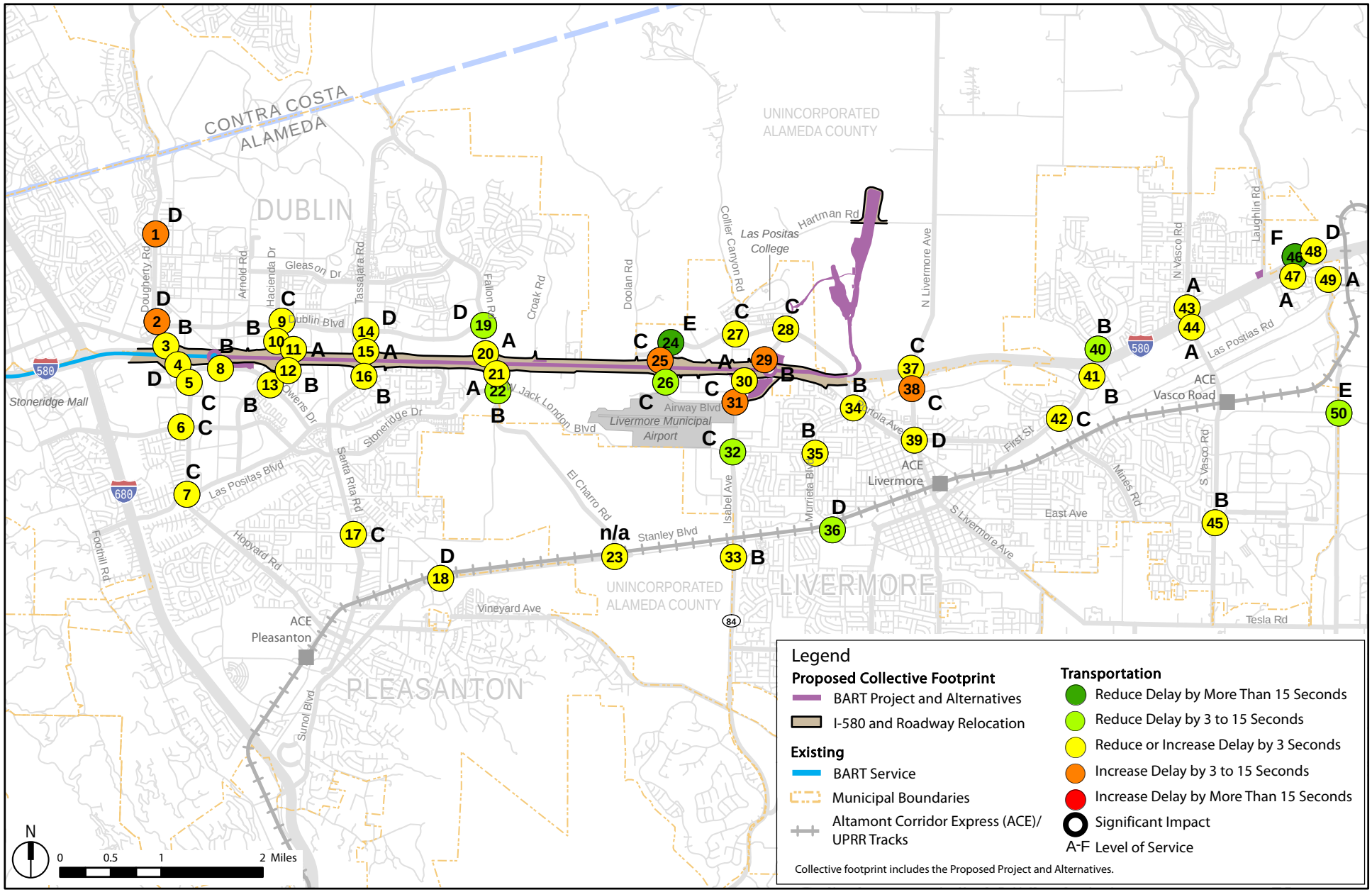
Figure 3.B-10
Transportation
Intersection LOS and Change in AM Delay
2025 Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

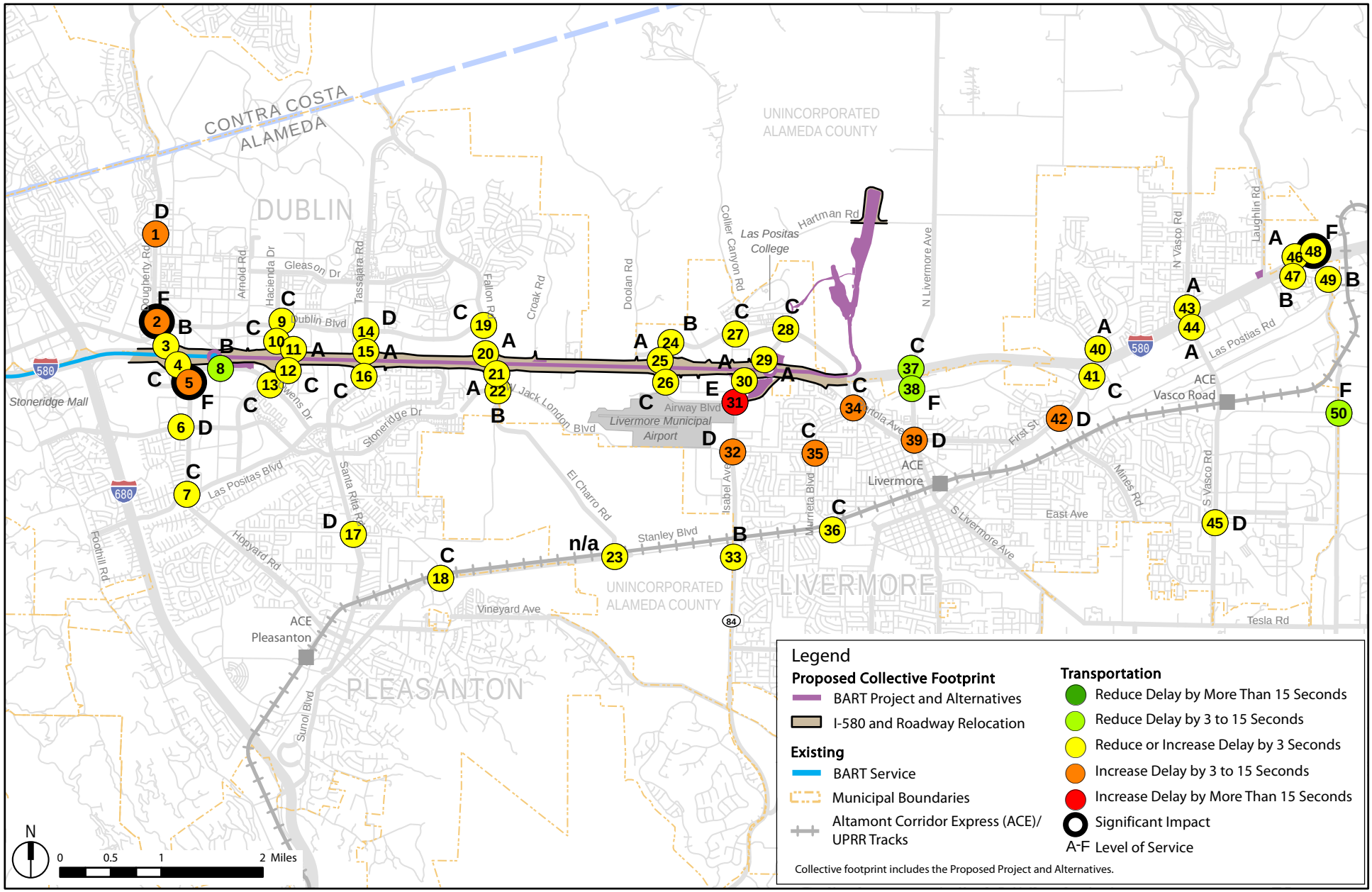
Figure 3.B-11
Transportation
Intersection LOS and Change in PM Delay
2025 Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

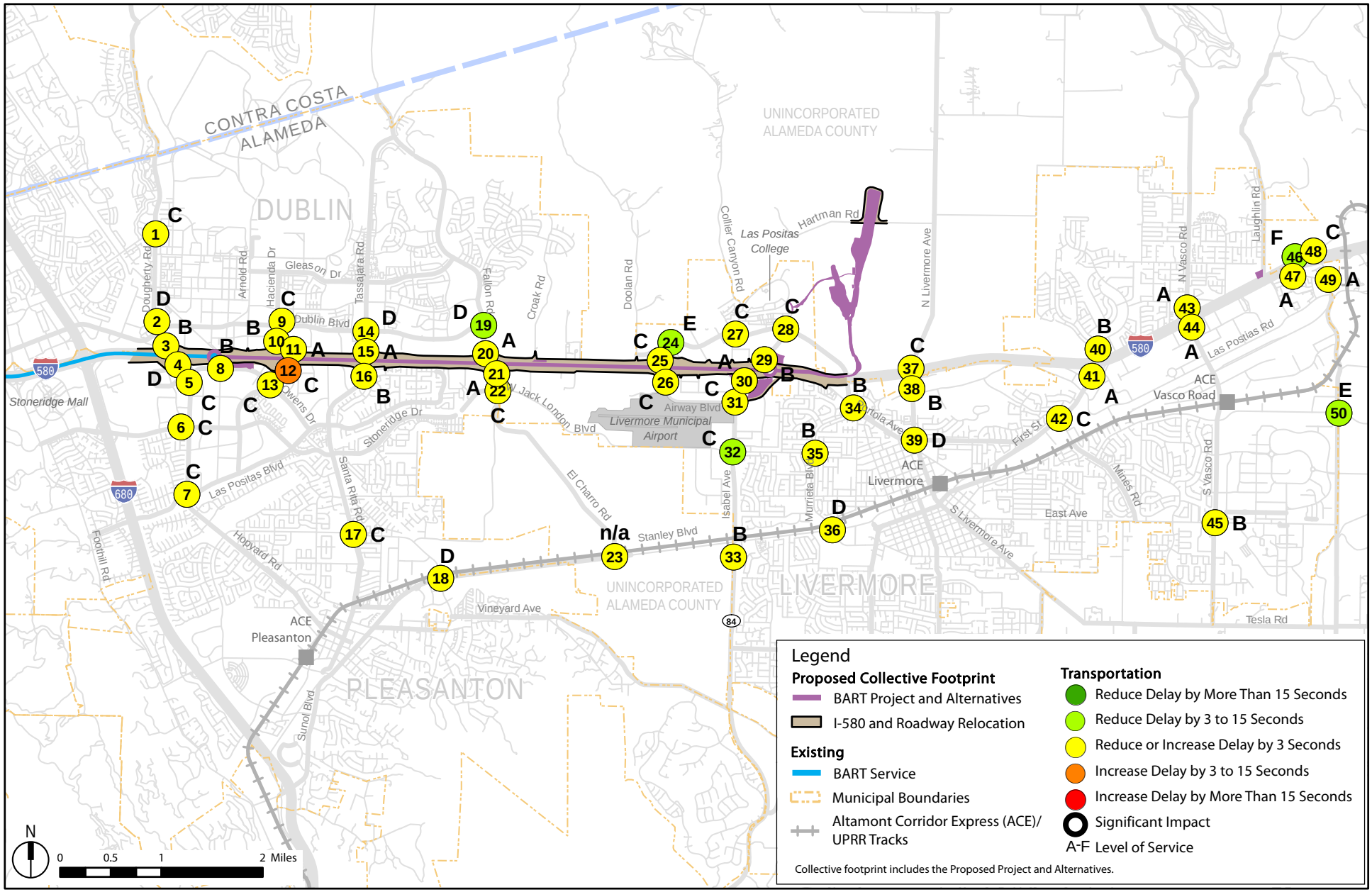
Figure 3.B-12
Transportation
Intersection LOS and Change in AM Delay
2025 DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

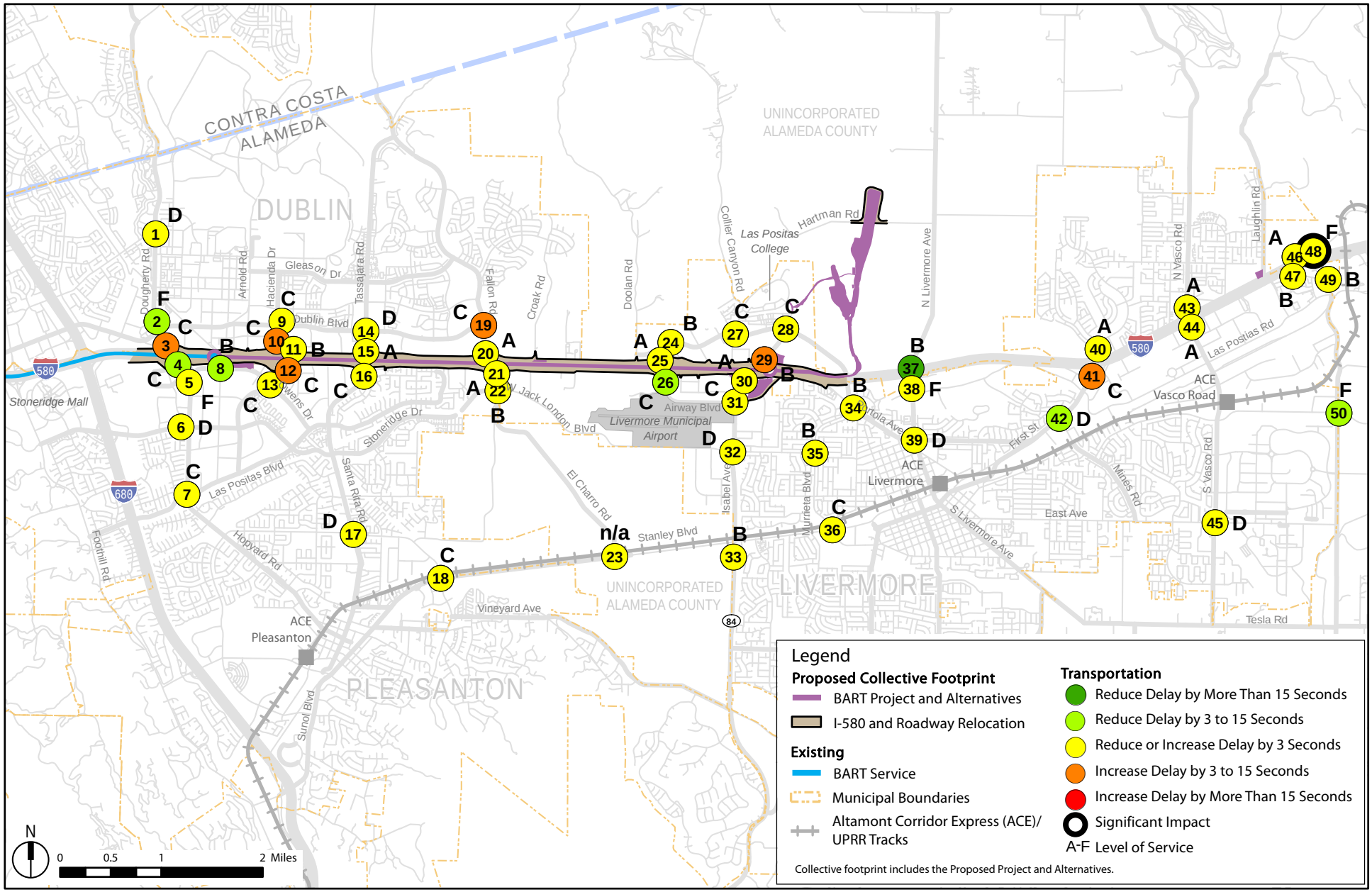
Figure 3.B-13
Transportation
Intersection LOS and Change in PM Delay
2025 DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

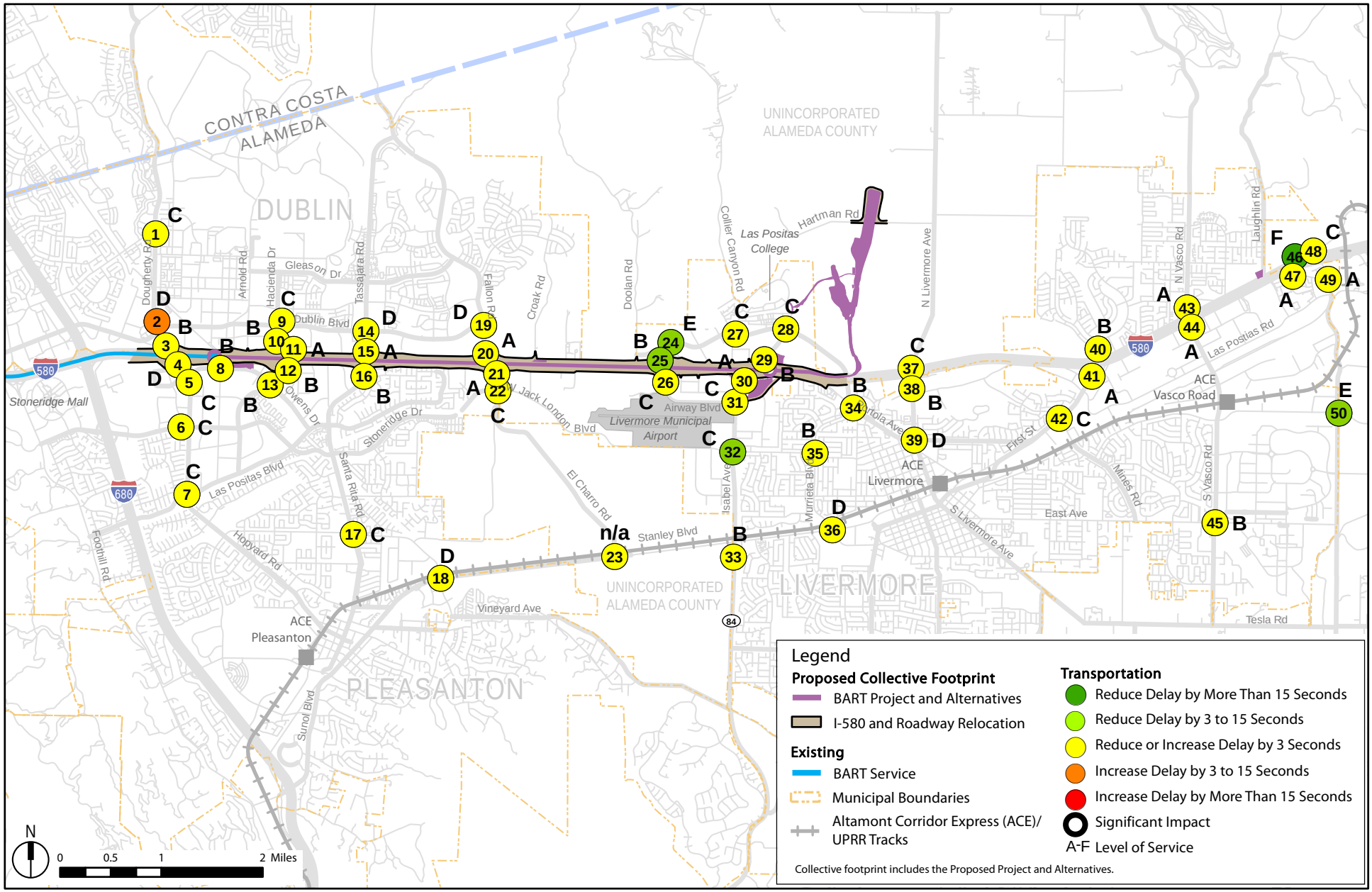
Figure 3.B-14
Transportation
Intersection LOS and Change in AM Delay
2025 Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

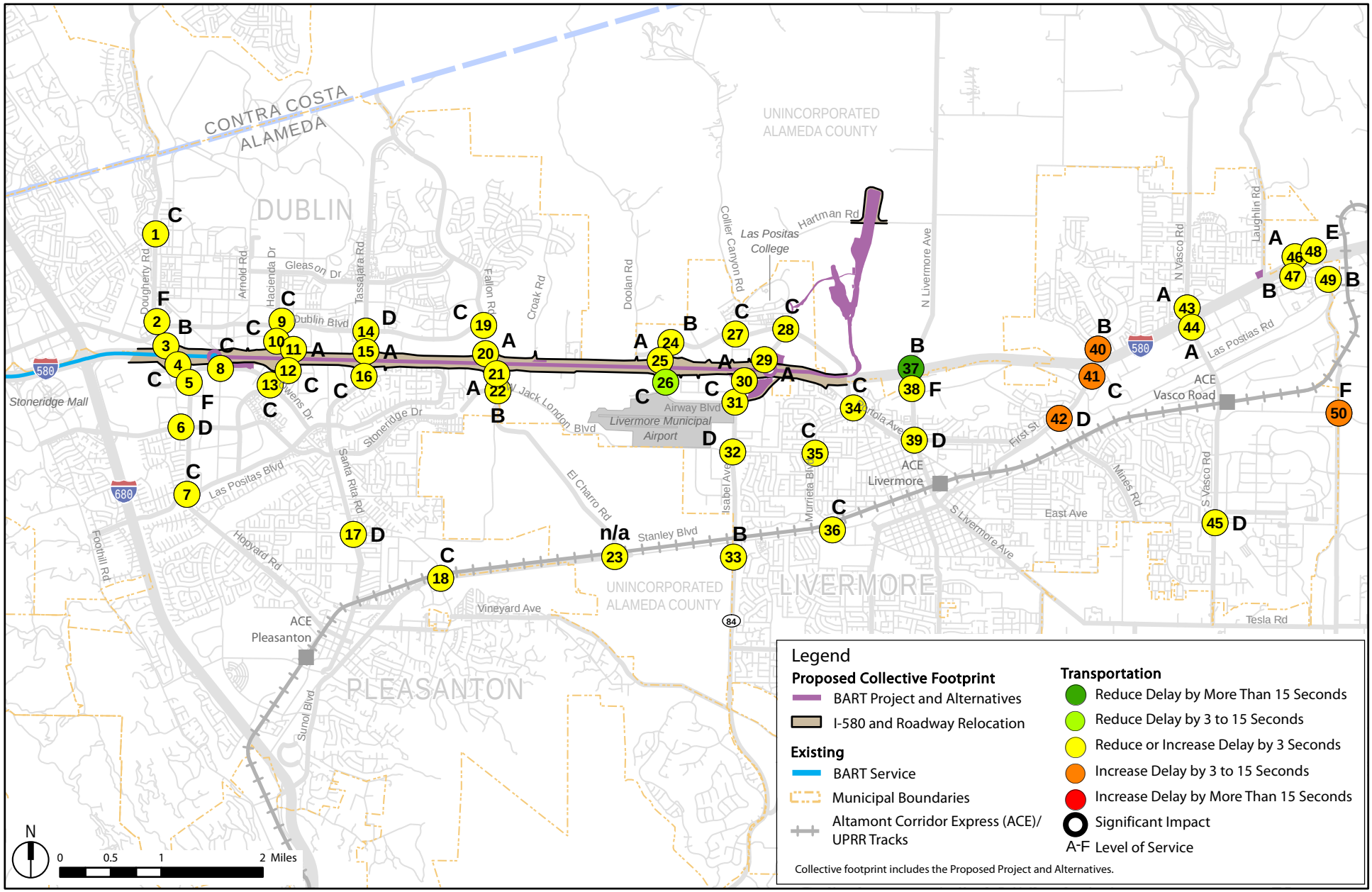
Figure 3.B-15
Transportation
Intersection LOS and Change in PM Delay
2025 Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B- 16
Transportation
Intersection LOS and Change in AM Delay
2025 Enhanced Bus Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-17
Transportation
Intersection LOS and Change in PM Delay
2025 Enhanced Bus Alternative

**No Project Alternative.** The 2025 No Project Alternative is the same as baseline conditions (i.e., 2025 No Project Conditions). Therefore, the 2025 No Project Alternative would have no impacts related to intersections operating at unacceptable levels. **(NI)**

**Conventional BART Project.** Under the Proposed Project in 2025, six intersections would exceed the standard for significant impacts. However, two of these intersections are exempt by policy from applicable LOS standards; therefore, impacts at these intersections would be considered less than significant. One of the four remaining intersections that experience impacts above the significant impact threshold may also be exempt, but is treated here as non-exempt until exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS E with a delay of 72.8 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **First Street & Mines Road (Intersection #42) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS E with a delay of 56.4 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at four intersections, as follows:

- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 109.8 seconds in the PM peak period. This intersection also has 68 additional trips Project Conditions compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road & Owens Road (Intersection #5) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 115.1 seconds in the PM peak period. This intersection also has 31 additional trips Project Conditions compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. This intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City of Pleasanton goals. If its exempt status is confirmed after consultation with the City of Pleasanton, there would be no impact and no mitigation would be required.
- **Livermore Avenue & Portola Avenue (Intersection #39) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 54.1 seconds

in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

- **Greenville Road & Altamont Pass Road (Intersection #48) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 81.0 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

Significant impacts at Intersection #2 and Intersection #48 would be reduced to less than significant with implementation of **Mitigation Measure TRAN-7a,** which requires improvements for turning and through lanes. Significant impacts at Intersection #5 and #39 would also be reduced with implementation **Mitigation Measure TRAN-7a**, which would include creating a full eight-phase signal operation at Intersection #5 and the addition of a second northbound left-turn lane at Intersection #39. However, these mitigations would not reduce the respective impacts at Intersection #5 and Intersection #39 to less than significant, and further improvements at these intersections would be infeasible due to physical constraints. Impacts at Intersection #5 and Intersection #39 would be significant and unavoidable. **(SU)**

**DMU Alternative.** Under the DMU Alternative in 2025, five intersections would exceed the standard for significant impacts. Two of these intersections are exempt by policy from applicable LOS standards, and are therefore considered to experience less-than-significant impacts. One of the three remaining intersections that experience impacts above the significant impact threshold may also be exempt, but is treated here as non-exempt until exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS E with a delay of 70.9 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **First Street & Mines Road (Intersection #42) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS E with a delay of 54.8 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at three intersections, as follows:

- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2) AM/PM**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 106.7 seconds in the AM peak and an LOS F with a delay of 164.8 seconds in

the PM peak period. This intersection also has 189 additional trips under the DMU Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.

- **Hopyard Road & Owens Road (Intersection #5) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 115.2 seconds in the PM peak period. This intersection also has 43 additional trips under Project Conditions compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. This intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City of Pleasanton goals. If its exempt status is confirmed after consultation with the City of Pleasanton, there would be no impact and no mitigation would be required.
- **Greenville Road & Altamont Pass Road (Intersection #48) PM**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 81.0 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

Significant impacts at Intersection #2 and Intersection #48 would be reduced to less than significant with implementation of **Mitigation Measure TRAN-7b,** which requires improvements for turning and through lanes. Significant impacts at Intersection #5 would also be reduced with implementation **Mitigation Measure TRAN-7b**, which would include creating a full eight-phase signal operation at Intersection #5. However, this mitigation would not reduce the impact at Intersection #5 to less than significant, and further improvements at this intersection would be infeasible due to physical constraints. Impacts at Intersection #5 would be significant and unavoidable. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative in 2025, one intersection would operate at unacceptable levels worse than under No Project Conditions. The following intersection would experience a significant impact:

- **Greenville Road & Altamont Pass Road (Intersection #48) PM**. Under the Express Bus/BRT Alternative 2025, this intersection would operate at an LOS F with a delay of 80.2 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

Significant impacts at Intersection# 48 would be reduced to less than significant with implementation of **Mitigation Measure TRAN-7c,** which requires improvements for turning and through lanes. **(LSM)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative in 2025, no operations would degrade below the threshold of significance. Therefore, the Enhanced Bus

Alternative would have no impacts related to intersections in 2025, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant impacts to intersections in 2025. For the Proposed Project, potential impacts would be reduced with implementation of **Mitigation Measure TRAN-7a,** which would require improvements at affected intersections. However, improvements at Intersection #5 and Intersection #39 would not be sufficient to reduce impacts to a less-than-significant level, and further intersection improvements would not be feasible. Therefore, the Proposed Project would result in a significant and unavoidable impact.

For the DMU Alternative, potential impacts would be reduced with implementation of **Mitigation Measure TRAN-7b,** which would require improvements at affected intersections. However, improvements at Intersection #5 would not be sufficient to reduce impacts to a less-than-significant level, and further intersection improvements would not be feasible. Therefore, the DMU Alternative would result in a significant and unavoidable impact.

For the Express Bus/BRT Alternative, potential impacts would be reduced to a less-than-significant level with implementation of **Mitigation Measure TRAN-7c**, which requires improvements for turning and through lanes.

As described above, the Enhanced Bus Alternative would not result in significant impacts, and no mitigation measures are required for this alternative.

**Mitigation Measure TRAN-7a: Improvements for Intersections #2, #5, #39, and #48 under 2025 Project Conditions (Conventional BART Project).**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City of Pleasanton, no mitigation is required.
- Livermore Avenue & Portola Avenue (Intersection #39) – Add a second northbound left-turn lane.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.

**Mitigation Measure TRAN-7b: Improvements for Intersections #2, #5, and #48 under 2025 Project Conditions (DMU Alternative/EMU Option).**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.

**Mitigation Measure TRAN-7c: Improvements for Intersection #48 under 2025 Project Conditions (Express Bus/BRT Alternative).**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersection:

- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.

***Impact TRAN-8: Intersections operating at an unacceptable LOS, under 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: NI)***

Table 3.B-49 below presents the results of the intersection LOS analysis for 2040, for the Proposed Project and Build Alternatives.

**TABLE 3.B-49 INTERSECTION DELAY AND LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1 | Dougherty Road & Amador Valley Road[a] | AM | 98.1 | F | **150.1** | **F** | **134.0** | **F** | 101.2 | F | 103.5 | F |
| | | PM | 32.6 | C | 37.7 | D | 38.9 | D | 33.3 | C | 32.9 | C |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard[a] | AM | 101.6 | F | **106.4** | **F** | **106.7** | **F** | 99.3 | F | 100.1 | F |
| | | PM | 147.9 | F | **173.8** | **F** | **164.8** | **F** | 150.2 | F | 147.4 | F |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps[a] | AM | 18.1 | B | 18.6 | B | 18.2 | B | 18.3 | B | 18.1 | B |
| | | PM | 19.1 | B | 18.0 | B | 18.9 | B | 20.4 | C | 20.5 | C |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | AM | 42.5 | D | 54.8 | D | 47.9 | D | 47.8 | D | 42.8 | D |
| | | PM | 46.3 | D | 45.4 | D | 43.1 | D | 43.2 | D | 42.6 | D |
| 5 | Hopyard Road & Owens Road | AM | 32.1 | C | 35.1 | D | 33.3 | C | 31.7 | C | 31.9 | C |
| | | PM | 100.7 | F | *107.6* | *F* | *98.7* | *F* | *101.6* | *F* | 101.3 | F |
| 6 | Hopyard Road & Stoneridge Drive | AM | 32.4 | C | 36.1 | D | 34.4 | C | 34.2 | C | 33.5 | C |
| | | PM | 39.3 | D | 40.8 | D | 40.1 | D | 39.4 | D | 38.7 | D |
| 7 | Hopyard Road & Las Positas Boulevard | AM | 25.9 | C | 24.8 | C | 26.0 | C | 25.6 | C | 25.0 | C |
| | | PM | 32.4 | C | 33.1 | C | 32.5 | C | 32.6 | C | 32.3 | C |
| 8 | Willow Road & Owens Road | AM | 12.4 | B | 11.6 | B | 11.7 | B | 12.5 | B | 12.5 | B |
| | | PM | 22.4 | C | 21.0 | C | 21.8 | C | 23.4 | C | 22.5 | C |
| 9 | Hacienda Drive & Dublin Boulevard[a] | AM | 37.4 | D | 38.6 | D | 37.8 | D | 37.3 | D | 37.6 | D |
| | | PM | 31.7 | C | 30.9 | C | 30.9 | C | 31.2 | C | 31.9 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings[a] | AM | 20.2 | C | 19.5 | B | 19.7 | B | 20.2 | C | 19.9 | B |
| | | PM | 28.8 | C | 26.9 | C | 27.7 | C | 28.7 | C | 28.7 | C |
| 11 | Hacienda Drive & I-580 WB Ramps[a] | AM | 7.7 | A | 7.5 | A | 7.5 | A | 7.9 | A | 7.6 | A |
| | | PM | 8.9 | A | 8.7 | A | 7.5 | A | 8.9 | A | 8.8 | A |
| 12 | Hacienda Drive & I-580 EB Ramps | AM | 18.9 | B | 18.8 | B | 18.6 | B | 19.3 | B | 19.0 | B |
| | | PM | 20.7 | C | 21.9 | C | 20.6 | C | 20.7 | C | 20.8 | C |
| 13 | Hacienda Drive & Owens Road | AM | 23.4 | C | 23.5 | C | 23.3 | C | 23.3 | C | 23.4 | C |
| | | PM | 30.5 | C | 32.2 | C | 29.8 | C | 30.4 | C | 30.5 | C |
| 14 | Tassajara Road & Dublin Boulevard[a] | AM | 50.5 | D | 40.7 | D | 47.2 | D | 50.2 | D | 50.4 | D |
| | | PM | 46.2 | D | 38.5 | D | 40.4 | D | 45.7 | D | 46.2 | D |
| 15 | Tassajara Road & I-580 WB Ramps[a] | AM | 11.5 | B | 11.6 | B | 11.4 | B | 11.5 | B | 11.5 | B |
| | | PM | 11.8 | B | 11.4 | B | 11.7 | B | 11.7 | B | 11.7 | B |

**TABLE 3.B-49 INTERSECTION DELAY AND LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | AM | 19.5 | B | 19.4 | B | 19.3 | B | 19.3 | B | 19.4 | B |
| | | PM | 32.8 | C | 34.2 | C | 32.6 | C | 32.7 | C | 32.7 | C |
| 17 | Santa Rita Road & Valley Avenue | AM | 24.0 | C | 27.2 | C | 24.1 | C | 24.0 | C | 26.2 | C |
| | | PM | 77.5 | E | 76.2 | E | 77.0 | E | 77.1 | E | 78.3 | E |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | AM | 38.5 | D | 38.5 | D | 38.4 | D | 38.3 | D | 38.5 | D |
| | | PM | 32.6 | C | 32.8 | C | 32.6 | C | 32.6 | C | 32.6 | C |
| 19 | Fallon Road & Dublin Boulevard[a] | AM | 35.1 | D | 28.1 | C | 42.4 | D | 34.6 | C | 35.1 | D |
| | | PM | 30.1 | C | 28.2 | C | 28.0 | C | 23.5 | C | 23.6 | C |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps[a] | AM | 10.8 | B | 11.3 | B | 11.0 | B | 11.0 | B | 8.4 | A |
| | | PM | 9.5 | A | 9.7 | A | 9.7 | A | 11.2 | B | 11.1 | B |
| 21 | El Charro Road & I-580 EB Ramps | AM | 11.3 | B | 11.3 | B | 11.2 | B | 11.2 | B | 11.1 | B |
| | | PM | 12.0 | B | 12.8 | B | 12.1 | B | 11.6 | B | 12.3 | B |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | AM | 26.5 | C | 22.6 | C | 26.1 | C | 24.1 | C | 24.1 | C |
| | | PM | 28.6 | C | 30.1 | C | 29.9 | C | 27.1 | C | 28.0 | C |
| 23 | Stanley Boulevard & El Charro Road | AM | 38.9 | D | 35.8 | D | 34.9 | C | 38.3 | D | 39.2 | D |
| | | PM | 31.6 | C | 22.3 | C | 23.1 | C | 30.3 | C | 29.0 | C |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | AM | 98.8 | F | 53.9 | D | 74.6 | E | 93.2 | F | 97.7 | F |
| | | PM | 35.7 | D | 24.1 | C | 24.5 | C | 34.7 | C | 36.5 | D |
| 25 | Airway Boulevard & I-580 WB Ramps | AM | 16.4 | B | 13.2 | B | 22.1 | C | 13.7 | B | 13.8 | B |
| | | PM | 5.5 | A | 6.9 | A | 6.5 | A | 5.5 | A | 5.5 | A |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | AM | 30.8 | C | 21.6 | C | 27.8 | C | 22.4 | C | 22.4 | C |
| | | PM | 39.4 | D | 26.5 | C | 28.5 | C | 38.3 | D | 38.5 | D |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | AM | 24.0 | C | 23.0 | C | 22.8 | C | 23.3 | C | 23.9 | C |
| | | PM | 22.3 | C | 20.6 | C | 21.0 | C | 22.4 | C | 22.6 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | AM | 27.7 | C | 27.1 | C | 27.0 | C | 27.5 | C | 27.5 | C |
| | | PM | 27.5 | C | 30.2 | C | 25.9 | C | 27.3 | C | 28.0 | C |

**TABLE 3.B-49 INTERSECTION DELAY AND LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 29 | Isabel Avenue & I-580 WB Ramps | AM | 11.5 | B | 15.0 | B | 12.4 | B | 13.0 | B | 12.8 | B |
| | | PM | 14.4 | B | 14.0 | B | 14.1 | B | 13.7 | B | 13.4 | B |
| 30 | Isabel Avenue & I-580 EB Ramps | AM | 6.1 | A | 6.0 | A | 5.1 | A | 6.6 | A | 7.0 | A |
| | | PM | 6.4 | A | 12.0 | B | 6.5 | A | 5.7 | A | 6.0 | A |
| 31 | Isabel Avenue & Airway Boulevard | AM | 34.3 | C | *58.5* | *E* | 45.2 | D | 34.2 | C | 34.1 | C |
| | | PM | 36.4 | D | *98.1* | *F* | *64.7* | *E* | 38.7 | D | 39.2 | D |
| 32 | Isabel Avenue & Jack London Boulevard | AM | 50.6 | D | 46.2 | D | 49.1 | D | 50.9 | D | 50.7 | D |
| | | PM | 79.8 | E | 65.7 | E | 75.4 | E | 80.6 | F | 48.6 | D |
| 33 | Isabel Avenue Connector & Stanley Boulevard | AM | 40.5 | D | 34.0 | C | 30.1 | C | 39.2 | D | 39.2 | D |
| | | PM | 73.8 | E | 64.6 | E | 67.7 | E | 73.8 | E | 71.1 | E |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | AM | 14.5 | B | 16.0 | B | 15.9 | B | 14.6 | B | 14.6 | B |
| | | PM | 33.7 | C | 29.0 | C | 32.3 | C | 40.3 | D | 33.4 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | AM | 25.0 | C | 30.6 | C | 31.7 | C | 24.6 | C | 24.5 | C |
| | | PM | 100.7 | F | **110.9** | **F** | 99.2 | F | 63.5 | E | 72.4 | E |
| 36 | Murrieta Boulevard & Stanley Boulevard | AM | 98.3 | F | 100.6 | F | 96.8 | F | 97.0 | F | 99.0 | F |
| | | PM | 45.8 | D | *55.3* | *E* | *54.0* | *D* | 47.1 | D | 48.6 | D |
| 37 | Livermore Avenue & I-580 WB Ramps | AM | 23.5 | C | 22.9 | C | 34.9 | C | 23.9 | C | 22.5 | C |
| | | PM | 27.8 | C | 27.3 | C | 29.5 | C | 26.1 | C | 26.1 | C |
| 38 | Livermore Avenue & I-580 EB Ramps | AM | 17.5 | B | 15.8 | B | 18.1 | B | 18.0 | B | 15.0 | B |
| | | PM | 74.3 | E | 69.1 | E | 70.0 | E | 78.1 | E | 74.6 | E |
| 39 | Livermore Avenue & Portola Avenue | AM | 43.8 | D | 43.5 | D | 43.4 | D | 41.3 | D | 40.9 | D |
| | | PM | 52.6 | D | **58.7** | **E** | 53.3 | D | 53.6 | D | 50.1 | D |
| 40 | First Street/Springtown Boulevard & I-580 WB Ramps | AM | 16.3 | B | 8.0 | A | 16.5 | B | 10.3 | B | 10.3 | B |
| | | PM | 14.1 | B | 16.1 | B | 16.1 | B | 13.0 | B | 12.9 | B |
| 41 | First Street & I-580 EB Ramps | AM | 14.5 | B | 11.2 | B | 14.2 | B | 11.8 | B | 12.0 | B |
| | | PM | 47.1 | D | 46.0 | D | 45.8 | D | 46.5 | D | 47.0 | D |
| 42 | First Street & Mines Road | AM | 26.2 | C | 26.3 | C | 26.0 | C | 26.3 | C | 25.8 | C |
| | | PM | 52.1 | D | *71.1* | *E* | *62.8* | *E* | 50.8 | D | 48.6 | D |
| 43 | Vasco Road / I-580 WB Ramps | AM | 0.7 | A | 0.6 | A | 0.7 | A | 0.7 | A | 0.7 | A |
| | | PM | 1.7 | A | 1.8 | A | 1.6 | A | 1.5 | A | 1.6 | A |
| 44 | Vasco Road / I-580 EB Ramps | AM | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | PM | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

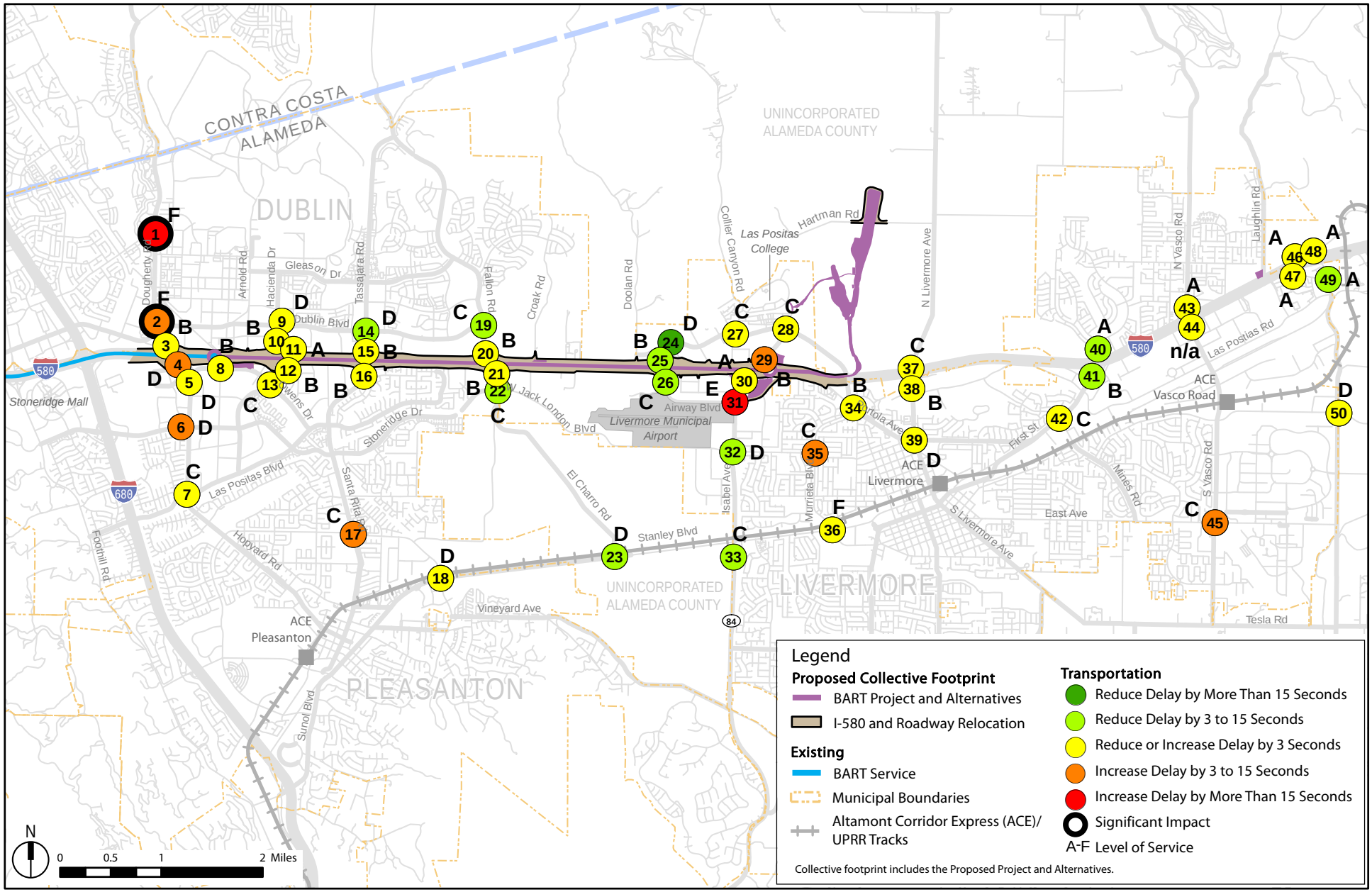
**TABLE 3.B-49 INTERSECTION DELAY AND LEVEL OF SERVICE, 2040 PROJECT CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 45 | Vasco Road & East Avenue | AM | 20.9 | C | 24.0 | C | 21.2 | C | 21.2 | C | 24.2 | C |
| | | PM | 87.4 | F | **92.5** | **F** | 86.1 | F | 85.7 | F | 84.9 | F |
| 46 | Greenville Road & I-580 WB Ramps | AM | 8.8 | A | 7.6 | A | 8.7 | A | 7.6 | A | 7.4 | A |
| | | PM | 5.3 | A | 5.6 | A | 5.5 | A | 5.4 | A | 5.4 | A |
| 47 | Greenville Road & I-580 EB Ramps | AM | 4.2 | A | 4.5 | A | 4.2 | A | 4.5 | A | 4.6 | A |
| | | PM | 9.2 | A | 10.0 | B | 9.9 | A | 9.5 | A | 9.4 | A |
| 48 | Greenville Road /Altamont Pass Road | AM | 7.1 | A | 8.3 | A | 7.6 | A | 7.1 | A | 7.1 | A |
| | | PM | 96.1 | F | **120.0** | **F** | **112.1** | **F** | 97.2 | F | 94.2 | F |
| 49 | Greenville Road & Southfront Road | AM | 14.3 | B | 8.7 | A | 14.1 | B | 8.8 | A | 8.8 | A |
| | | PM | 13.9 | B | 14.0 | B | 13.9 | B | 14.5 | B | 16.9 | B |
| 50 | Greenville Road / Patterson Pass Road | AM | 40.6 | D | 42.0 | D | 42.8 | D | 39.8 | D | 39.4 | D |
| | | PM | 156.3 | F | **186.7** | **F** | 156.6 | F | 159.7 | F | 157.4 | F |

Notes: EB = eastbound; WB = westbound; LOS = level of service.
**Bold**/gray shading indicates intersections having a significant impact; i*talic*/gray shading indicates policy-exempt intersections having a less-than-significant impact.
[a] The significant impact criteria of the Cities of Dublin and Pleasanton use added vehicle trips as a metric rather than increased delay.
Source: Cambridge Systematics, 2017.

Figures 3.B-18 through 3.B-25 present the results of the intersection LOS analysis for 2040.

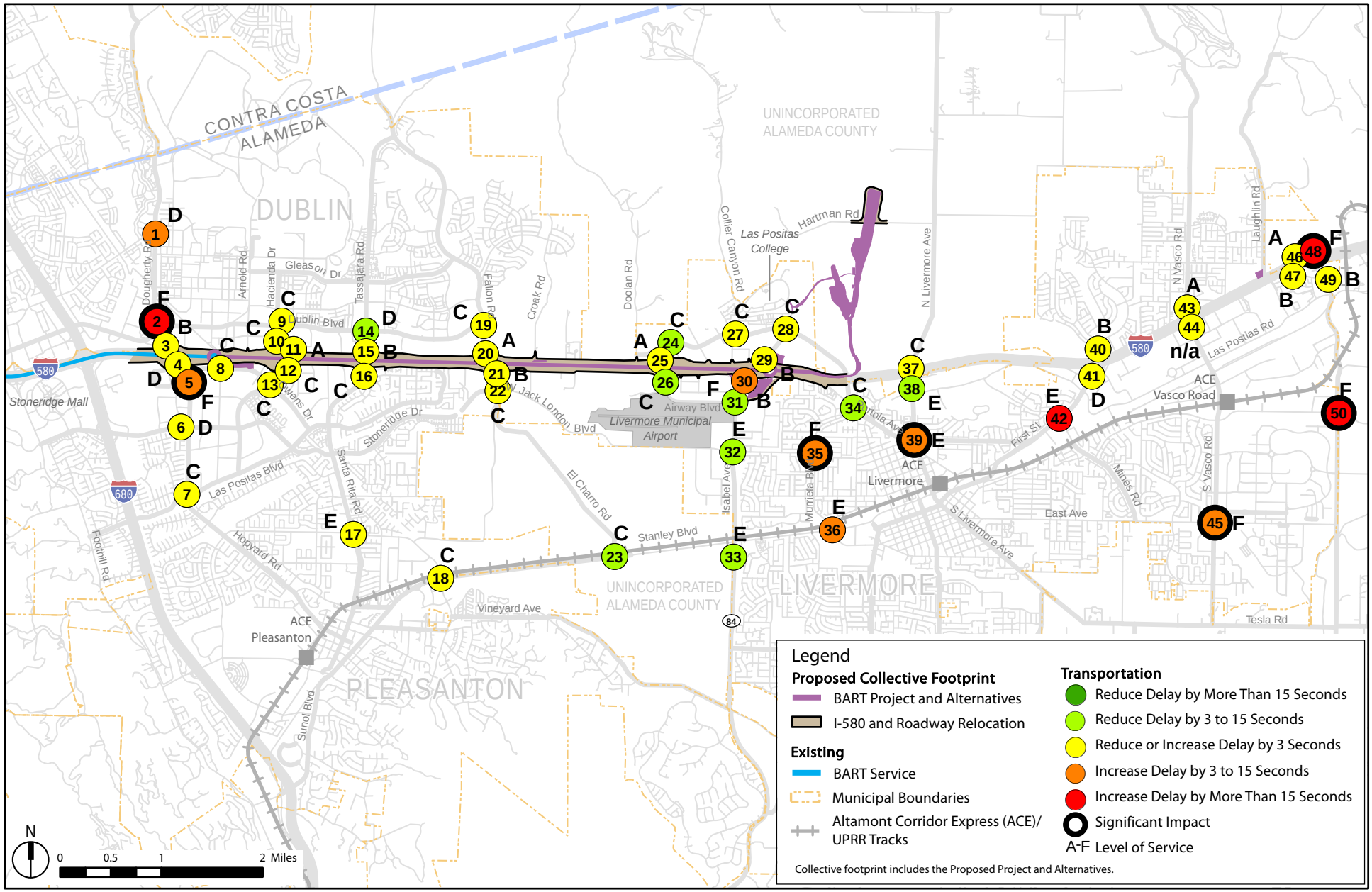
**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to intersections. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

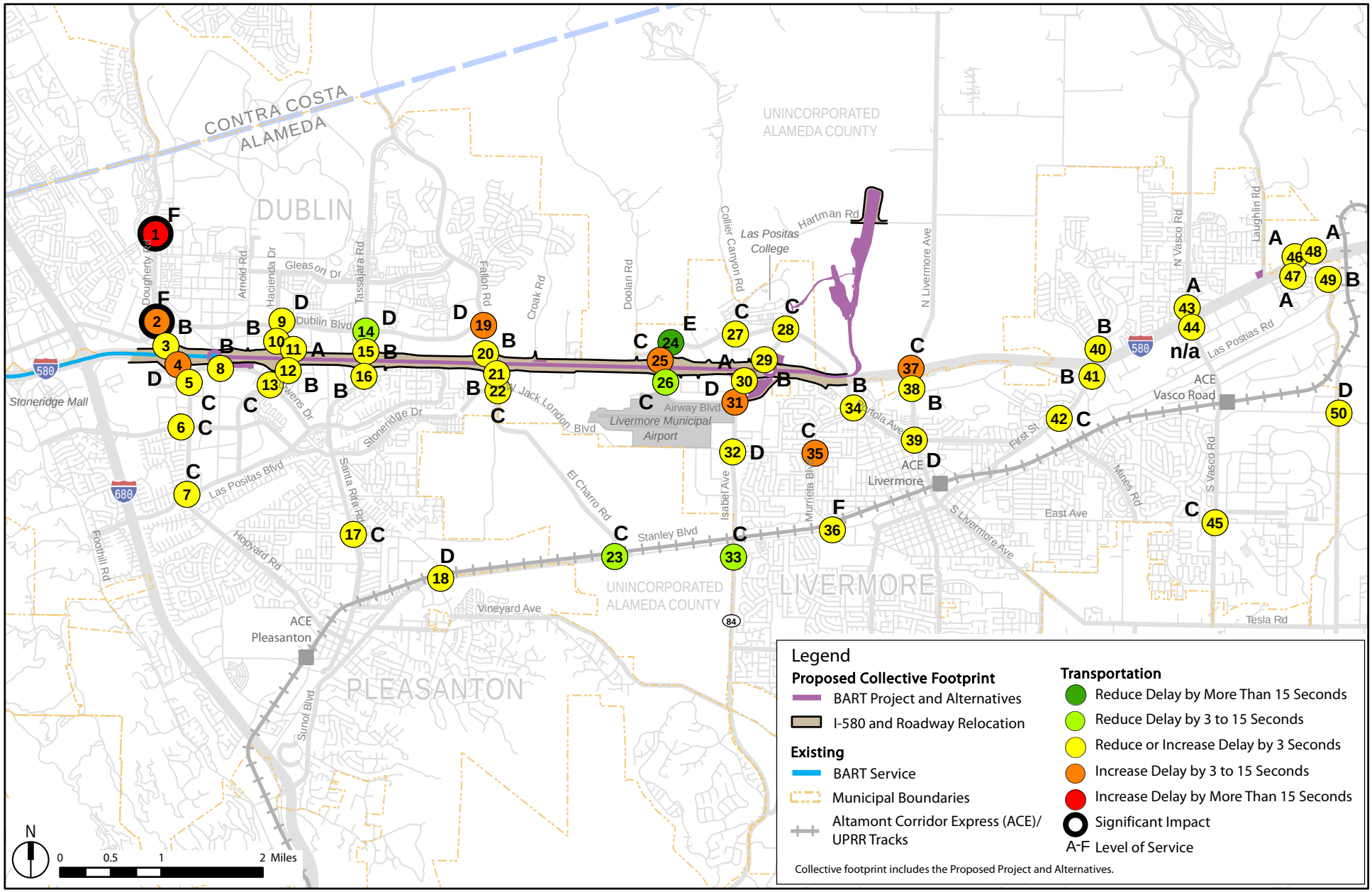
Figure 3.B- 18
Transportation
Intersection LOS and Change in AM Delay
2040 Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

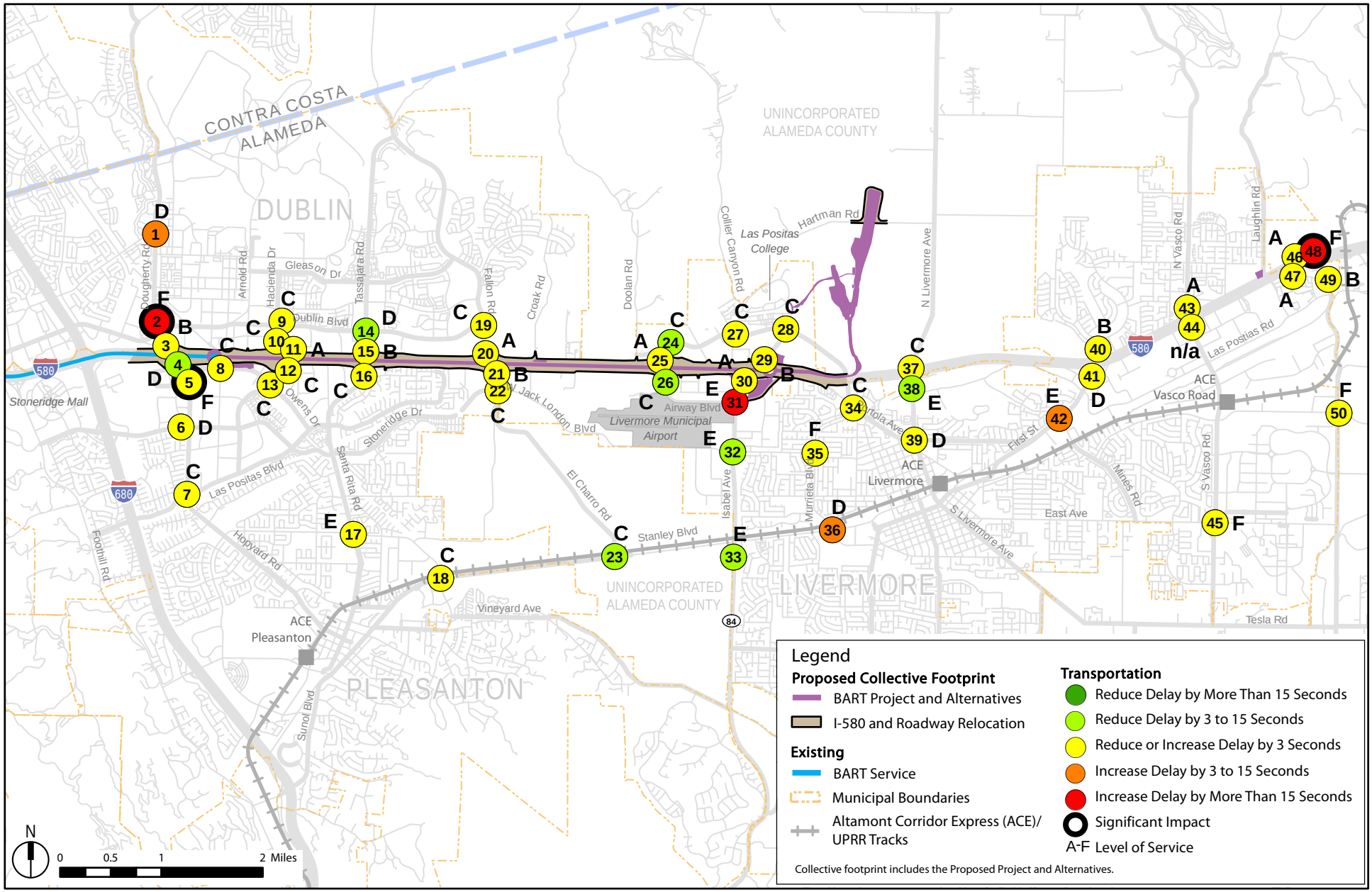
Figure 3.B-19
Transportation
Intersection LOS and Change in PM Delay
2040 Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

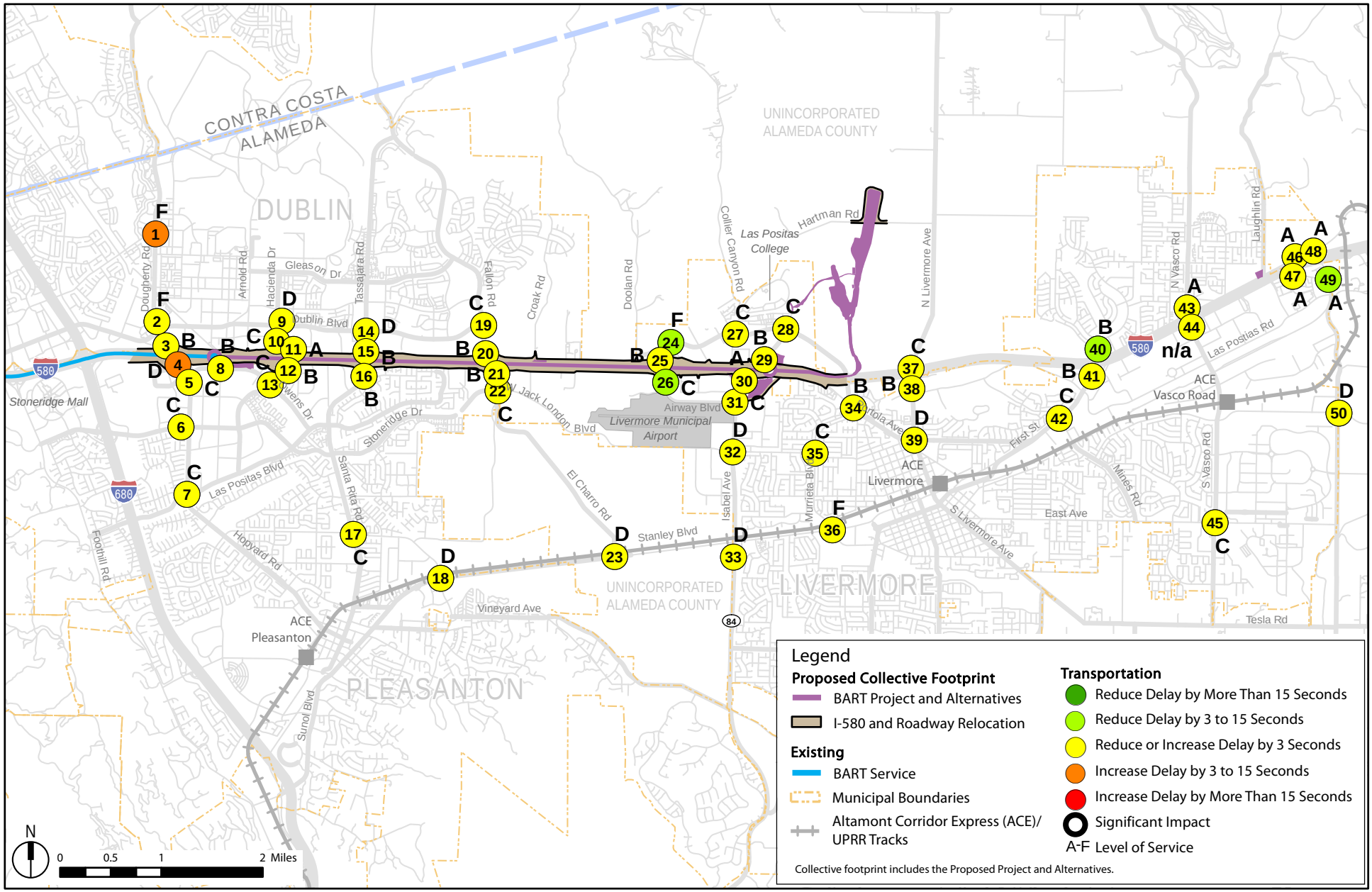
Figure 3.B-20
Transportation
Intersection LOS and Change in AM Delay
2040 DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

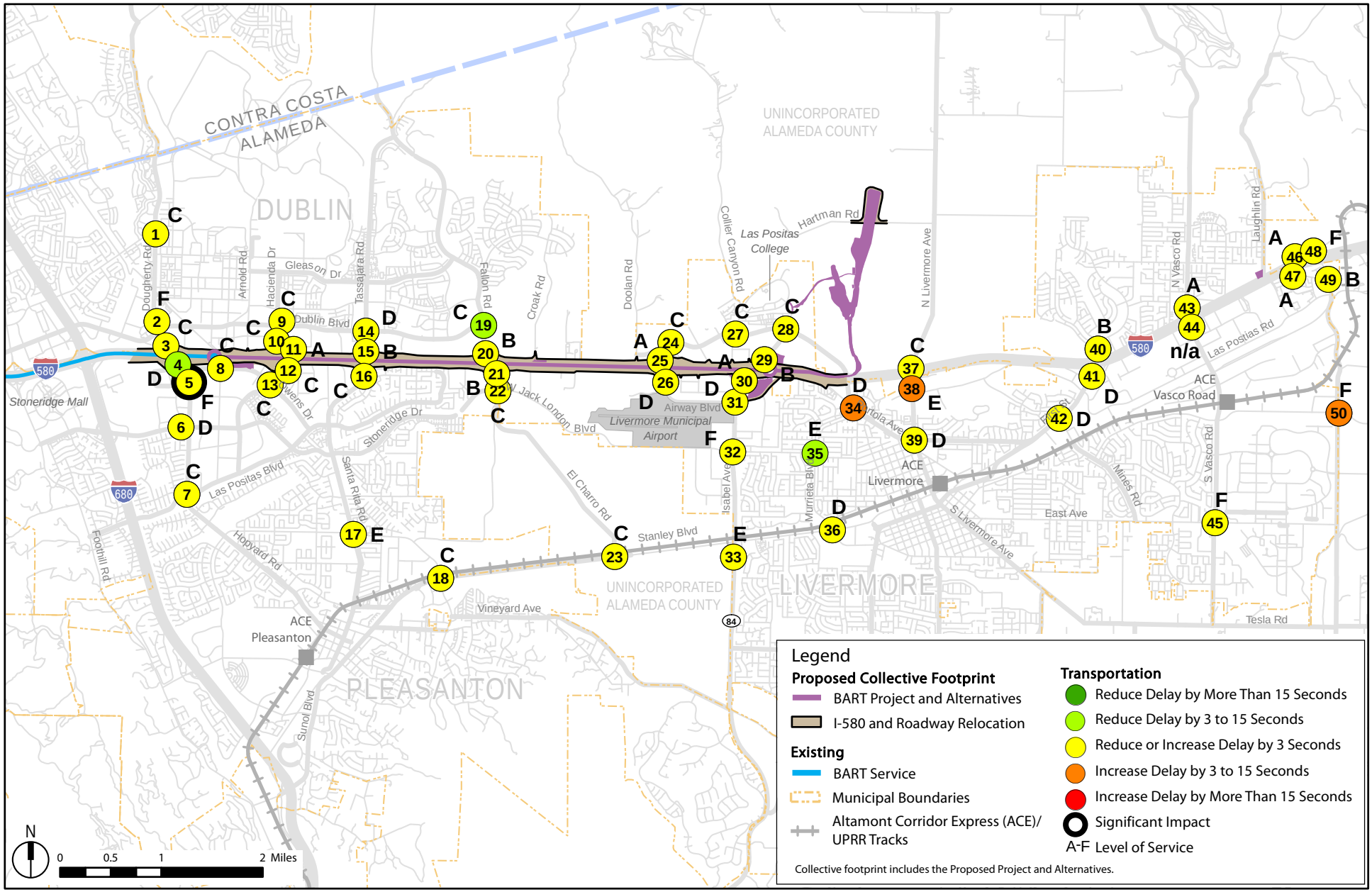
Figure 3.B-21
Transportation
Intersection LOS and Change in PM Delay
2040 DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

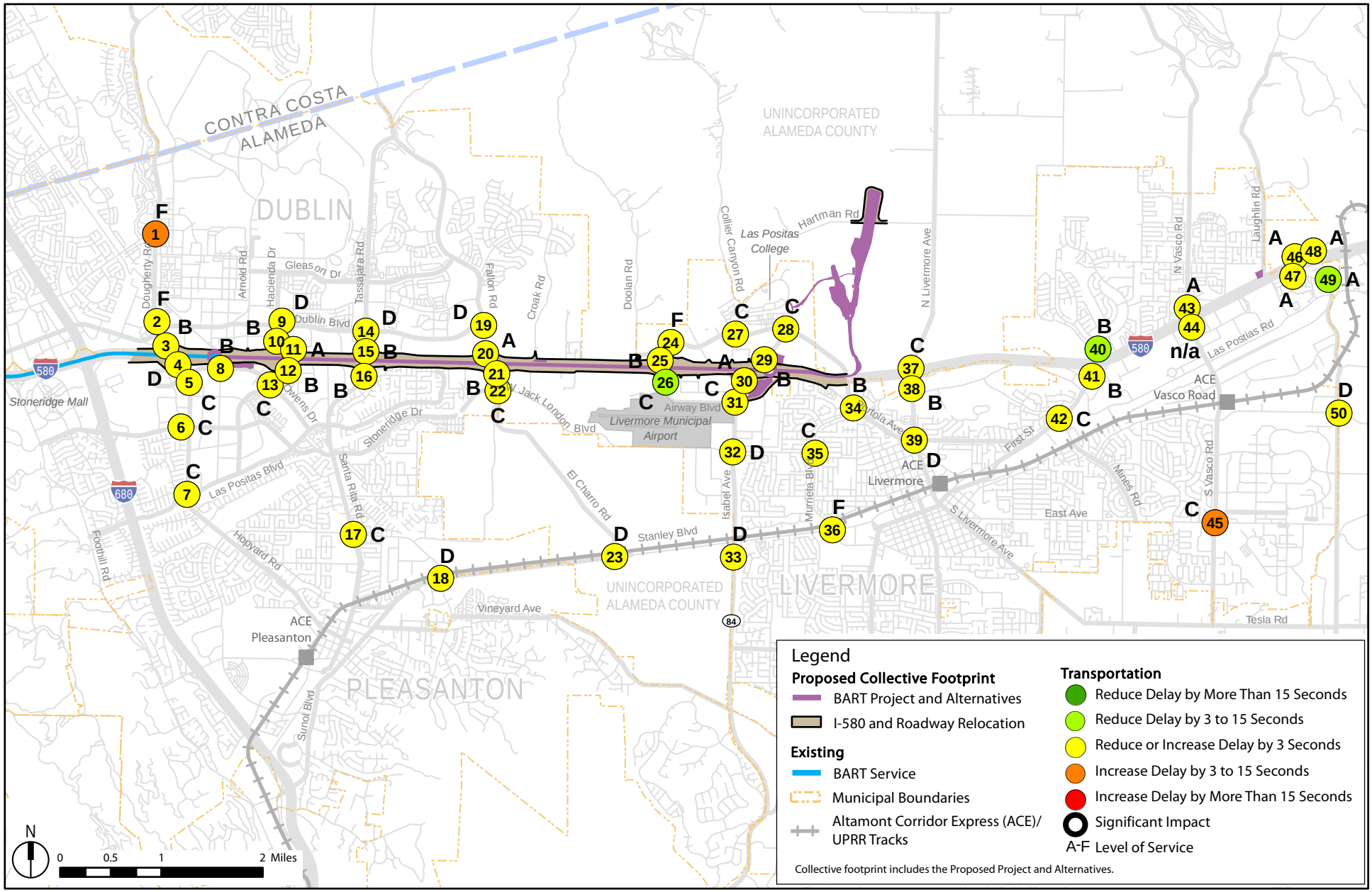
Figure 3.B-22
Transportation
Intersection LOS and Change in AM Delay
2040 Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

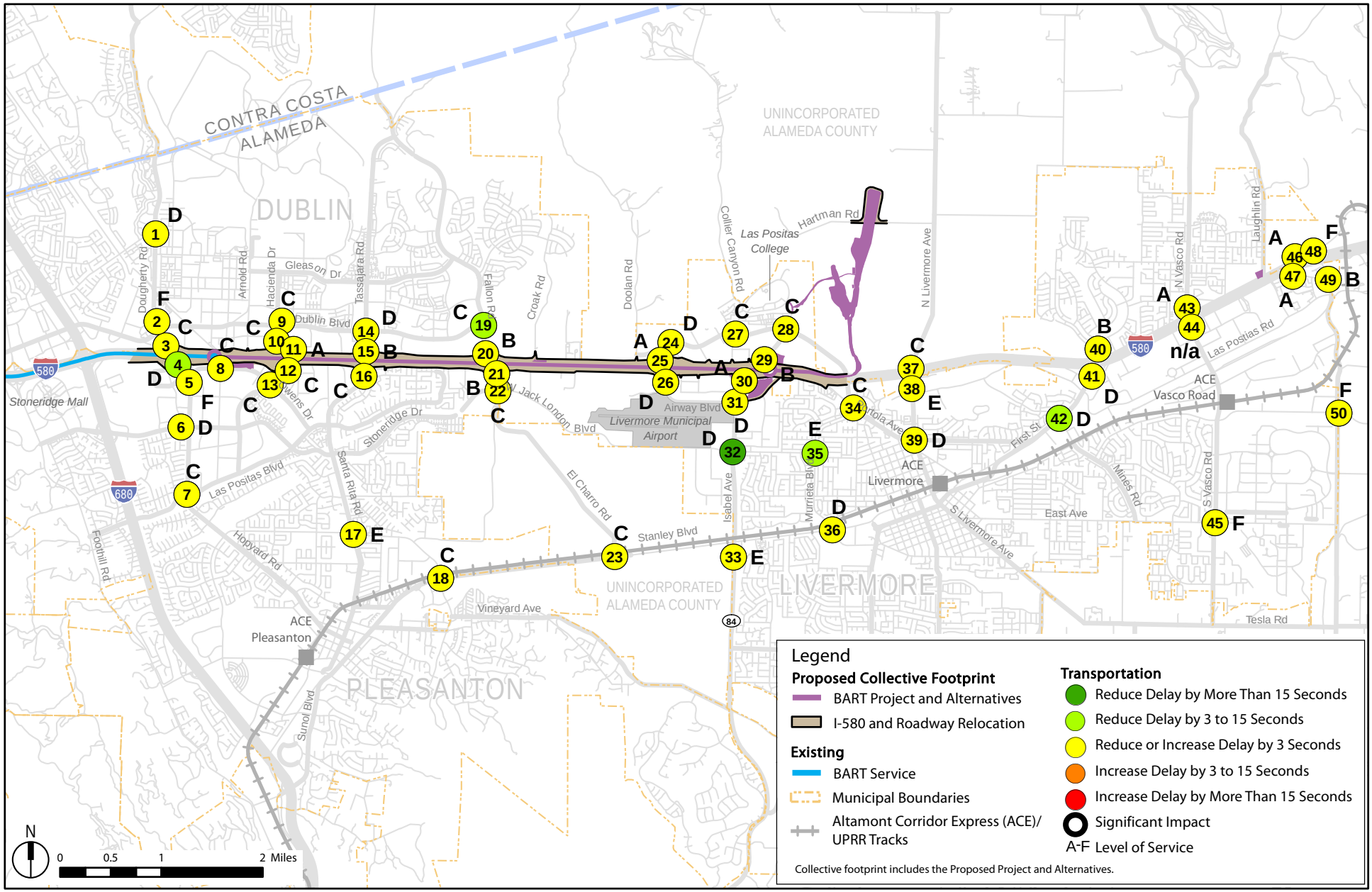
Figure 3.B-23
Transportation
Intersection LOS and Change in PM Delay
2040 Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-24
Transportation
Intersection LOS and Change in AM Delay
2040 Enhanced Bus Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-25
Transportation
Intersection LOS and Change in PM Delay
2040 Enhanced Bus Alternative

the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to intersections. **(NI)**

**Conventional BART Project.** Under the Proposed Project in 2040, 11 intersections would experience significant or less-than-significant impacts. Three of these intersections are exempt by policy from applicable LOS standards, and are therefore considered to experience less-than-significant impacts. One of the eight remaining other intersections that experience impacts above the significance threshold may also be exempt, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 58.5 seconds in the AM peak period and an LOS F with a delay of 98.1 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **Murrieta Boulevard & Stanley Boulevard (Intersection #36)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 55.3 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.
- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 71.1 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following eight intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 150.1 seconds in the AM peak period. This intersection also has 391 additional trips under the Project Conditions compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 106.4 seconds in the AM peak and an LOS F with a delay of 173.8 seconds in the PM peak period. This intersection also has 187 additional trips in the AM peak period and 296

additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater that the City of Dublin's threshold of 50 additional trips.

- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 107.6 seconds in the PM peak. This intersection has 253 additional trips in the AM peak period and 220 additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater that the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Murrieta Boulevard & Jack London Boulevard (Intersection #35)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 110.9 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Livermore Avenue & Portola Avenue (Intersection #39)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 58.7 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Vasco Road & East Avenue (Intersection #45)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 92.5 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road & Altamont Pass Road (Intersection #48)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 120.0 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Patterson Pass Road (Intersection #50).** Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 186.7 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #5 and Intersection #39, significant impacts would be reduced to less than significant with implementation of **Mitigation Measure TRAN-8a,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-8a** would include the addition of a full eight-phase signal operation at Intersection #5 and second northbound left-turn lane at Intersection #39. However, these mitigations would not reduce the significant impacts at Intersection #5 and Intersection #39 to less than significant, and further improvements at these

intersections would be infeasible due to physical constraints. Impacts at Intersection #5 and Intersection #39 would be significant and unavoidable. **(SU)**

**DMU Alternative.** Under the DMU Alternative in 2040, three intersections are exempt by policy from applicable LOS standards, and are therefore considered to experience less-than-significant impacts, while four intersections would experience significant impacts. One of the four intersections listed to experience significant impacts may be exempt by policy from applicable LOS standards, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 64.7 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **Murrieta Boulevard & Stanley Boulevard (Intersection #36)**. Under 2040 Project Conditions, this intersection would operate at an LOS D with a delay of 54.0 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.
- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 62.8 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following four intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 134.0 seconds in the AM peak period. This intersection also has 279 additional trips under the DMU Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 106.7 seconds in the AM peak and an LOS F with a delay of 164.8 seconds in the PM peak period. This intersection also has 189 additional trips under the DMU Alternative

compared to in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.

- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 98.7 seconds in the PM peak. This intersection also has 133 additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater that the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City of Pleasanton goals. If its exempt status is confirmed after consultation with the City, there would be no impact and no mitigation would be required.
- **Greenville Road & Altamont Pass Road (Intersection #48)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 112.1 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #5, significant impacts would be reduced to less than significant with implementation of **Mitigation Measure TRAN-8b,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-8b** would include the addition of a full eight-phase signal operation at Intersection #5. However, this mitigation would not reduce the significant impacts at Intersection #5 to less than significant, and further improvements at this intersection would be infeasible due to physical constraints. Impacts at Intersection #5 would be significant and unavoidable. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative in 2040, one intersection would experience significant or less-than-significant impacts. This intersection may be exempt, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

Significant impacts would occur at the following intersection:

- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 101.6 seconds in the PM peak. This intersection also has 10 additional trips under the Express Bus Alternative compared to No Project Conditions in the PM peak period, which is equal to the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.

**Mitigation Measure TRAN-8c** would include the addition of a full eight-phase signal operation at Intersection #5. However, this mitigation would not reduce the significant

impacts at Intersection #5 to less than significant, and further improvements at this intersection would be infeasible due to physical constraints. Impacts at Intersection #5 would be significant and unavoidable. **(SU)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative in 2040, no operations would degrade below the threshold of significance. Therefore, the Enhanced Bus Alternative would have no impacts related to intersections in 2040, and no mitigation measures are required. **(NI)**.

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and the Express Bus/BRT Alternative would have potentially significant impacts to intersections in 2040. Impacts associated with the Proposed Project at most intersections would be reduced to less than significant with implementation of **Mitigation Measure TRAN-8a**. However, impacts at Intersection #5 and Intersection #39 would be significant and unavoidable. Additional mitigation at this intersection is infeasible due to physical constraints that prevent the addition of new turning lanes or through lanes.

With implementation of **Mitigation Measure TRAN-8b**, impacts associated with the DMU Alternative at most intersections would be reduced to less than significant. However, impacts at Intersection #5 would be significant and unavoidable. Additional mitigation at this intersection is infeasible due to physical constraints that prevent the addition of new turning lanes or through lanes.

Under the Express Bus/BRT Alternative the implementation of **Mitigation Measure TRAN-8c** would not lower impacts at Intersection #5 to less than significant and impacts at this intersection would be significant and unavoidable. Additional mitigation at this intersection is infeasible due to physical constraints that prevent the addition of new turning lanes or through lanes.

As described above, the Enhanced Bus Alternative would not result in significant impacts and no mitigation measures are required for this alternative.

**Mitigation Measure TRAN-8a: Improvements for Intersections #1, #2, #5, #35, #39, #45, #48, and #50 under 2040 Project Conditions (Conventional BART Project).**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.

- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Murrieta Boulevard & Jack London Boulevard (Intersection #35) – Add an eastbound right-turn overlap phase.
- Livermore Avenue & Portola Avenue (Intersection #39) – Add a second northbound left-turn lane.
- Vasco Road & East Avenue (Intersection #45) – Operate eastbound and westbound phases as split phases. Reconfigure eastbound lanes to include one left-turn lane, one shared left-turn/through lane, and one shared through/right-turn lane.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

**Mitigation Measure TRAN-8b: Improvements for Intersections #1, #2, #5, and #48 under 2040 Project Conditions (DMU Alternative/EMU Option)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.

**Mitigation Measure TRAN-8c: Improvements for Intersection #5 under 2040 Project Conditions (Express Bus/BRT Alternative)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersection:

- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the

City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.

### Transit

***Impact TRAN-9: Impede the ability to improve transit access to BART, improve surrounding transit system inefficiencies, or improve ridership on surrounding transit services, under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

The Proposed Project and Build Alternatives specifically aim to improve accessibility to the BART system by extending the rail service farther east and/or improving feeder bus service to and from BART. The Proposed Project and all Alternatives would provide similar or better access to BART than No Project Conditions. For the Proposed Project and the DMU Alternative, the proposed Isabel Station would feature a loop road adjacent to the station on the north side that would facilitate bus access. Connecting feeder bus service would be shifted to the Isabel Station from the Dublin/Pleasanton Station, and bus frequencies would match proposed rail frequencies. The Express Bus/BRT Alternative would provide exclusive bus lanes to the existing Dublin/Pleasanton Station, thereby enhancing bus access to BART. The Enhanced Bus Alternative would feature more bus service to the Dublin/Pleasanton Station than under No Project Conditions, as well as new bus infrastructure improvements on the key routes serving the station.

The Proposed Project and Build Alternatives specifically aim to improve surrounding transit service to the BART system by increasing the availability of frequent transit through the BART rail extension farther east and/or improving feeder bus service to and from BART. The Proposed Project and Build Alternatives would encourage higher-quality surrounding transit service and the reduction of system inefficiencies.

Bus operations plans under the Proposed Project and the DMU Alternative (with EMU Option) are identical and assume the elimination of redundant service and implementation of new bus routes and higher bus frequencies to connect key destinations in the project area to the new Isabel Station.

The Express Bus/BRT Alternative also proposes new bus routes to connect key destinations within the project area to the existing Dublin/Pleasanton Station, as well as higher bus service frequencies along these new and existing routes. In addition, the Express Bus/BRT Alternative would feature a direct bus to BART transfer at the Dublin/Pleasanton Station in the I-580 median for buses traveling on I-580. The bus operations plan under the Enhanced Bus Alternative is similar to the Express Bus/BRT Alternative, except that it does not feature a direct bus-to-rail freeway transfer station,

and it modifies bus service to the Lawrence Livermore National Laboratory employment area.

Table 3.B-50 below presents the daily ridership projections under 2025 Project Conditions for surrounding transit services; ACE ridership is expected to drop under the Proposed Project and DMU Alternative. Once BART is extended to Santa Clara County, some ACE riders traveling to southern Alameda County and Santa Clara County may prefer to ride BART but may be unable to find parking at the Dublin/Pleasanton Station. However, under the Proposed Project and DMU Alternative, these riders would switch from ACE to BART due to the available parking spaces at Isabel Station.

The ridership projections do not include a BART-ACE rail connection. ACE ridership could increase if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented.

**TABLE 3.B-50 SURROUNDING TRANSIT SERVICES RIDERSHIP (WEEKDAY BOARDINGS), 2025 PROJECT CONDITIONS**

| | Systemwide Boardings (Change from No Project) | | | | |
|---|---|---|---|---|---|
| | **No Project** | **Conventional BART Project** | **DMU Alternative** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| ACE | 5,600 | 4,800 (-800) | 4,900 (-700) | 5,500 (-100) | 5,600 (0) |
| LAVTA | 10,400 | 10,700 (+300) | 11,000 (+600) | 11,700 (+1,300) | 10,700 (+300) |
| RTD | 360 | 20 (-340) | 30 (-330) | 60 (-300) | 360 (0) |

Notes: ACE = Altamont Corridor Express; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District.
ACE ridership numbers only include boardings in San Joaquin County and the Bay Area. These numbers do not reflect boarding along potential future ACE extensions into Stanislaus and Merced Counties.
Source: Cambridge Systematics, 2017.

For a similar reason, RTD ridership would also drop under multiple BART Livermore Extension Build Alternatives. LAVTA ridership is expected to increase under the rail alternatives, as extended BART service increases the draw of connecting bus service. LAVTA ridership is expected to increase the most under the Express Bus/BRT Alternative, as the assumed LAVTA bus routes using the median bus/HOT lanes would attract some of the riders that would have taken the extended rail service.

Table 3.B-51 below presents the daily ridership projections under 2040 Project Conditions for surrounding transit services. Similar to 2025 Project Conditions, ACE and RTD ridership would decrease, a result of BART extended service competing with those

services, and LAVTA ridership would be expected to increase under the rail alternatives, as the extended service increases the appeal of connecting bus service.

**TABLE 3.B-51 SURROUNDING TRANSIT SERVICES RIDERSHIP (WEEKDAY BOARDINGS), 2040 PROJECT CONDITIONS**

| | Systemwide Boardings | | | | |
|---|---|---|---|---|---|
| | No Project Conditions | Conventional BART Project | DMU Alternative | Express Bus/BRT Alternative | Enhanced Bus Alternative |
| ACE | 6,900 | 5,500 (-1,400) | 6,000 (-900) | 6,500 (-400) | 6,800 (-100) |
| LAVTA | 14,700 | 14,300 (-400) | 14,900 (+200) | 16,900 (+2,200) | 15,200 (+500) |
| RTD | 340 | 50 (-290) | 50 (-290) | 80 (-260) | 340 (0) |

Notes: ACE = Altamont Corridor Express; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District.
Change from No Project Conditions shown in parentheses. ACE ridership numbers only include boardings in San Joaquin County and the Bay Area. These numbers do not reflect boarding along potential future ACE extensions into Stanislaus and Merced Counties.
Source: Cambridge Systematics, 2017.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts on transit access to BART, surrounding transit system inefficiencies, or ridership on surrounding transit services. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to transit access to BART, surrounding transit system inefficiencies, or ridership on surrounding transit services. **(NI)**

**Conventional BART Project.** The modified routes operated by LAVTA would experience higher productivity as a result of the improved transit service coverage under the Proposed Project in 2025 and 2040. The RTD bus route to the Dublin/Pleasanton Station currently serves a limited number of riders and would experience reductions under the

Proposed Project. ACE currently serves a higher number of riders and would also see a decrease. ACE ridership could increase if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented. Because the changes in ridership are small compared to overall ridership for these transit services, the impacts to these transit services is not expected to be significant. Overall, impacts under the Proposed Project related to surrounding transit service ridership in 2025 and 2040 would be less than significant, and no mitigation measures are required. **(LS)**

**DMU Alternative.** The DMU Alternative's impact in 2025 and 2040 on other area transit routes is similar to that of the Proposed Project. Therefore, the DMU Alternative's impact to surrounding transit service ridership in 2025 and 2040 would be less than significant, similar to the Proposed Project, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative in 2025 and 2040, LAVTA routes would experience increased ridership, with the assumed R-B and X-B routes seeing higher ridership as the substitute for extended rail service. The RTD bus route to the Dublin/Pleasanton Station currently serves a limited number of riders and would experience reductions under the Express Bus/BRT Alternative. ACE currently serves a higher number of riders and would also see a decrease. ACE ridership could increase if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented. Because the changes in ridership are small compared to overall ridership for these transit services, the impacts to these transit services is not expected to be significant. Overall, impacts under the Express Bus/BRT Alternative related to surrounding transit service ridership in 2025 and 2040 would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Other area transit services would experience the same or higher ridership as a result of the improved transit service coverage under the Enhanced Bus Alternative in 2025 and 2040. Therefore, the Enhanced Bus Alternative would have no impacts related to surrounding transit service ridership in 2025 and 2040, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to surrounding transit service ridership in 2025 and 2040, and no mitigation measures are required.

**Bicycle**

***Impact TRAN-10: Worsen bicycle level of traffic stress, bicycle circulation and access, or bicycle safety hazards compared, under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: B; DMU Alternative: B; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to bicycle LTS, bicycle circulation and access, or bicycle safety hazards. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to bicycle LTS, bicycle circulation and access, or bicycle safety hazards. **(NI)**

**Conventional BART Project.** To connect pedestrians and cyclists to the proposed Isabel Station east of Isabel Avenue in I-580 median, the Proposed Project includes bicycle/pedestrian overcrossings both to the north and south of the freeway. One side of the overcrossing would head south over the Arroyo Las Positas and touch down in a newly expanded parking facility north of Airway Boulevard, connecting to the new extension of the Airway Boulevard bike lane previously mentioned. The other side would head north to touch down north of the westbound I-580 off-ramp and east of Isabel Avenue.

In addition, the Proposed Project would utilize the BART Station Access Guidelines (as described in Regulatory Framework) in its design of relevant station components.[30] BART would work with local jurisdictions to implement the bicycle access guidelines in the plans for the stations and station areas, including the City of Livermore for the proposed Isabel Station. The Proposed Project specifically aims to increase bicycle access to the new station, and in addition to the bicycle/pedestrian overcrossing of I-580, would provide new service road and bike/pedestrian way along the creek that borders the southern parking area of the new station.

With the construction of the new BART station east of Isabel Avenue in the I-580 median, new bicycle access would be possible with the construction of the pedestrian-bicycle overcrossing of I-580 that would connect the north and south sides of the freeway and the station in between. This connection would provide a route with a lower LTS than the current routes. These connections would also increase bicycle access to the new station.

[30] Ibid.

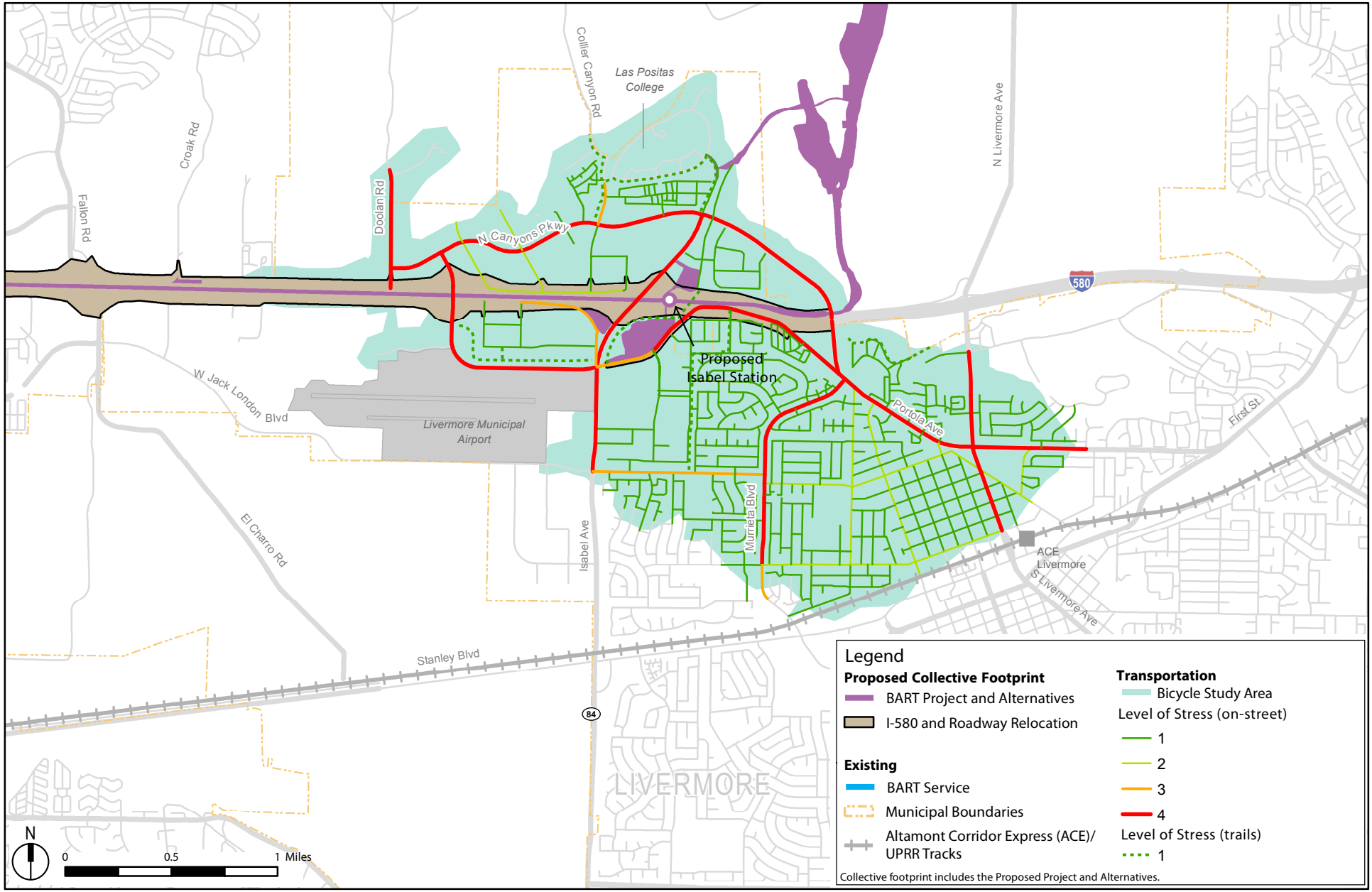
The new Isabel Station would attract additional bicyclists from the surrounding neighborhoods, as shown in Figure 3.B-26. At the I-580 ramps to and from Isabel Avenue, vehicles on Isabel heading to and from I-580 necessitate bicycle merging and weaving, which bicyclists may perceive as safety hazards. To address bicycle safety and provide bicycle station access, the Proposed Project would construct a pedestrian-bicycle overcrossing of I-580 that would connect to the Isabel Station from both the north and south sides of I-580, providing an alternative crossing of I-580. Therefore, the Proposed Project would add improvements to bicycle LTS, circulation and access, and safety in 2025 and 2040 and have a beneficial impact. **(B)**

**DMU Alternative.** The DMU Alternative would have similar LTS impacts as the Proposed Project, and the new bicycle connection would provide a station access route with a lower LTS than the current routes. The DMU Alternative would have similar bicycle circulation and access impacts to the Proposed Project, as the new I-580 overcrossing would increase bicycle access to the new station. Similar to the Proposed Project, the DMU Alternative would follow the BART Station Access Guidelines to ensure that bicycle access is prioritized in the DMU Alternative design. Finally, the DMU Alternative would have similar impacts to bicycle safety as the Proposed Project. Therefore, the DMU Alternative's impact to bicycle LTS, circulation and access, and safety in 2025 and 2040 would be beneficial, similar to the Proposed Project, and no mitigation measures are required. **(B)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would not make any changes to the bicycle study area. Therefore, the Express Bus/BRT Alternative would have no impacts related to bicycle LTS, circulation and access, and safety in 2025 and 2040, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would not make any changes to the bicycle study area. Therefore, the Enhanced Bus Alternative would have no impacts related to bicycle LTS, circulation and access, and safety in 2025 and 2040, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to bicycle LTS, circulation and access, or safety in 2025 and 2040, and no mitigation measures are required.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-26
Transportation
Bicycle Level of Stress
2025 and 2040 Conventional BART Project

### Pedestrians

***Impact TRAN-11: Worsen pedestrian crossing distance or delay, circulation and access or safety hazards, under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: B; DMU Alternative: B; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

The Proposed Project and Build Alternatives include numerous pedestrian improvements, including improvements to pedestrian accessibility to the Dublin/Pleasanton and Isabel Stations.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to pedestrian crossing distance or delay, circulation and access or safety hazards. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to pedestrian crossing distance or delay, circulation and access or safety hazards. **(NI)**

**Conventional BART Project.** The Proposed Project would utilize the BART Station Access Guidelines in its design of the relevant station components. These guidelines (see Regulatory Framework section) describe design elements and principles that support pedestrian access to the new station. BART would work with local jurisdictions to implement these pedestrian access guidelines in the plans for stations and station areas, including the City of Livermore for facilities near the proposed Isabel Station. The Proposed Project at the new Isabel Station would include pedestrian access improvements, including a new sidewalk along the north side of East Airway Boulevard, and a new I-580 pedestrian overcrossing that would improve pedestrian circulation in the area. However, the Proposed Project would involve construction of a set of connecting tracks from the I-580 median to the proposed storage area north of I-580, requiring the demolition of a bridge west of Portola Avenue and replacement of the bridge east of Portola Avenue.

The key pedestrian locations in the study area are the area immediately surrounding the existing Dublin/Pleasanton and the proposed Isabel Stations, as well as the two study intersections of Isabel Avenue and Airway Boulevard and Isabel Avenue and Portola Avenue. The curb-to-curb widths for these two intersections would not change substantially from No Project Conditions under the Proposed Project.

Pedestrian crossing distances and delays in the study area for pedestrians would not change compared with No Project Conditions, as the cross-sections of the relevant roadways having pedestrian crosswalks are unaffected by the project.

Regarding pedestrian safety hazards, construction of the Proposed Project may attract additional pedestrians from the surrounding neighborhoods. Some of these pedestrians may access the station using Isabel Avenue and by crossing the I-580 ramps to and from Isabel Avenue, which may be perceived as safety hazards. There is one signalized crossing of the eastbound off-ramp, at Isabel Avenue. The other two striped crossings on the west side of Isabel Avenue—of the eastbound on-ramp from southbound Isabel Avenue and of the westbound on-ramp from southbound Isabel Avenue—are uncontrolled, with no signalization. The crossings on the east side of Isabel, including crossings of the westbound on-ramp from northbound Isabel, the eastbound on-ramp from northbound Isabel, and the westbound off-ramp, currently feature no pedestrian crossing facilities. To address pedestrian safety and provide for pedestrian station access, the Proposed Project would involve construction of a pedestrian-bicycle overcrossing of I-580 that would connect to the Isabel Station from both the north and south sides of I-580, eliminating the need for pedestrians to cross the I-580 ramps. At the Dublin/Pleasanton Station, this alternative would not make changes affecting pedestrian travel. Therefore, the impact of the Proposed Project on pedestrian crossings, circulation, and access in 2025 and 2040, would be beneficial. **(B)**

**DMU Alternative.** The DMU Alternative would feature similar pedestrian facilities in the vicinity of the proposed Isabel Station as the Proposed Project, and therefore would have similar impacts on pedestrian crossings, circulation, and access. Like the Proposed Project, the DMU Alternative would also use the BART Station Access Guidelines in its design to ensure high-quality pedestrian access.

Pedestrian safety impacts under the DMU Alternative are similar to those for the Proposed Project, except at the Dublin/Pleasanton Station where the project would involve construction of a new passenger loading platform to serve both DMU trains and BART trains, north of the northern BART tracks. Passengers transferring from BART to DMU would arrive on the existing BART platform, using vertical circulation to cross underneath the tracks and up onto the new DMU platform. Passengers transferring from DMU to BART would arrive on the new DMU platform, where they would board a BART train on the other side of the new platform. Therefore, the DMU Alternative's impact to pedestrian crossings,

circulation, and access in 2025 and 2040 would be beneficial, similar to the Proposed Project, and no mitigation measures are required. **(B)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would not make any changes to the pedestrian study area, and therefore would have no impact on pedestrian access in the area.

In the area surrounding the Dublin/Pleasanton Station, the Express Bus/BRT Alternative would not make any changes to pedestrian facilities, and therefore would have no impact on pedestrian safety hazards.

This alternative also features new bus islands for passengers boarding and exiting express buses at the Dublin/Pleasanton Station, with vertical circulation allowing passengers to cross under the existing BART tracks to get to and from the existing BART platform. One bus platform would be adjacent to the I-580 westbound travel lanes and another adjacent to the I-580 eastbound lanes, which could present a pedestrian hazard. To address pedestrian safety, the Express Bus/BRT alternative would feature a physical barrier to protect and buffer passengers from high-speed motor vehicle traffic along both bus platforms. Therefore, impacts under the Express Bus/BRT Alternative related to pedestrian crossings, circulation, and access in 2025 and 2040 would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would not make any changes to the pedestrian study area. Therefore, the Enhanced Bus Alternative would have no impacts related to pedestrian crossings, circulation, and access in 2025 and 2040, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to pedestrian crossing distance, circulation and access, or safety in 2025 and 2040, and no mitigation measures are required.

***Impact TRAN-12: Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks, under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE,

and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks. However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks. **(NI)**

**Conventional BART Project and Alternatives.** The Proposed Project and Build Alternatives involve changes to surface transportation only. The Livermore Municipal Airport is located within approximately 0.35 mile south of I-580 and of the project site. The slight decrease in distance between the BART system and the Livermore Municipal Airport due to the presence of the Isabel Station would not have any substantial impact on the demand for flights into and out of the airport. The Proposed Project and Build Alternatives would not encroach upon that airport's property or require relocation of any airport facilities. Therefore, the Proposed Project and Alternatives would have no impact on air traffic patterns. Impacts related to airport safety are addressed in Section 3.N, Public Health and Safety. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to air traffic patterns in 2025 and 2040, and no mitigation measures are required.

***Impact TRAN-13: Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including

both residential and commercial. These improvements and development projects could result in potential impacts to hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). However, the effects of the other projects associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). **(NI)**

**Conventional BART Project and Alternatives.** The Proposed Project and Alternatives would include shifts in the I-580 freeway, as well as changes to the local roadway network. These changes would be designed to be consistent with applicable State and local roadway design standards, guidelines, and policies, which State and local jurisdictions have developed in consideration of design for traffic safety. The types of expected roadway users under the Proposed Project and Build Alternatives in the vicinity of the Project would be similar to those under existing conditions, including traffic associated with commuting as well as that associated with travelers accessing local residential and commercial land uses, with low-speed traffic using local roadways and high-speed traffic using I-580. No increases in incompatible roadway uses would result from the Proposed Project or Alternatives. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Build Alternatives would not result in significant impacts related to hazards due to a design feature in 2025 and 2040, and no mitigation measures are required.

***Impact TRAN-14: Result in inadequate emergency access under 2025 or 2040 Project Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential impacts to emergency access. However, the effects of the other projects

associated with the No Project Alternative scenario have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to emergency access. **(NI)**

**Conventional BART Project and Alternatives.** Impacts to emergency access would occur if any permanent modifications to the roadway network included blockages of roadway segments. Neither the Proposed Project, nor any of the Alternatives, would make permanent modifications that would block any of the existing roadway segments. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to emergency access in 2025 and 2040, and no mitigation measures are required.

### (b) Operations – Cumulative Analysis

The Cumulative Analysis includes the impacts of the cumulative traffic generated by the Proposed Project and Build Alternatives as well as the traffic that would be generated by anticipated future projects. As described in Section 3.A, Introduction to Environmental Analysis, cumulative projects that could cause impacts combined with those caused by the Proposed Project or Build Alternatives include the added vehicle trips associated with (1) the INP combined with the Dublin/Pleasanton Station Garage Expansion for the Proposed Project and the DMU Alternative; and (2) the Dublin/Pleasanton Station Garage Expansion for the Express Bus/BRT Alternative and Enhanced Bus Alternative.

The geographic study area for cumulative impacts is the same as the project impacts study area described in the Introduction subsection above.

As described in **Impacts TRAN-12**, **TRAN-13**, and **TRAN-14** above, the Proposed Project and Build Alternatives would have no impacts related to air traffic patterns, hazards due to design features, or emergency access. Therefore, the Proposed Project and Build Alternatives would not contribute to cumulative impacts related to these issues during operations.

#### Freeway Segments

***Impact TRAN-15(CU): General-purpose lane freeway segments operating at unacceptable LOS, under 2025 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

Tables 3.B-52, 3.B-53, 3.B-54, and 3.B-55 below presents the results of the general-purpose lane freeway segment LOS analysis for 2025, for the Proposed Project and Alternatives.

**No Project Alternative.** As described in **Impact TRAN-3** above, the No Project Alternative would have no impacts associated with freeway segments operating at unacceptable LOS. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project.** For the Proposed Project under 2025 Cumulative Conditions, three general-purpose freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions, and the Proposed Project would not increase the V/C ratio of those segments by more than 2 percent.

The Proposed Project performs differently under 2025 Cumulative Conditions compared to 2025 Project Conditions because of the expanded garage at the Dublin/Pleasanton Station, which attracts more travelers using routes other than I-580, such as those coming from Danville using Dougherty Road.

Therefore, the Proposed Project would have a less-than-significant impact related to general-purpose lane freeway segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(LS)**

**DMU Alternative.** For the DMU Alternative under 2025 Cumulative Conditions, four general-purpose freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions, and the alternative would not increase the V/C ratio of those segments by more than 2 percent. Therefore, the DMU Alternative would have a less-than-significant impact related to general-purpose lane freeway segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2025 Cumulative Conditions, five general-purpose freeway segments would operate at unacceptable levels during one of the peak periods. The Express Bus/BRT Alternative would increase the V/C ratio of one general-purpose freeway segment already operating at unacceptable LOS. However, compared with No Project Conditions, the Express Bus/BRT Alternative would not increase the V/C ratio of that segment by more than 2 percent. Therefore, impacts under the Express Bus/BRT Alternative related to general-purpose lane freeway segments under 2025 Cumulative Conditions would be less than significant, and no mitigation measures are required. **(LS)**

**TABLE 3.B-52 AM WESTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.971 | E | 0.982 | E | 0.980 | E | 0.973 | E | 0.974 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | E | 0.995 | E | 0.997 | E | 0.999 | *F* | *1.001* | *F* | *1.002* |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.004 | F | 1.006 | F | 1.007 | F | 1.007 | F | 1.008 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.975 | E | 0.969 | E | 0.974 | E | 0.978 | E | 0.976 |
| 5 | Airway Boulevard | Isabel Avenue | F | 1.037 | E | 0.997 | F | 1.025 | F | 1.044 | F | 1.041 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.051 | F | 1.035 | F | 1.043 | F | 1.055 | F | 1.055 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.984 | E | 0.975 | E | 0.976 | E | 0.987 | E | 0.988 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.978 | E | 0.980 | E | 0.972 | E | 0.979 | E | 0.981 |
| 9 | Vasco Road | Greenville Road | E | 0.977 | E | 0.973 | E | 0.974 | E | 0.979 | E | 0.977 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | F | 1.038 | F | 1.038 | F | 1.031 | F | 1.039 | F | 1.041 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
*Italic*/gray shading indicates policy-exempt intersections having a less-than-significant impact.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-53 PM WESTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.634 | C | 0.639 | C | 0.641 | C | 0.635 | C | 0.642 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | C | 0.630 | C | 0.614 | C | 0.628 | C | 0.632 | C | 0.638 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | C | 0.659 | C | 0.645 | C | 0.659 | C | 0.661 | C | 0.666 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | C | 0.623 | C | 0.609 | C | 0.622 | C | 0.625 | C | 0.631 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.545 | B | 0.525 | B | 0.541 | B | 0.551 | B | 0.552 |
| 6 | Isabel Avenue | Livermore Avenue | C | 0.636 | C | 0.622 | C | 0.626 | C | 0.639 | C | 0.629 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.513 | B | 0.525 | B | 0.525 | B | 0.513 | B | 0.519 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | C | 0.586 | C | 0.603 | C | 0.605 | C | 0.589 | C | 0.602 |
| 9 | Vasco Road | Greenville Road | B | 0.578 | B | 0.578 | B | 0.579 | B | 0.577 | C | 0.584 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | C | 0.603 | C | 0.623 | C | 0.625 | C | 0.607 | C | 0.614 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-54 AM EASTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.471 | B | 0.466 | B | 0.466 | B | 0.470 | B | 0.472 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.532 | B | 0.522 | B | 0.528 | B | 0.530 | B | 0.535 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.567 | B | 0.557 | B | 0.563 | B | 0.564 | B | 0.570 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.547 | B | 0.537 | B | 0.543 | B | 0.544 | B | 0.549 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.488 | B | 0.459 | B | 0.482 | B | 0.486 | B | 0.490 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.537 | B | 0.545 | B | 0.543 | B | 0.536 | B | 0.537 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.519 | B | 0.544 | B | 0.535 | B | 0.519 | B | 0.518 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.567 | C | 0.602 | C | 0.583 | B | 0.566 | B | 0.568 |
| 9 | Vasco Road | Greenville Road | B | 0.571 | C | 0.584 | B | 0.574 | B | 0.573 | B | 0.573 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | B | 0.444 | B | 0.455 | B | 0.446 | B | 0.447 | B | 0.446 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-55 PM EASTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.714 | C | 0.709 | C | 0.707 | C | 0.713 | C | 0.719 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.899 | D | 0.895 | D | 0.894 | D | 0.892 | E | 0.901 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | E | 0.954 | E | 0.939 | E | 0.951 | E | 0.946 | E | 0.953 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.970 | E | 0.946 | E | 0.964 | E | 0.961 | E | 0.974 |
| 5 | Airway Boulevard | Isabel Avenue | E | 0.953 | E | 0.933 | E | 0.953 | E | 0.949 | E | 0.958 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.037 | F | 1.042 | F | 1.050 | F | 1.037 | F | 1.042 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.922 | E | 0.941 | E | 0.944 | E | 0.920 | E | 0.931 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.903 | E | 0.922 | E | 0.920 | E | 0.902 | E | 0.910 |
| 9 | Vasco Road | Greenville Road | D | 0.892 | E | 0.918 | E | 0.916 | D | 0.890 | E | 0.904 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.817 | D | 0.835 | D | 0.832 | D | 0.817 | D | 0.823 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**Enhanced Bus Alternative.** For the Enhanced Bus Alternative under 2025 Cumulative Conditions, five general-purpose freeway segments would operate at unacceptable levels during one of the peak periods. The Enhanced Bus Alternative would increase the V/C ratio of one general-purpose freeway segment already operating at unacceptable LOS. However, compared with No Project Conditions, the Enhanced Bus Alternative would not increase the V/C ratio of that segment by more than 2 percent. Therefore, impacts under the Enhanced Bus Alternative related to general-purpose lane freeway segments under 2025 Cumulative Conditions would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to general-purpose lane freeway segments under 2025 Cumulative Conditions, and no mitigation measures are required.

***Impact TRAN-16(CU): General-Purpose freeway segments operating at unacceptable LOS, under 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Tables 3.B-56, 3.B-57, 3.B-58, and 3.B-59 below present the results of the General-purpose freeway segment LOS analysis for 2040, for the Proposed Project and Build Alternatives.

**No Project Alternative.** As described in **Impact TRAN-4** above, the No Project Alternative would have no impacts related to general purpose lane freeway segments during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project.** As described in **Impact TRAN-4**, the Proposed Project in 2040 would slightly reduce vehicle volumes on I-580 between Isabel Avenue and Hacienda Drive. East of Isabel Avenue, a small increase of vehicles on I-580 would result from travelers drawn to BART rather than ACE, and thus would require the use of I-580 to reach the Isabel Station. Under Cumulative Conditions, the expanded parking at the Dublin/Pleasanton Station would attract a small number of additional vehicles back onto I-580 between the Dublin/Pleasanton Station and the Isabel Station. Additionally, the INP land use growth would result in additional vehicles on I-580 both east and west of Isabel Avenue.

**TABLE 3.B-56 AM WESTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.981 | E | 0.978 | E | 0.980 | E | 0.983 | E | 0.983 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | F | 1.004 | E | 0.994 | E | 0.996 | F | 1.006 | F | 1.007 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.020 | F | 1.011 | F | 1.013 | F | 1.023 | F | 1.022 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.995 | E | 0.967 | E | 0.979 | E | 0.997 | E | 0.997 |
| 5 | Airway Boulevard | Isabel Avenue | F | 1.064 | F | 1.027 | F | 1.050 | F | 1.067 | F | 1.068 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.103 | **F** | **1.166** | **F** | **1.157** | F | 1.105 | F | 1.104 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | F | 1.026 | **F** | **1.086** | **F** | **1.065** | F | 1.026 | F | 1.024 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | F | 1.037 | **F** | **1.092** | **F** | **1.072** | F | 1.035 | F | 1.037 |
| 9 | Vasco Road | Greenville Road | F | 1.071 | **F** | **1.130** | **F** | **1.099** | F | 1.068 | F | 1.069 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | F | 1.056 | **F** | **1.120** | **F** | **1.084** | F | 1.061 | F | 1.060 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-57 PM WESTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.748 | D | 0.765 | D | 0.769 | C | 0.746 | C | 0.749 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.758 | D | 0.764 | D | 0.768 | D | 0.757 | D | 0.757 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | D | 0.780 | D | 0.796 | D | 0.800 | D | 0.779 | D | 0.780 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | D | 0.754 | D | 0.777 | D | 0.788 | D | 0.750 | D | 0.756 |
| 5 | Airway Boulevard | Isabel Avenue | C | 0.664 | C | 0.683 | C | 0.687 | C | 0.665 | C | 0.667 |
| 6 | Isabel Avenue | Livermore Avenue | D | 0.771 | D | 0.763 | D | 0.768 | D | 0.768 | D | 0.772 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | C | 0.738 | C | 0.719 | C | 0.732 | C | 0.738 | C | 0.737 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | D | 0.826 | D | 0.837 | D | 0.836 | D | 0.828 | D | 0.827 |
| 9 | Vasco Road | Greenville Road | D | 0.776 | D | 0.791 | D | 0.790 | D | 0.778 | D | 0.776 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.750 | D | 0.764 | D | 0.761 | D | 0.752 | D | 0.750 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-58 AM EASTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.548 | B | 0.567 | B | 0.571 | B | 0.545 | B | 0.548 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | C | 0.651 | C | 0.662 | C | 0.666 | C | 0.650 | C | 0.652 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | C | 0.668 | C | 0.684 | C | 0.689 | C | 0.666 | C | 0.669 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | C | 0.653 | C | 0.680 | C | 0.687 | C | 0.652 | C | 0.655 |
| 5 | Airway Boulevard | Isabel Avenue | C | 0.588 | B | 0.565 | C | 0.578 | C | 0.588 | C | 0.591 |
| 6 | Isabel Avenue | Livermore Avenue | C | 0.633 | C | 0.617 | C | 0.623 | C | 0.636 | C | 0.637 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | C | 0.628 | C | 0.644 | C | 0.640 | C | 0.631 | C | 0.631 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | D | 0.766 | D | 0.779 | D | 0.776 | D | 0.766 | D | 0.765 |
| 9 | Vasco Road | Greenville Road | C | 0.674 | C | 0.690 | C | 0.685 | C | 0.600 | C | 0.674 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | B | 0.567 | C | 0.579 | C | 0.576 | B | 0.568 | B | 0.567 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-59 PM EASTBOUND I-580 GENERAL-PURPOSE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | C | 0.684 | C | 0.684 | C | 0.681 | C | 0.684 | C | 0.686 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | E | 0.940 | E | 0.937 | E | 0.936 | E | 0.940 | E | 0.941 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | E | 0.976 | E | 0.976 | E | 0.976 | E | 0.978 | E | 0.979 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.970 | E | 0.974 | E | 0.974 | E | 0.967 | E | 0.970 |
| 5 | Airway Boulevard | Isabel Avenue | E | 0.992 | E | 0.995 | **F** | **1.008** | E | 0.992 | E | 0.995 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.083 | **F** | **1.145** | **F** | **1.150** | F | 1.086 | F | 1.085 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | F | 1.013 | **F** | **1.057** | **F** | **1.075** | F | 1.011 | F | 1.011 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | F | 1.016 | **F** | **1.060** | **F** | **1.073** | F | 1.017 | F | 1.020 |
| 9 | Vasco Road | Greenville Road | E | 0.957 | E | 0.993 | **F** | **1.011** | E | 0.950 | E | 0.958 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | D | 0.816 | D | 0.845 | D | 0.858 | D | 0.817 | D | 0.817 |

Notes: LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates segments that operate at unacceptable levels.
Source: Cambridge Systematics, 2017.

For the Proposed Project under 2040 Cumulative Conditions, five general-purpose freeway segments would have a significant impact compared to No Project Conditions. Impacts would occur at the following segments:

- **Isabel Avenue to Livermore Avenue General-Purpose (Segment #6).** This segment would operate at a V/C ratio of 1.166 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.145 and LOS F during the PM peak hour in the eastbound direction.
- **Livermore Avenue to Springtown Boulevard General-Purpose (Segment #7).** This segment would operate at a V/C ratio of 1.086 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.057 and LOS F during the PM peak hour in the eastbound direction.
- **Springtown Boulevard to Vasco Road General-Purpose (Segment #8).** This segment would operate at a V/C ratio of 1.092 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.060 and LOS F during the PM peak hour in the eastbound direction.
- **Vasco Road to Greenville Road General-Purpose (Segment #9).** This segment would operate at a V/C ratio of 1.130 and LOS F during the AM peak hour in the westbound direction.
- **Greenville Road to Carroll Road General-Purpose (Segment #10).** This segment would operate at a V/C ratio of 1.120 and LOS F during the AM peak hour in the westbound direction.

Typical mitigation measures that would address this type of significant impact entail operational improvements to the freeway, such as adding or modifying ramp metering, adding express lanes, and constructing other capacity enhancements such as additional travel lanes. The transportation analysis already accounts for these types of planned and programed operational improvements along the study area segments of I-580, as described in the No Project Conditions subsection above.

No additional improvements would be feasible to address this significant impact. Specifically, while adding travel lanes to I-580 would increase the capacity of the freeway and reduce this impact, physical constraints and the existing ROW along the affected freeway segment make this infeasible. For example, widening I-580 would conflict with bridge columns at Vasco Road and would impact homes, businesses, and/or an existing park (Northfront Park). Furthermore, adding travel lanes can lead to additional social and environmental impacts such as induced travel demand (e.g., increased passenger vehicles on the roadway because of greater freeway capacity). The additional passenger vehicles would have adverse environmental impacts, including degradation of air quality, increased noise from vehicles, and reductions in transit use, as less congestion or reduced driving time may make driving more attractive than transit.

Therefore, impacts for the Proposed Project related to general-purpose lane freeway segments under 2040 Cumulative Conditions would be significant and unavoidable, and no mitigation measures are feasible. **(SU)**

**DMU Alternative.** The DMU Alternative under 2040 Cumulative Conditions would result in similar traffic shifts as the Proposed Project, but with smaller magnitude.

Under the DMU Alternative in 2040, six general-purpose freeway segments would have a significant impact compared to No Project Conditions. Impacts would occur at the following segments:

- **Airway Boulevard to Isabel Avenue General-Purpose (Segment #5)**. This segment would operate at a V/C ratio of 1.008 and LOS F during the PM peak hour in the eastbound direction.
- **Isabel Avenue to Livermore Avenue General-Purpose (Segment #6)**. This segment would operate at a V/C ratio of 1.157 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.150 and LOS F during the PM peak hour in the eastbound direction.
- **Livermore Avenue to Springtown Boulevard General-Purpose (Segment #7)**. This segment would operate at a V/C ratio of 1.065 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.075 and LOS F during the PM peak hour in the eastbound direction.
- **Springtown Boulevard to Vasco Road General-Purpose (Segment #8)**. This segment would operate at a V/C ratio of 1.072 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.073 and LOS F during the PM peak hour in the eastbound direction.
- **Vasco Road to Greenville Road General-Purpose (Segment #9)**. This segment would operate at a V/C ratio of 1.099 and LOS F during the AM peak hour in the westbound direction and a V/C ratio of 1.011 and LOS F during the PM peak hour in the eastbound direction.
- **Greenville Road to Carroll Road General-Purpose (Segment #10)**. This freeway segment would operate at a V/C ratio of 1.084 and LOS F during the AM peak hour in the westbound direction.

Potential mitigation measures for this significant impact would include capacity enhancements and operational improvements. As described in the No Project Conditions subsection above, this analysis already accounts for planned and programmed operational improvements along the study area segments of I-580.

Additional improvements, such as capacity enhancement, are infeasible for the affected freeway segments. As described for the Proposed Project above, adding general-purpose

lanes to I-580 is infeasible due to physical constraints and would have adverse impacts to existing uses along the affected freeway segments. In addition, social and environmental impacts from induced travel demand, including degradation of air quality, increased noise, and reductions in transit use would result from adding capacity to I-580. Therefore, under 2040 Cumulative Conditions, the DMU Alternative would have a significant and unavoidable impact on general-purpose lane freeway segments, similar to the Proposed Project, and no mitigation measures are feasible. **(SU)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2040 Cumulative Conditions, eight express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions. Therefore, the Express Bus/BRT Alternative would have no impacts related to general purpose lane freeway segments under 2040 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** For the Enhanced Bus Alternative under 2040 Cumulative Conditions, eight express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions. Therefore, the Enhanced Bus Alternative would have no impacts related to general purpose lane freeway segments under 2040 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have significant and unavoidable cumulative effects on general-purpose lane freeway segments as no mitigations are feasible. The Express Bus/BRT Alternative and Enhanced Bus Alternative would not contribute to cumulative impacts on general-purpose lane freeway segments and no mitigation measures are required.

***Impact TRAN-17(CU): HOV/express lane freeway segments operating at unacceptable LOS, under 2025 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Tables 3.B-60, 3.B-61, 3.B-62, and 3.B-63 below present the results of the HOV/express lane freeway segment LOS analysis for 2025, for the Proposed Project and Build Alternatives.

**No Project Alternative.** As described in **Impact TRAN-5** above, the No Project Alternative would have no impacts associated with a HOV/express lane freeway segments operating at unacceptable LOS. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**TABLE 3.B-60 AM WESTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | E | 0.978 | E | 0.968 | E | 0.974 | E | 0.965 | E | 0.976 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | F | 1.014 | F | 1.004 | F | 1.013 | F | 1.001 | F | 1.015 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | F | 1.024 | F | 1.011 | F | 1.019 | F | 1.010 | F | 1.030 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | E | 0.990 | E | 0.974 | E | 0.988 | E | 0.982 | E | 0.993 |
| 5 | Airway Boulevard | Isabel Avenue | F | 1.044 | E | 0.994 | F | 1.032 | F | 1.030 | F | 1.045 |
| 6 | Isabel Avenue | Livermore Avenue | F | 1.055 | F | 1.045 | F | 1.055 | F | 1.047 | F | 1.062 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | E | 0.994 | E | 0.993 | E | 0.994 | E | 0.987 | E | 0.994 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | E | 0.981 | E | 0.991 | E | 0.985 | E | 0.975 | E | 0.990 |
| 9 | Vasco Road | Greenville Road | D | 0.866 | D | 0.869 | D | 0.869 | D | 0.854 | D | 0.860 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-61 PM WESTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.449 | B | 0.431 | B | 0.431 | B | 0.451 | B | 0.421 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.448 | B | 0.429 | B | 0.429 | B | 0.450 | B | 0.419 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.474 | B | 0.450 | B | 0.455 | B | 0.476 | B | 0.450 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.473 | B | 0.449 | B | 0.453 | B | 0.475 | B | 0.447 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.426 | B | 0.414 | B | 0.410 | B | 0.430 | B | 0.406 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.421 | B | 0.411 | B | 0.404 | B | 0.425 | B | 0.400 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.366 | B | 0.362 | B | 0.356 | B | 0.368 | A | 0.346 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.356 | B | 0.353 | A | 0.346 | B | 0.359 | A | 0.336 |
| 9 | Vasco Road | Greenville Road | A | 0.180 | A | 0.240 | A | 0.244 | A | 0.199 | A | 0.207 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-62 AM EASTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.291 | A | 0.203 | A | 0.247 | A | 0.299 | A | 0.293 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.293 | A | 0.204 | A | 0.249 | A | 0.301 | A | 0.295 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.147 | A | 0.102 | A | 0.125 | A | 0.151 | A | 0.148 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.147 | A | 0.102 | A | 0.125 | A | 0.151 | A | 0.148 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.147 | A | 0.103 | A | 0.125 | A | 0.151 | A | 0.148 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.147 | A | 0.103 | A | 0.125 | A | 0.151 | A | 0.148 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.146 | A | 0.102 | A | 0.124 | A | 0.150 | A | 0.146 |
| 9 | Vasco Road | Greenville Road | A | 0.000 | A | 0.000 | A | 0.000 | A | 0.000 | A | 0.000 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-63 PM EASTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | D | 0.827 | D | 0.785 | D | 0.769 | D | 0.829 | D | 0.773 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | D | 0.846 | D | 0.805 | D | 0.785 | D | 0.847 | D | 0.788 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.442 | B | 0.417 | B | 0.408 | B | 0.443 | B | 0.411 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.398 | B | 0.376 | B | 0.367 | B | 0.400 | B | 0.369 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.433 | B | 0.411 | B | 0.400 | B | 0.436 | B | 0.399 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.402 | B | 0.377 | B | 0.367 | B | 0.407 | B | 0.372 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | B | 0.364 | A | 0.342 | A | 0.334 | B | 0.370 | A | 0.338 |
| 9 | Vasco Road | Greenville Road | C | 0.624 | C | 0.589 | B | 0.575 | C | 0.634 | C | 0.590 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**Conventional BART Project.** For the Proposed Project under 2025 Cumulative Conditions, three express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under the No Project Conditions. Therefore, the Proposed Project would have no impacts related HOV/express lane segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**DMU Alternative.** For the DMU Alternative under 2025 Cumulative Conditions, four express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions. Therefore, the DMU Alternative would have no impacts related to HOV/express lane segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2025 Cumulative Conditions, four express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions. Therefore, the Express Bus/BRT Alternative would have no impacts related to HOV/express lane segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** For the Enhanced Bus Alternative under 2025 Cumulative Conditions, four express lane freeway segments would operate at unacceptable levels during one of the peak periods. However, these segments would operate no worse than under No Project Conditions. Therefore, the Enhanced Bus Alternative would have no impacts related to HOV/express lane segments under 2025 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to HOV/express lane freeway segments under 2025 Cumulative Conditions, and no mitigation measures are required.

***Impact TRAN-18(CU): HOV/express lane freeway segments operating at unacceptable LOS, under 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact TRAN-6** above, the No Project Alternative would have no impacts related to HOV/express lane freeway segments during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Alternatives.** Under 2040 Cumulative Conditions, the HOV policy is expected to be three persons per vehicle, rather than the current two persons per vehicle. The analysis showed that, under this policy, fewer vehicles would qualify to use the HOV/express lanes, causing them to operate at an improved LOS in 2040 compared with 2025.

Tables 3.B-64, 3.B-65, 3.B-66, and 3.B-67 below presents the results of the HOV/express lane freeway segment LOS analysis under 2040 Cumulative Conditions, for the Proposed Project and Alternatives.

Under the Proposed Project and Alternatives, all HOV/express lane freeway segments would operate at acceptable levels in the 2040 cumulative analysis. **(NI)**

**TABLE 3.B-64 AM WESTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | B | 0.466 | B | 0.444 | B | 0.455 | B | 0.463 | B | 0.465 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | B | 0.450 | B | 0.429 | B | 0.440 | B | 0.447 | B | 0.450 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | B | 0.446 | B | 0.425 | B | 0.437 | B | 0.443 | B | 0.446 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | B | 0.435 | B | 0.416 | B | 0.426 | B | 0.434 | B | 0.436 |
| 5 | Airway Boulevard | Isabel Avenue | B | 0.399 | B | 0.386 | B | 0.395 | B | 0.395 | B | 0.398 |
| 6 | Isabel Avenue | Livermore Avenue | B | 0.396 | B | 0.383 | B | 0.398 | B | 0.394 | B | 0.394 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | B | 0.378 | B | 0.365 | B | 0.378 | B | 0.375 | B | 0.378 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.349 | A | 0.335 | A | 0.345 | B | 0.350 | B | 0.356 |
| 9 | Vasco Road | Greenville Road | A | 0.280 | A | 0.286 | A | 0.280 | A | 0.277 | A | 0.275 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-65 PM WESTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | A | 0.214 | A | 0.223 | A | 0.221 | A | 0.212 | A | 0.215 |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.221 | A | 0.231 | A | 0.228 | A | 0.219 | A | 0.223 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.222 | A | 0.229 | A | 0.226 | A | 0.221 | A | 0.222 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.216 | A | 0.223 | A | 0.221 | A | 0.215 | A | 0.216 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.202 | A | 0.205 | A | 0.204 | A | 0.201 | A | 0.202 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.199 | A | 0.196 | A | 0.199 | A | 0.196 | A | 0.198 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.181 | A | 0.179 | A | 0.180 | A | 0.181 | A | 0.181 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.174 | A | 0.173 | A | 0.173 | A | 0.174 | A | 0.174 |
| 9 | Vasco Road | Greenville Road | A | 0.131 | A | 0.131 | A | 0.131 | A | 0.131 | A | 0.131 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-66 AM EASTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.192 | A | 0.194 | A | 0.197 | A | 0.188 | A | 0.191 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.198 | A | 0.203 | A | 0.206 | A | 0.194 | A | 0.197 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.105 | A | 0.107 | A | 0.109 | A | 0.103 | A | 0.104 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.102 | A | 0.099 | A | 0.103 | A | 0.100 | A | 0.101 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.098 | A | 0.097 | A | 0.099 | A | 0.097 | A | 0.098 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.098 | A | 0.097 | A | 0.099 | A | 0.097 | A | 0.098 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.096 | A | 0.095 | A | 0.097 | A | 0.095 | A | 0.096 |
| 9 | Vasco Road | Greenville Road | A | 0.174 | A | 0.172 | A | 0.175 | A | 0.173 | A | 0.173 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

**TABLE 3.B-67 PM EASTBOUND I-580 HOV/EXPRESS LANE FREEWAY LEVEL OF SERVICE, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | To | From | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C | LOS | V/C |
| 1 | Dougherty Road/ Hopyard Road | Hacienda Drive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Hacienda Drive | Tassajara Road/Santa Rita Road | A | 0.232 | A | 0.227 | A | 0.226 | A | 0.234 | A | 0.232 |
| 3 | Tassajara Road/Santa Rita Road | Fallon Road/ El Charro Road | A | 0.239 | A | 0.234 | A | 0.233 | A | 0.241 | A | 0.238 |
| 4 | Fallon Road/ El Charro Road | Airway Boulevard | A | 0.129 | A | 0.128 | A | 0.127 | A | 0.127 | A | 0.128 |
| 5 | Airway Boulevard | Isabel Avenue | A | 0.124 | A | 0.124 | A | 0.125 | A | 0.122 | A | 0.122 |
| 6 | Isabel Avenue | Livermore Avenue | A | 0.128 | A | 0.135 | A | 0.135 | A | 0.127 | A | 0.128 |
| 7 | Livermore Avenue | Springtown Boulevard/ First Street | A | 0.119 | A | 0.123 | A | 0.123 | A | 0.120 | A | 0.119 |
| 8 | Springtown Boulevard/ First Street | Vasco Road | A | 0.109 | A | 0.111 | A | 0.111 | A | 0.109 | A | 0.109 |
| 9 | Vasco Road | Greenville Road | A | 0.167 | A | 0.166 | A | 0.167 | A | 0.166 | A | 0.167 |
| 10 | Greenville Road | Carroll Road/ Flynn Road | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes: N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
Source: Cambridge Systematics, 2017.

### Local Roadway Intersections

***Impact TRAN-19(CU): Intersections operating at an unacceptable LOS, under 2025 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LSM)***

Table 3.B-68 below presents the results of the intersection LOS analysis for 2025 cumulative conditions, for the Proposed Project and Build Alternatives.

**TABLE 3.B-68 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2025 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1 | Dougherty Road & Amador Valley Road[a] | AM | 30.4 | C | 32.0 | C | 37.5 | D | 30.6 | C | 30.7 | C |
| | | PM | 35.0 | D | 38.5 | D | 43.2 | D | 24.1 | C | 34.8 | C |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard[a] | AM | 43.5 | D | 52.2 | D | 50.8 | D | 44.1 | D | 44.7 | D |
| | | PM | 106.9 | F | 109.5 | F | **109.7** | **F** | **98.6** | **F** | 105.0 | F |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps[a] | AM | 11.0 | B | 11.5 | B | 11.2 | B | 11.8 | B | 11.9 | B |
| | | PM | 17.4 | B | 18.0 | B | 16.8 | B | 21.6 | C | 20.9 | C |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | AM | 37.8 | D | 38.2 | D | 41.3 | D | 35.7 | D | 35.3 | D |
| | | PM | 33.5 | C | 34.4 | C | 29.9 | C | 26.5 | C | 26.4 | C |
| 5 | Hopyard Road & Owens Road | AM | 33.0 | C | 34.4 | C | 33.5 | C | 33.3 | C | 33.2 | C |
| | | PM | 108.7 | F | *116.0* | *F* | *115.2* | *F* | 110.0 | F | 111.5 | F |
| 6 | Hopyard Road & Stoneridge Drive | AM | 30.1 | C | 30.2 | C | 30.0 | C | 30.4 | C | 30.5 | C |
| | | PM | 37.0 | D | 38.6 | D | 37.7 | D | 38.9 | D | 38.6 | D |
| 7 | Hopyard Road & Las Positas Boulevard | AM | 24.1 | C | 24.0 | C | 23.9 | C | 24.0 | C | 24.0 | C |
| | | PM | 27.2 | C | 27.2 | C | 27.8 | C | 27.2 | C | 27.7 | C |
| 8 | Willow Road & Owens Road | AM | 11.7 | B | 16.4 | B | 11.4 | B | 11.9 | B | 12.0 | B |
| | | PM | 22.7 | C | 23.2 | C | 12.9 | B | 13.0 | B | 12.9 | B |
| 9 | Hacienda Drive & Dublin Boulevard[a] | AM | 24.0 | C | 24.0 | C | 24.0 | C | 24.0 | C | 24.0 | C |
| | | PM | 29.1 | C | 28.9 | C | 29.0 | C | 29.0 | C | 29.2 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings[a] | AM | 19.2 | B | 19.2 | B | 19.2 | B | 19.2 | B | 19.2 | B |
| | | PM | 25.5 | C | 24.3 | C | 26.8 | C | 35.2 | D | 34.7 | C |
| 11 | Hacienda Drive & I-580 WB Ramps | AM | 7.4 | A | 7.1 | A | 7.4 | A | 8.8 | A | 8.7 | A |
| | | PM | 8.5 | A | 7.4 | A | 9.3 | A | 11.2 | B | 10.7 | B |

**TABLE 3.B-68 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2025 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 12 | Hacienda Drive & I-580 EB Ramps | AM | 17.4 | B | 20.8 | C | 17.0 | B | 15.9 | B | 16.2 | B |
| | | PM | 20.3 | C | 20.2 | C | 16.2 | B | 29.6 | C | 21.7 | C |
| 13 | Hacienda Drive & Owens Road | AM | 27.5 | C | 18.7 | B | 19.7 | B | 27.8 | B | 19.7 | B |
| | | PM | 32.5 | C | 31.7 | C | 39.5 | D | 30.3 | C | 33.8 | C |
| 14 | Tassajara Road & Dublin Boulevard[a] | AM | 43.0 | D | 40.9 | D | 41.7 | D | 43.5 | D | 43.4 | D |
| | | PM | 42.0 | D | 41.6 | D | 44.8 | D | 43.2 | D | 45.3 | D |
| 15 | Tassajara Road & I-580 WB Ramps[a] | AM | 8.8 | A | 9.5 | A | 8.8 | A | 10.1 | B | 10.2 | B |
| | | PM | 9.5 | A | 9.4 | A | 10.0 | A | 9.5 | A | 9.7 | A |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | AM | 17.8 | B | 18.3 | B | 17.9 | B | 18.3 | B | 18.3 | B |
| | | PM | 30.6 | C | 30.6 | C | 37.5 | D | 32.9 | C | 32.8 | C |
| 17 | Santa Rita Road & Valley Avenue | AM | 21.7 | C | 21.7 | C | 21.9 | C | 21.8 | C | 21.8 | C |
| | | PM | 45.8 | D | 50.2 | D | 48.8 | D | 49.5 | D | 49.9 | D |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | AM | 37.4 | D | 37.3 | D | 37.3 | D | 37.4 | D | 37.4 | D |
| | | PM | 32.8 | C | 32.7 | C | 32.5 | C | 32.8 | C | 32.8 | C |
| 19 | Fallon Road & Dublin Boulevard[a] | AM | 48.2 | D | 41.7 | D | 44.9 | D | 48.6 | D | 50.7 | D |
| | | PM | 21.4 | C | 20.6 | C | 21.7 | C | 21.6 | C | 22.1 | C |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps[a] | AM | 8.0 | A | 8.2 | A | 8.1 | A | 9.0 | A | 9.0 | A |
| | | PM | 9.4 | A | 9.4 | A | 9.1 | A | 8.8 | A | 9.1 | A |
| 21 | El Charro Road & I-580 EB Ramps | AM | 8.2 | A | 8.6 | A | 8.6 | A | 9.7 | A | 9.8 | A |
| | | PM | 8.2 | A | 8.2 | A | 9.1 | A | 8.8 | A | 8.1 | A |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | AM | 26.8 | C | 17.0 | B | 17.2 | B | 20.5 | C | 20.6 | C |
| | | PM | 18.3 | B | 18.1 | B | 18.0 | B | 18.3 | B | 16.9 | B |
| 23 | Stanley Boulevard & El Charro Road | AM | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] |
| | | PM | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] | N/A[2] |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | AM | 78.7 | E | 53.9 | D | **130.4** | **F** | **84.4** | **F** | **86.4** | **F** |
| | | PM | 13.6 | B | 12.2 | B | 26.5 | C | 14.0 | B | 14.8 | B |
| 25 | Airway Boulevard & I-580 WB Ramps | AM | 20.8 | C | 18.4 | B | 23.7 | C | 21.4 | C | 21.4 | C |
| | | PM | 5.4 | A | 5.1 | A | 12.3 | B | 5.4 | A | 4.2 | A |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | AM | 28.6 | C | 40.5 | D | 43.2 | D | 31.1 | C | 31.2 | C |
| | | PM | 27.9 | C | 25.8 | C | 32.5 | C | 27.6 | C | 23.4 | C |

**TABLE 3.B-68 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2025 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | AM | 22.9 | C | 24.4 | C | 24.0 | C | 25.6 | C | 23.8 | C |
| | | PM | 25.6 | C | 20.7 | C | 26.0 | C | 25.7 | C | 26.7 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | AM | 27.9 | C | 28.0 | C | 28.0 | C | 28.1 | C | 28.1 | C |
| | | PM | 25.0 | C | 25.5 | C | 27.1 | C | 25.2 | C | 25.6 | C |
| 29 | Isabel Avenue & I-580 WB Ramps | AM | 10.8 | B | 17.1 | B | 16.2 | B | 11.3 | B | 11.3 | B |
| | | PM | 9.9 | A | 9.8 | A | 9.7 | A | 9.9 | A | 12.6 | B |
| 30 | Isabel Avenue & I-580 EB Ramps | AM | 6.6 | A | 7.8 | A | 7.5 | A | 5.9 | A | 6.0 | A |
| | | PM | 6.6 | A | 8.9 | A | 9.4 | A | 6.6 | A | 5.8 | A |
| 31 | Isabel Avenue & Airway Boulevard | AM | 26.7 | C | *51.7* | *D* | 28.7 | C | 26.9 | C | 27.4 | C |
| | | PM | 31.7 | C | *67.2* | *E* | 41.4 | D | 30.7 | C | 30.5 | C |
| 32 | Isabel Avenue & Jack London Boulevard | AM | 37.1 | D | 34.5 | C | 34.7 | C | 34.4 | C | 34.3 | C |
| | | PM | 43.1 | D | *51.7* | *D* | 45.8 | D | 42.4 | D | 46.5 | D |
| 33 | Isabel Avenue Connector & Stanley Boulevard | AM | 15.7 | B | 15.7 | B | 15.8 | B | 16.2 | B | 15.8 | B |
| | | PM | 15.8 | B | 15.9 | B | 19.7 | B | 15.0 | B | 17.8 | B |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | AM | 14.1 | B | 20.5 | C | 14.9 | B | 14.1 | B | 14.1 | B |
| | | PM | 20.2 | C | 44.2 | D | 28.5 | C | 20.3 | C | 22.2 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | AM | 17.9 | B | 17.9 | B | 17.9 | B | 17.8 | B | 17.8 | B |
| | | PM | 20.5 | C | 27.7 | C | 26.1 | C | 20.5 | C | 23.4 | C |
| 36 | Murrieta Boulevard & Stanley Boulevard | AM | 40.3 | D | 38.3 | D | 37.7 | D | 40.3 | D | 37.9 | D |
| | | PM | 29.3 | C | 29.4 | C | 29.4 | C | 29.3 | C | 29.4 | C |
| 37 | Livermore Avenue & I-580 WB Ramps | AM | 21.4 | C | 24.7 | C | 21.8 | C | 21.4 | C | 21.4 | C |
| | | PM | 39.3 | D | 14.4 | B | 20.2 | C | 19.4 | B | 13.2 | B |
| 38 | Livermore Avenue & I-580 EB Ramps | AM | 17.5 | B | 10.9 | B | 17.8 | B | 17.5 | B | 17.5 | B |
| | | PM | 108.2 | F | **117.1** | **F** | 102.2 | F | 109.8 | F | 107.7 | F |
| 39 | Livermore Avenue & Portola Avenue | AM | 39.3 | D | **46.9** | **D** | 42.6 | D | 40.8 | D | 41.9 | D |
| | | PM | 37.3 | D | **52.3** | **D** | 44.1 | D | 36.3 | D | 40.5 | D |
| 40 | First Street/Springtown Boulevard & I-580 WB Ramps | AM | 16.3 | B | 12.4 | B | 11.7 | B | 16.3 | B | 16.3 | B |
| | | PM | 7.5 | A | 7.5 | A | 12.7 | B | 7.4 | A | 5.2 | A |
| 41 | First Street & I-580 EB Ramps | AM | 9.8 | A | 9.9 | A | 10.1 | B | 9.9 | A | 9.8 | A |
| | | PM | 30.4 | C | 32.0 | C | 36.0 | D | 30.5 | C | 37.6 | D |

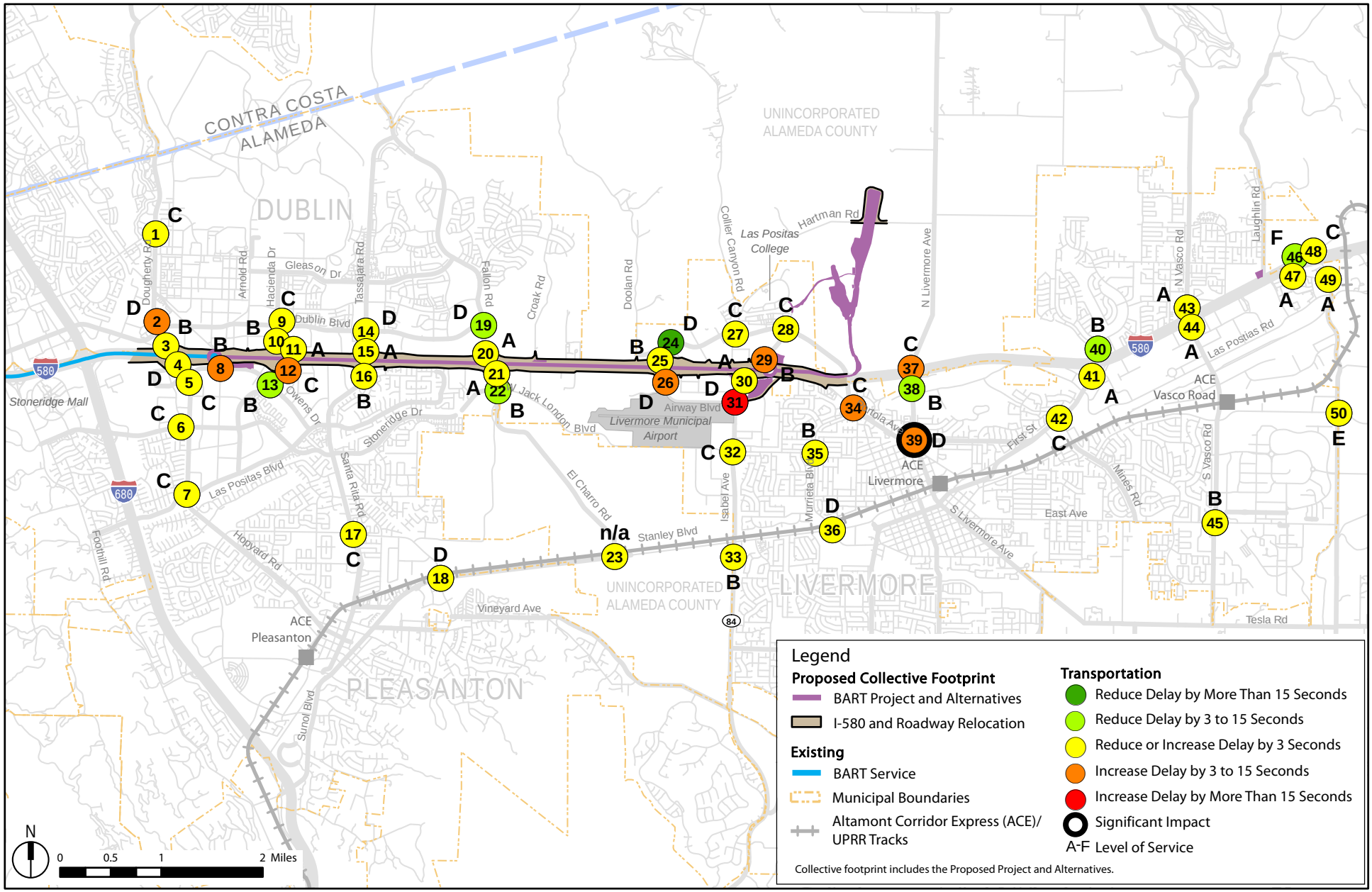
**TABLE 3.B-68 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2025 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART Project | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 42 | First Street & Mines Road | AM | 24.2 | C | 24.6 | C | 23.0 | C | 24.2 | C | 24.6 | C |
| | | PM | 48.6 | D | *57.1* | *E* | *54.9* | *D* | 49.9 | D | *54.8* | *D* |
| 43 | Vasco Road / I-580 WB Ramps | AM | 1.0 | A | 1.0 | A | 1.0 | B | 1.0 | B | 1.0 | A |
| | | PM | 1.1 | A | 1.1 | A | 1.1 | A | 1.1 | A | 1.8 | A |
| 44 | Vasco Road / I-580 EB Ramps | AM | 0.3 | A | 0.3 | A | 0.3 | A | 0.3 | A | 0.3 | A |
| | | PM | 0.7 | A | 0.7 | A | 0.7 | A | 0.7 | A | 0.7 | A |
| 45 | Vasco Road & East Avenue | AM | 18.8 | B | 18.9 | B | 18.1 | B | 18.8 | B | 19.0 | B |
| | | PM | 42.2 | D | 42.1 | D | 41.4 | D | 41.3 | D | 42.0 | D |
| 46 | Altamont Pass Road & I-580 WB Ramps | AM | 123.8 | F | 111.8 | F | 121.9 | F | 116.8 | F | 112.3 | F |
| | | PM | 7.0 | A | 6.8 | A | 6.9 | A | 6.6 | A | 6.4 | A |
| 47 | Southfront Road & I-580 EB Ramps | AM | 10.0 | A | 10.0 | A | 9.9 | A | 10.0 | A | 10.0 | A |
| | | PM | 13.8 | B | 13.7 | B | 14.0 | B | 13.9 | B | 14.6 | B |
| 48 | Greenville Road /Altamont Pass Road | AM | 35.1 | D | 32.9 | C | 38.1 | D | 33.2 | C | 33.5 | C |
| | | PM | 79.8 | E | **80.9** | **F** | **81.4** | **F** | 79.3 | E | **80.6** | **F** |
| 49 | Greenville Road & Southfront Road | AM | 8.9 | A | 8.9 | A | 8.8 | A | 8.8 | A | 8.9 | A |
| | | PM | 14.2 | B | 14.9 | B | 14.6 | B | 11.0 | B | 14.3 | B |
| 50 | Greenville Road / Patterson Pass Road | AM | 61.7 | E | 63.0 | E | 61.1 | E | 62.0 | E | 61.1 | E |
| | | PM | 132.2 | F | 120.9 | F | **138.6** | **F** | 133.6 | F | **146.0** | **F** |

Notes: EB = eastbound; WB = westbound; N/A = not applicable; LOS = level of service; V/C = volume-to-capacity ratio.
**Bold**/gray shading indicates intersections having a significant impact; i*talic*/gray shading indicates policy-exempt intersections having a less-than-significant impact.
[a] The significant impact criteria of the Cities of Dublin and Pleasanton use added vehicle trips as a metric rather than increased delay.
Source: Cambridge Systematics, 2017.

Figures 3.B-27 through 3.B-34 present the results of the intersection LOS analysis for 2025 cumulative conditions.

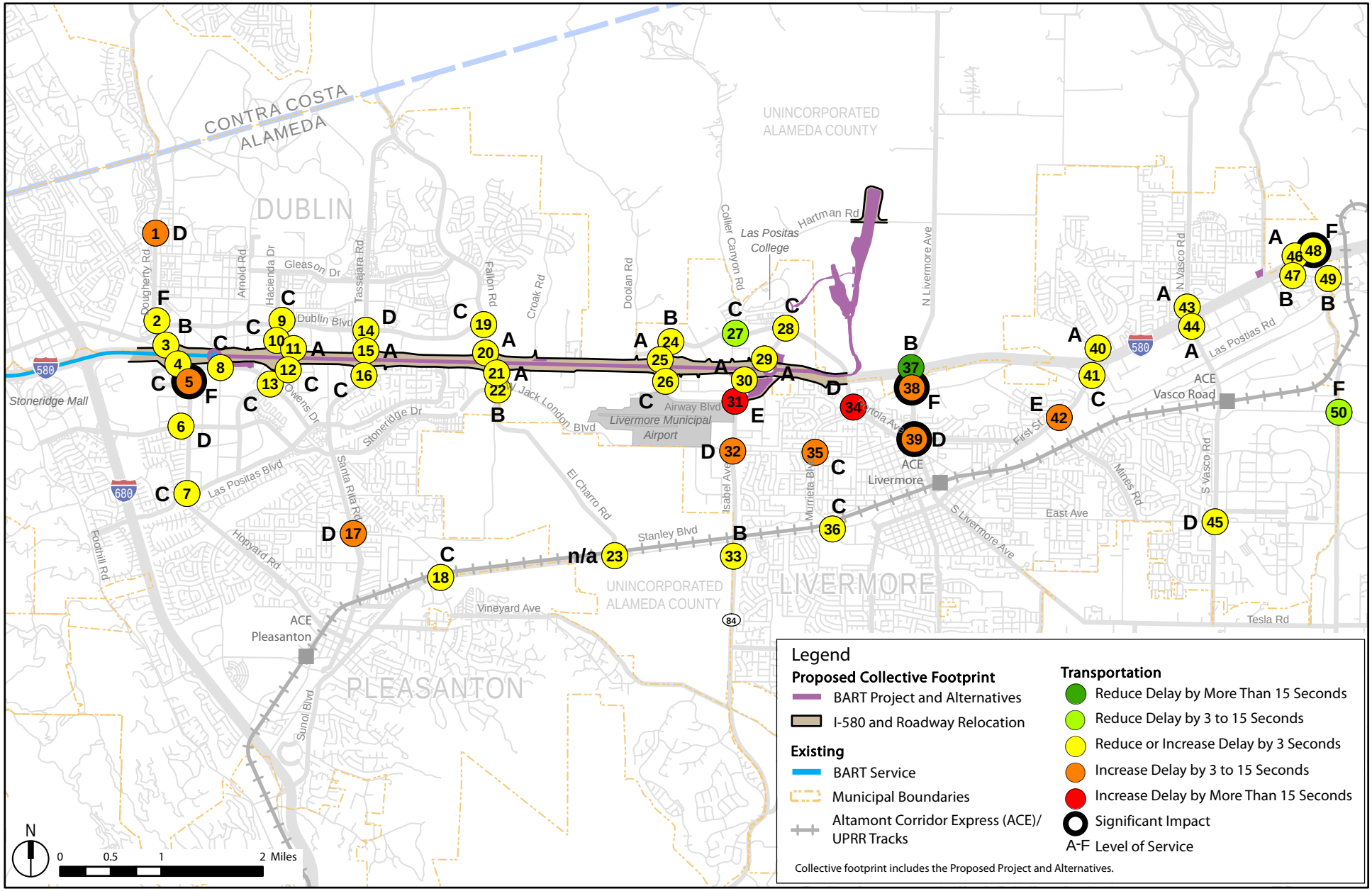
**No Project Alternative.** As described in **Impact TRAN-7** above, the No Project Alternative would have no impacts related to intersections during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

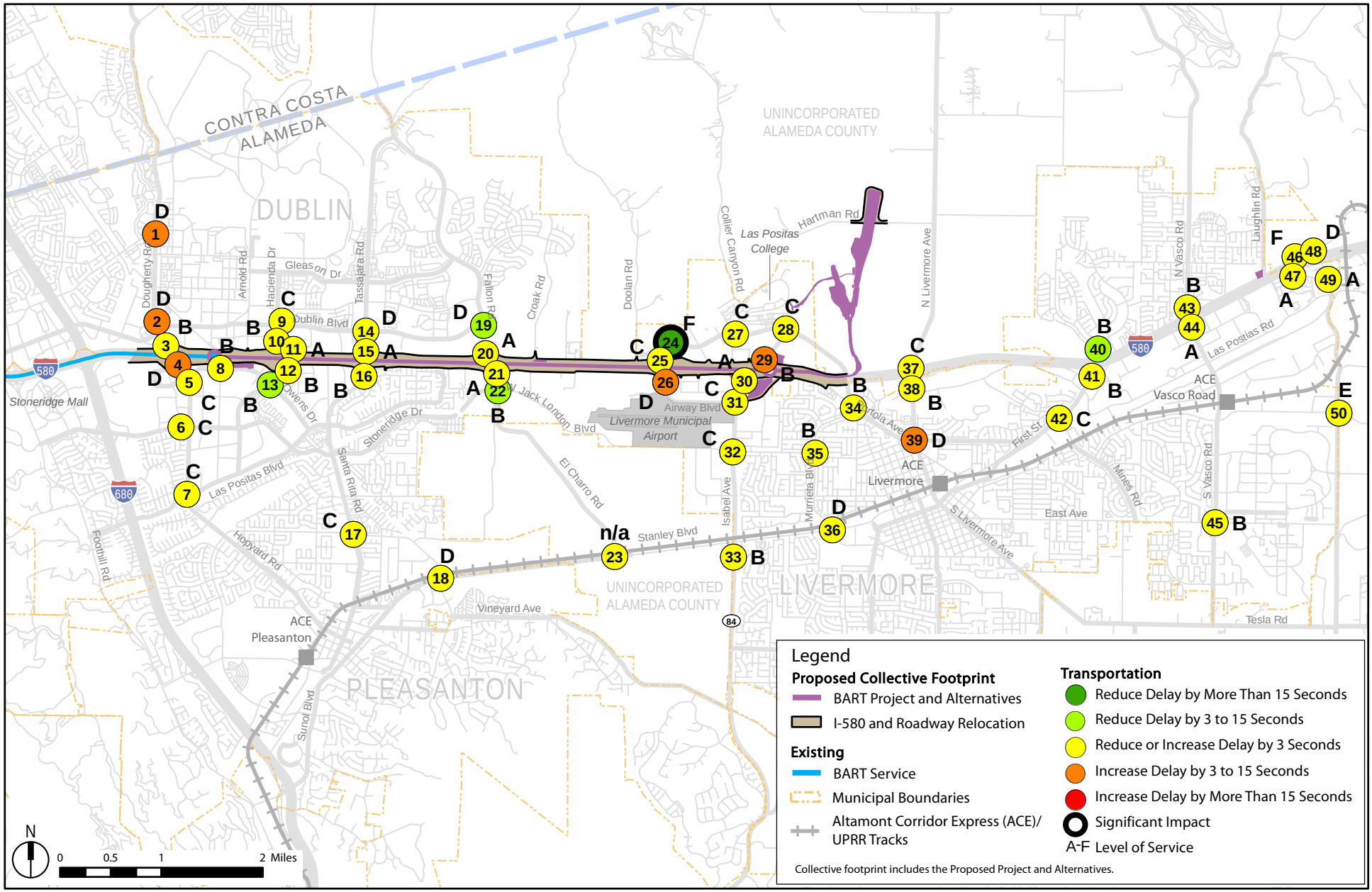
Figure 3.B-27
Transportation
Intersection LOS and Change in AM Delay
2025 Cumulative Conditions, Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

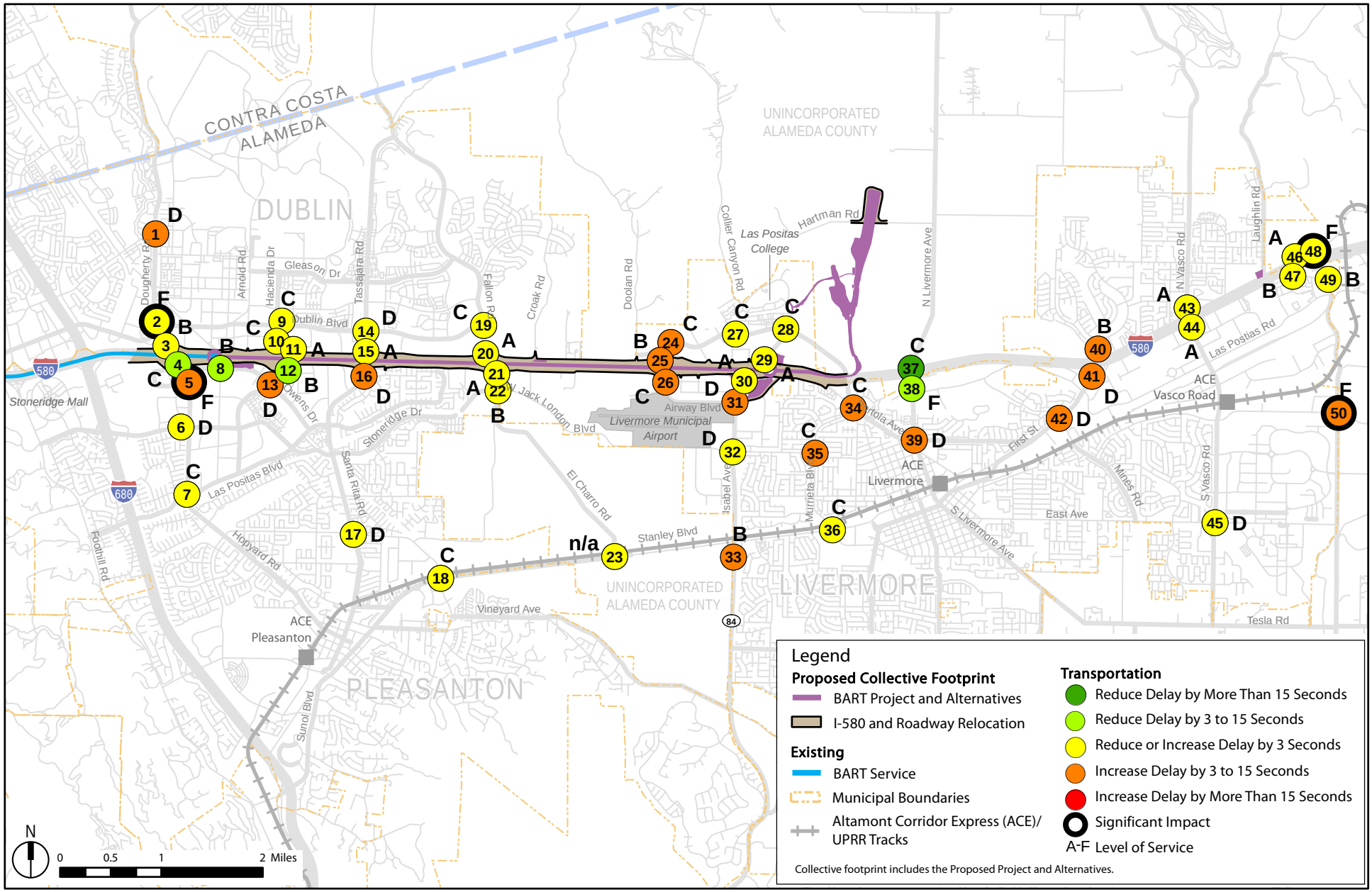
Figure 3.B-28
Transportation
Intersection LOS and Change in PM Delay
2025 Cumulative Conditions, Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

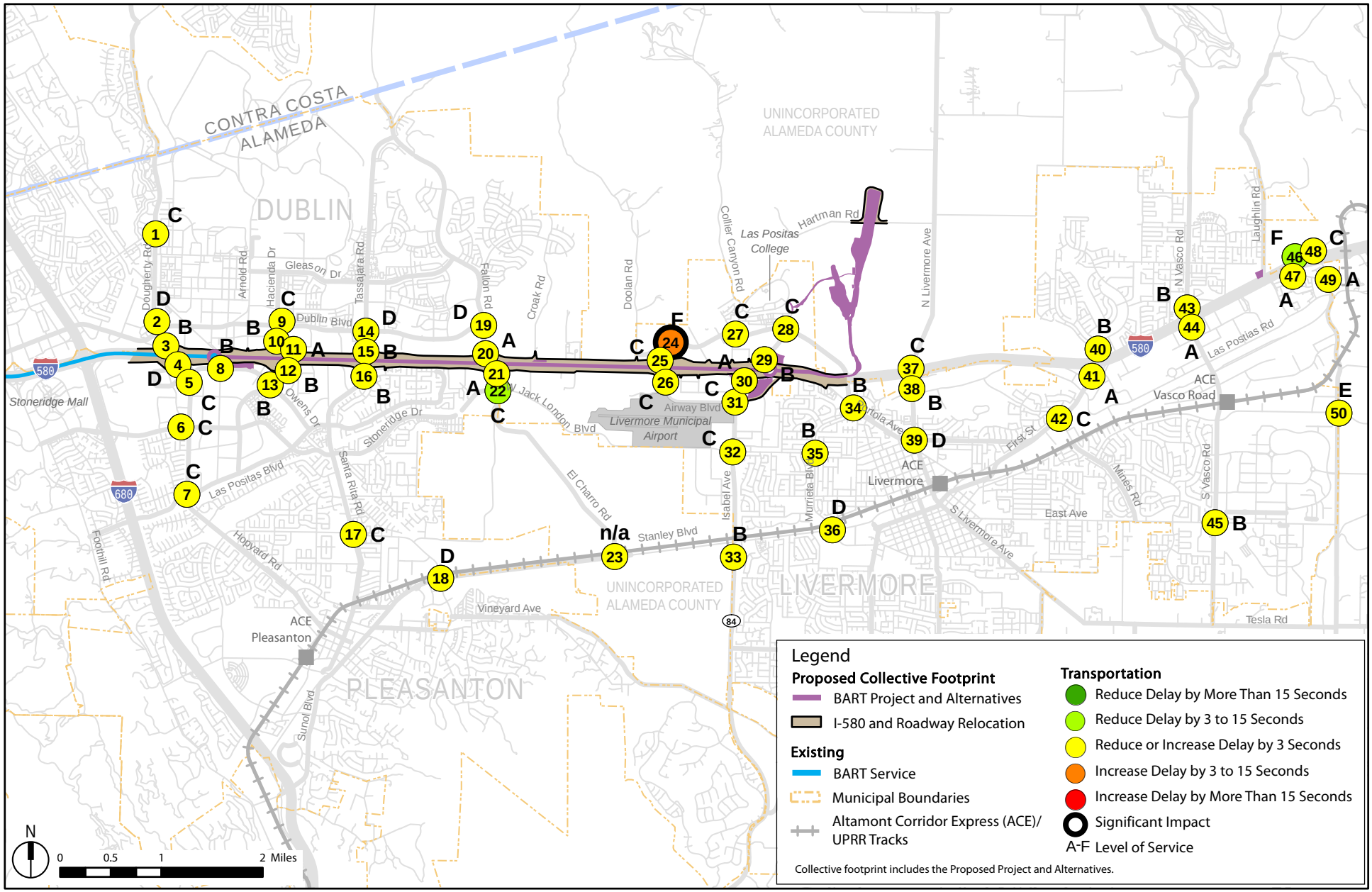
Figure 3.B-29
Transportation
Intersection LOS and Change in AM Delay
2025 Cumulative Conditions, DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

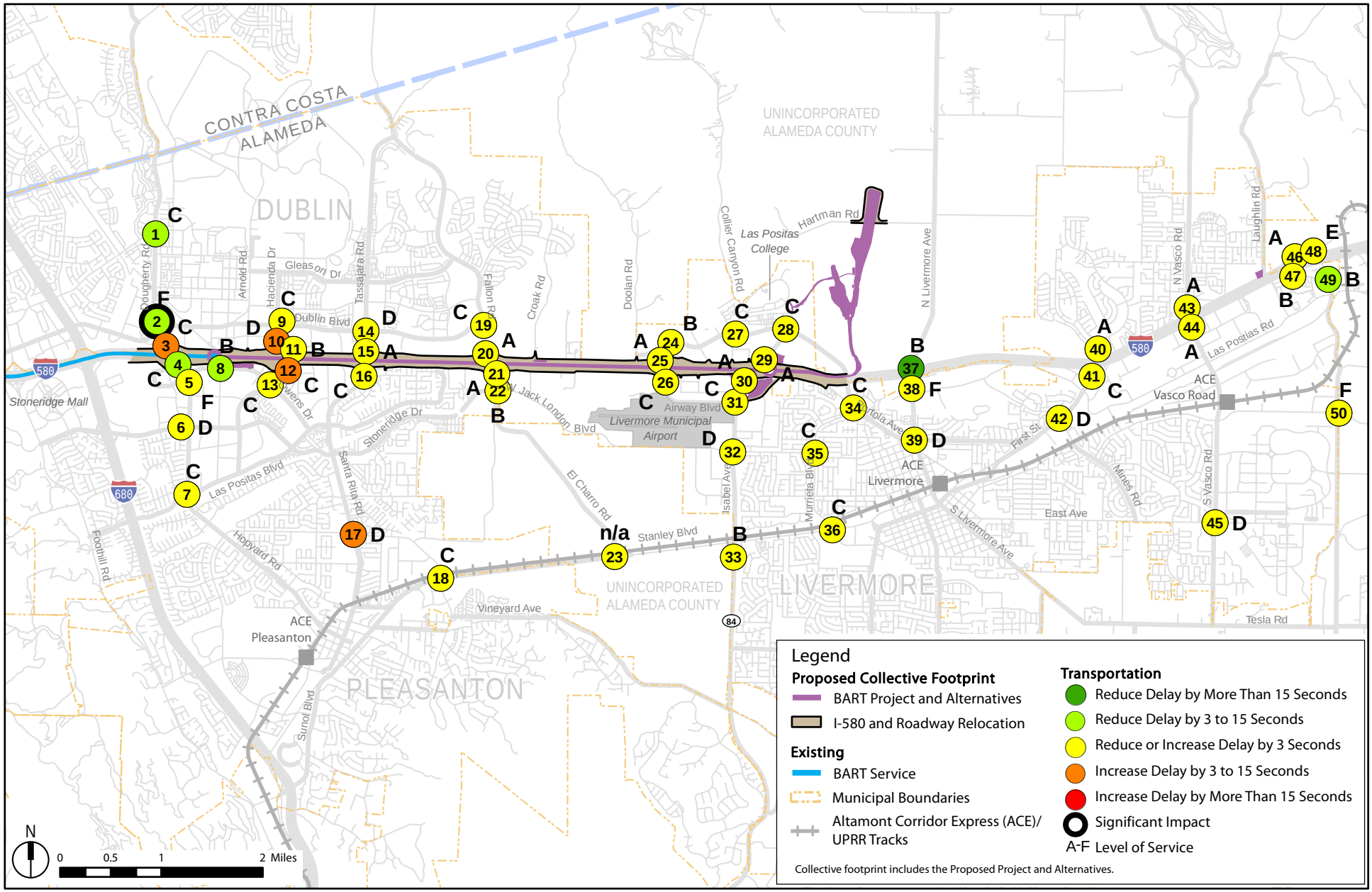
Figure 3.B-30
Transportation
Intersection LOS and Change in PM Delay
2025 Cumulative Conditions, DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

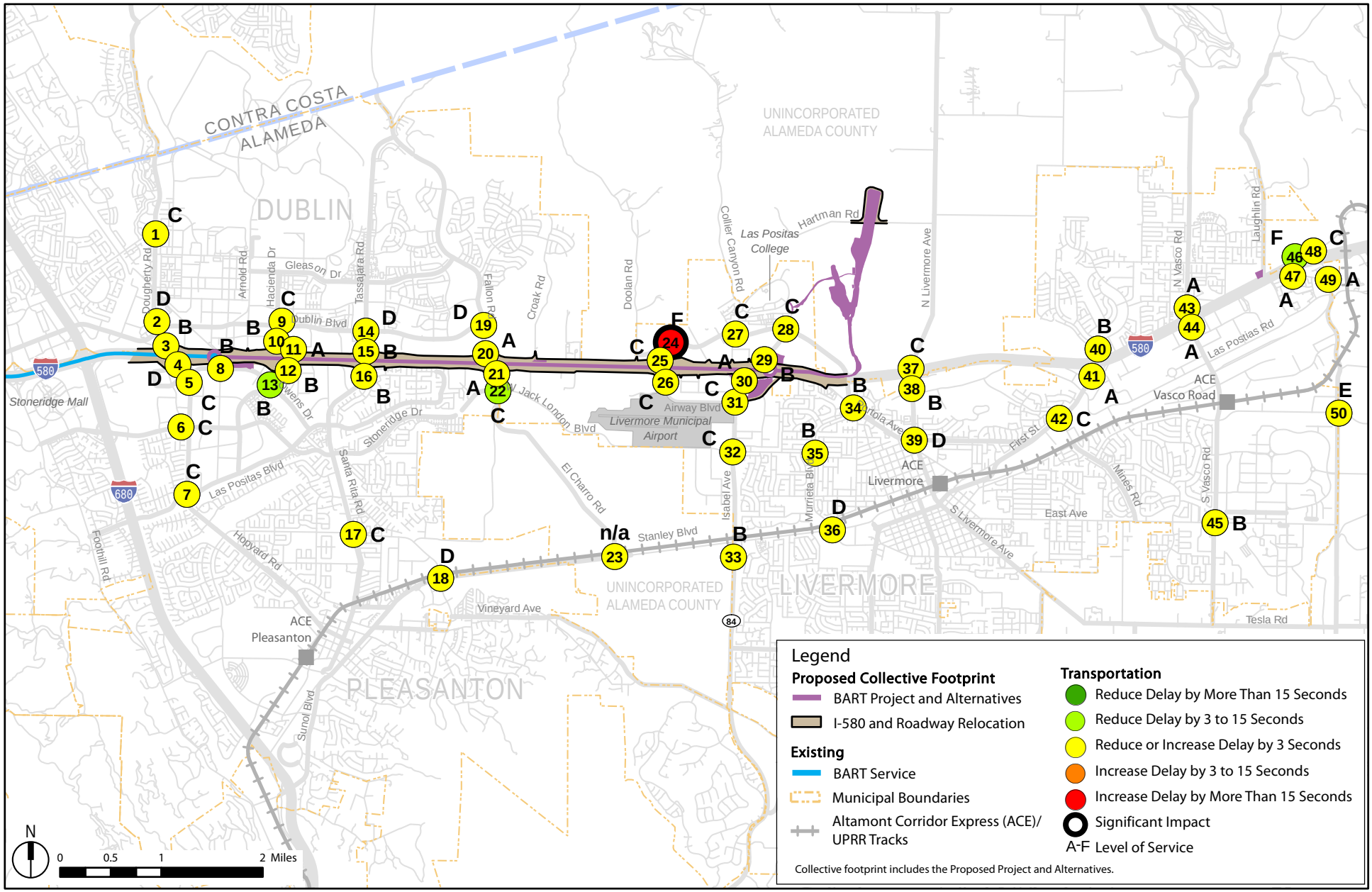
Figure 3.B-31
Transportation
Intersection LOS and Change in AM Delay
2025 Cumulative Conditions, Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

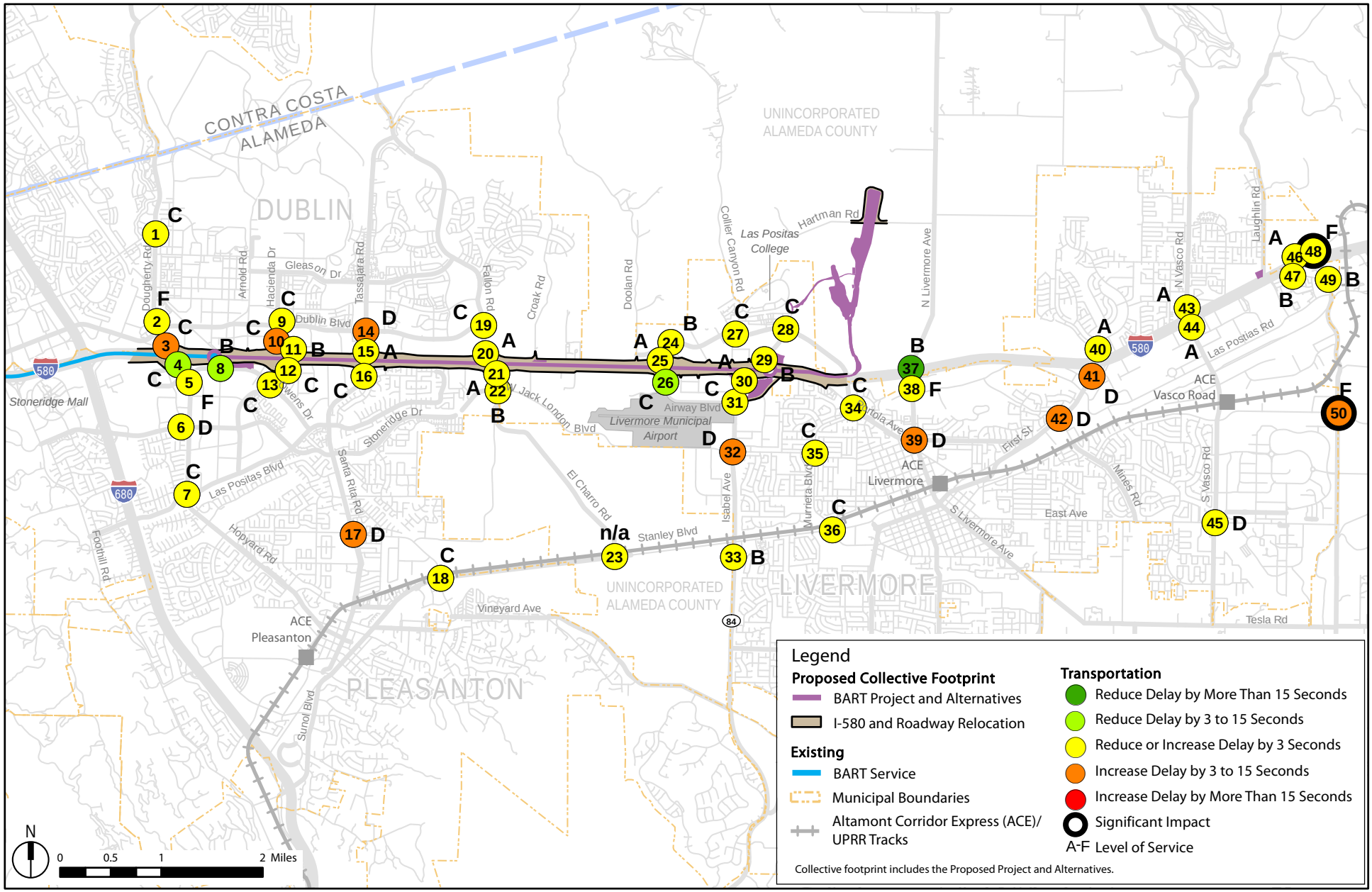
Figure 3.B-32
Transportation
Intersection LOS and Change in PM Delay
2025 Cumulative Conditions, Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-33
Transportation
Intersection LOS and Change in AM Delay
2025 Cumulative Conditions, Enhanced Bus Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-34
Transportation
Intersection LOS and Change in PM Delay
2025 Cumulative Conditions, Enhanced Bus Alternative

**Conventional BART Project.** For the Proposed Project under 2025 Cumulative Conditions, seven intersections would experience significant or less-than-significant impacts. Three of these intersections are exempt by policy from applicable LOS standards, and are therefore considered to experience less-than-significant impacts. One of the other four remaining intersections may also be exempt, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31)**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 51.7 seconds in the AM peak period and an LOS E with a delay of 67.2 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **Isabel Avenue & Jack London Boulevard (Intersection #32)**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 51.7 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.
- **First Street & Mines Road (Intersection #42)**. Under 2025 Project Conditions, this intersection would operate at an LOS E with a delay of 57.1 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following four intersections:

- **Hopyard Road & Owens Road (Intersection #5)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 116.0 seconds in the PM peak period. This intersection also has 58 additional trips under Project Conditions compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Livermore Avenue & I-580 EB Ramps (Intersection #38)**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 117.1 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

- **Livermore Avenue & Portola Avenue (Intersection #39)**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 46.9 seconds in the AM peak period and an LOS D with a delay of 52.3 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Altamont Pass Road (Intersection #48)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 80.9 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #5 and Intersection #39, impacts would be reduced to less-than-significant levels with implementation of **Mitigation Measure TRAN-19a,** which requires intersection improvements such as additional turning and through lanes. Mitigation Measure **TRAN-19a** requires the addition of a second northbound left-turn lane at Intersection #39 and full eight-phase signal operations at Intersection #5. However, these intersection improvements would not be sufficient to reduce impacts to less than significant, and further lane additions would be infeasible due to physical constraints. Impacts at Intersection #5 and Intersection #39 would be significant and unavoidable. **(SU)**

**DMU Alternative.** For the DMU Alternative under 2025 Cumulative Conditions, six intersections would experience significant impacts. One of these intersections is exempt by policy from LOS standards. One of the five other remaining intersections that experience significant impacts may also be exempt by policy, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersection is as follows:

- **First Street & Mines Road (Intersection #42)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS D with a delay of 54.9 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following five intersections:

- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 109.7 seconds in the PM peak period. This intersection also has 87 additional trips under the DMU Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.

- **Hopyard Road & Owens Road (Intersection #5)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 115.2 seconds in the PM peak period. This intersection also has 27 additional trips under the DMU Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Airway Boulevard/North Canyons Parkway (Intersection #24)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 130.4 seconds in the AM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Altamont Pass Road (Intersection #48)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 81.4 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Altamont Pass Road (Intersection #50)**. Under 2025 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 138.6 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

At Intersection #2, Intersection #24, Intersection #48, and Intersection #50, significant impacts would be reduced to a less-than-significant level with implementation of **Mitigation Measure TRAN-19b,** which requires intersection improvements such as additional turning and through lanes. Impacts at Intersection #5 could not be reduced to less than significant despite the implementation proposed in **Mitigation Measure TRAN-19b**. The impact at Intersection #5 under 2025 Cumulative Conditions would therefore be significant and unavoidable. **(SU)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2025 Cumulative Conditions, two intersections would experience significant or less-than-significant impacts. Significant impacts would occur at the following two intersections:

- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 98.6 seconds in the PM peak period. This intersection also has 56 additional trips under the Express Bus Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Airway Boulevard/North Canyons Parkway (Intersection #24)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 84.4 seconds in

the AM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

At Intersection #2 and Intersection #24, significant impacts would be reduced to less than significant with implementation of **Mitigation Measure TRAN-19c,** which requires intersection improvements such as additional turning and through lanes. **(LSM)**

**Enhanced Bus Alternative.** For the Enhanced Bus Alternative under 2025 Cumulative Conditions, four intersections would experience significant or less-than-significant impacts. One of these four intersections is exempt by policy from LOS standards.

The policy-exempt intersection is as follows:

- **First Street & Mines Road (Intersection #42)**. Under 2025 Project Conditions, this intersection would operate at an LOS D with a delay of 54.8 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following three intersections:

- **Airway Boulevard/North Canyons Parkway (Intersection #24)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 86.4 seconds in the AM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Altamont Pass Road (Intersection #48)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 80.6 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Altamont Pass Road (Intersection #50)**. Under 2025 Project Conditions, this intersection would operate at an LOS F with a delay of 146.0 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

At Intersection #24, Intersection #48, and Intersection #50, significant impacts would be reduced to less than significant with implementation of **Mitigation Measure TRAN-19d,** which requires intersection improvements such as additional turning and through lanes. **(LSM)**

**Mitigation Measures**. As described above, the Proposed Project and Build Alternatives would have potentially significant cumulative impacts to intersections under 2025 Cumulative Conditions. **Mitigation Measure TRAN-19a**, **Mitigation Measure TRAN-19b**,

**Mitigation Measure TRAN-19c**, and **Mitigation Measure TRAN-19d** would require BART to coordinate with local jurisdictions in implementing intersection improvements and contribute fair share funding. With implementation of these mitigation measures, potential impacts would be reduced to a less-than-significant level at all intersections except for Intersection #5 (Proposed Project and DMU Alternative). Mitigation of impacts at Intersection #5 and Intersection #39 to less than significant would require further lane additions, which would be infeasible due to physical constraints. Impacts at these intersections would remain significant and unavoidable.

**Mitigation Measure TRAN-19a: Improvements for Intersections #5, #38, #39, and #48 under 2025 Cumulative Conditions (Conventional BART Project)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Livermore Avenue & I-580 EB Ramps (Intersection #38) – Add a dedicated northbound right-turn lane.
- Livermore Avenue & Portola Avenue (Intersection #39) – Add a second northbound left-turn lane.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.

**Mitigation Measure TRAN-19b: Improvements for Intersections #2, #5, #24, #48, and #50 under 2025 Cumulative Conditions (DMU Alternative/EMU Option)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Airway Boulevard/Driveway & North Canyons Parkway (Intersection #24) – Convert two existing lanes to provide two northbound left-turn lanes with protected phasing.

- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

**Mitigation Measure TRAN-19c: Improvements for Intersections #2 and #24 under 2025 Cumulative Conditions (Express Bus/BRT Alternative)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Airway Boulevard/Driveway & North Canyons Parkway (Intersection #24): Convert two existing lanes to provide two northbound left-turn lanes with protected phasing.

**Mitigation Measure TRAN-19d: Improvements for Intersections #24, #48, and #50 under 2025 Cumulative Conditions (Enhanced Bus Alternative)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Airway Boulevard/Driveway & North Canyons Parkway (Intersection #24): Convert two existing lanes to provide two northbound left-turn lanes with protected phasing.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

***Impact TRAN-20(CU): Intersections operating at an unacceptable LOS, under 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: SU)***

Table 3.B-69 below presents the results of the intersection LOS analysis for 2040, for the Proposed Project and Build Alternatives.

**TABLE 3.B-69 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2040 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART (Proposed Project) | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 1 | Dougherty Road & Amador Valley Road[a] | AM | 98.1 | F | **154.2** | **F** | **143.0** | **F** | **103.4** | **F** | **104.7** | **F** |
| | | PM | 32.6 | C | 38.4 | D | 36.8 | D | 32.9 | C | 33.4 | C |
| 2 | Hopyard Road/Dougherty Road & Dublin Boulevard[a] | AM | 101.6 | F | **116.2** | **F** | **107.5** | **F** | 99.3 | F | **101.7** | **F** |
| | | PM | 147.9 | F | **177.8** | **F** | **158.4** | **F** | **152.5** | **F** | **151.4** | **F** |
| 3 | Dougherty Road/Hopyard Road & I-580 WB Ramps[a] | AM | 18.1 | B | 18.3 | B | 24.4 | C | 17.5 | B | 18.4 | B |
| | | PM | 19.1 | B | 18.5 | B | 18.5 | B | 19.1 | B | 19.2 | B |
| 4 | Hopyard Road/Dougherty Road & I-580 EB Ramps | AM | 42.5 | D | 50.5 | D | 48.9 | D | 46.7 | D | 49.1 | D |
| | | PM | 46.3 | D | 51.3 | D | 49.9 | D | 46.5 | D | 46.2 | D |
| 5 | Hopyard Road & Owens Road | AM | 32.1 | C | 33.5 | C | 33.2 | C | 31.6 | C | 31.7 | C |
| | | PM | 100.7 | F | 108.6 | F | *107.8* | *F* | *102.3* | *F* | *102.7* | *F* |
| 6 | Hopyard Road & Stoneridge Drive | AM | 32.4 | C | 35.5 | D | 33.5 | C | 33.8 | C | 33.7 | C |
| | | PM | 39.3 | D | 39.1 | D | 39.9 | D | 39.7 | D | 38.7 | D |
| 7 | Hopyard Road & Las Positas Boulevard | AM | 25.9 | C | 25.9 | C | 26.4 | C | 26.1 | C | 25.6 | C |
| | | PM | 32.4 | C | 36.2 | D | 33.3 | C | 32.8 | C | 33.1 | C |
| 8 | Willow Road & Owens Road | AM | 12.4 | B | 11.7 | B | 11.7 | B | 12.7 | B | 12.9 | B |
| | | PM | 22.4 | C | 25.3 | C | 23.3 | C | 23.5 | C | 23.3 | C |
| 9 | Hacienda Drive & Dublin Boulevard[a] | AM | 37.4 | D | 37.8 | D | 37.7 | D | 37.4 | D | 37.5 | D |
| | | PM | 31.7 | C | 34.9 | C | 32.1 | C | 32.2 | C | 32.7 | C |
| 10 | Hacienda Drive & Martinelli Boulevard/Hacienda Crossings[a] | AM | 20.2 | C | 19.8 | B | 19.6 | B | 20.2 | C | 19.9 | B |
| | | PM | 28.8 | C | 28.1 | C | 27.8 | C | 29.2 | C | 29.7 | C |
| 11 | Hacienda Drive & I-580 WB Ramps[a] | AM | 7.7 | A | 7.4 | A | 7.2 | A | 7.8 | A | 7.5 | A |
| | | PM | 8.9 | A | 8.9 | A | 8.3 | A | 8.9 | A | 9.2 | A |
| 12 | Hacienda Drive & I-580 EB Ramps | AM | 18.9 | B | 18.4 | B | 18.1 | B | 18.8 | B | 18.9 | B |
| | | PM | 20.7 | C | 22.3 | C | 21.7 | C | 21.0 | C | 20.8 | C |
| 13 | Hacienda Drive & Owens Road | AM | 23.4 | C | 23.8 | C | 23.7 | C | 23.4 | C | 23.5 | C |
| | | PM | 30.5 | C | 33.9 | C | 32.2 | C | 30.7 | C | 31.2 | C |
| 14 | Tassajara Road & Dublin Boulevard[a] | AM | 50.5 | D | 45.9 | D | 46.8 | D | 50.6 | D | 50.9 | D |
| | | PM | 46.2 | D | 46.5 | D | 44.4 | D | 46.7 | D | 47.7 | D |
| 15 | Tassajara Road & I-580 WB Ramps[a] | AM | 11.5 | B | 11.6 | B | 11.5 | B | 11.5 | B | 11.5 | B |
| | | PM | 11.8 | B | 12.8 | B | 12.6 | B | 11.7 | B | 11.8 | B |
| 16 | Santa Rita Road & I-580 EB Ramps/Pimlico Drive | AM | 19.5 | B | 19.7 | B | 19.6 | B | 19.4 | B | 19.3 | B |
| | | PM | 32.8 | C | 33.6 | C | 33.2 | C | 32.8 | C | 32.8 | C |
| 17 | Santa Rita Road & Valley Avenue | AM | 24.0 | C | 24.6 | C | 24.3 | C | 23.9 | C | 24.2 | C |
| | | PM | 77.5 | E | **81.0** | **F** | **77.9** | **E** | 78.5 | E | **79.9** | **E** |

**TABLE 3.B-69 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2040 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART (Proposed Project) | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 18 | Bernal Avenue/Valley Avenue & Stanley Boulevard | AM | 38.5 | D | 38.4 | D | 38.3 | D | 38.4 | D | 38.4 | D |
| | | PM | 32.6 | C | 32.8 | C | 32.8 | C | 32.5 | C | 32.5 | C |
| 19 | Fallon Road & Dublin Boulevard[a] | AM | 35.1 | D | 31.4 | C | 42.5 | D | 35.1 | D | 35.3 | D |
| | | PM | 30.1 | C | 29.6 | C | 29.8 | C | 23.6 | C | 23.7 | C |
| 20 | El Charro Road/Fallon Road & I-580 WB Ramps[a] | AM | 10.8 | B | 8.5 | A | 11.0 | B | 11.2 | B | 11.1 | B |
| | | PM | 9.5 | A | 9.5 | A | 10.0 | B | 10.9 | B | 10.9 | B |
| 21 | El Charro Road & I-580 EB Ramps | AM | 11.3 | B | 11.3 | B | 11.4 | B | 11.1 | B | 11.1 | B |
| | | PM | 12.0 | B | 16.0 | B | 14.5 | B | 12.1 | B | 11.9 | B |
| 22 | El Charro Road & Stoneridge Drive/Jack London Boulevard | AM | 26.5 | C | 25.4 | C | 24.1 | C | 23.9 | C | 26.9 | C |
| | | PM | 28.6 | C | 32.0 | C | 33.4 | C | 28.3 | C | 29.3 | C |
| 23 | Stanley Boulevard & El Charro Road | AM | 38.9 | D | 47.2 | D | 42.4 | D | 40.9 | D | 40.7 | D |
| | | PM | 31.6 | C | 25.8 | C | 24.5 | C | 30.1 | C | 29.9 | C |
| 24 | Airway Boulevard/Driveway & North Canyons Parkway | AM | 98.8 | F | 60.2 | E | 96.6 | F | 99.7 | F | 96.1 | F |
| | | PM | 35.7 | D | 24.5 | C | 24.2 | C | 33.5 | C | 36.4 | D |
| 25 | Airway Boulevard & I-580 WB Ramps | AM | 16.4 | B | 13.5 | B | 17.9 | B | 14.2 | B | 16.6 | B |
| | | PM | 5.5 | A | 9.4 | A | 9.3 | A | 5.9 | A | 5.7 | A |
| 26 | Airway Boulevard & I-580 EB Ramps/Kitty Hawk Road | AM | 30.8 | C | 24.4 | C | 22.7 | C | 23.9 | C | 30.9 | C |
| | | PM | 39.4 | D | 38.0 | D | 28.4 | C | 39.6 | D | 39.4 | D |
| 27 | Collier Canyon Road & North Canyons Parkway/Portola Avenue | AM | 24.0 | C | 33.3 | C | 35.2 | D | 23.4 | C | 23.5 | C |
| | | PM | 22.3 | C | 26.8 | C | 23.4 | C | 22.6 | C | 22.6 | C |
| 28 | Isabel Avenue/Campus Hill Drive & Portola Avenue | AM | 27.7 | C | 28.2 | C | 28.4 | C | 27.7 | C | 27.8 | C |
| | | PM | 27.5 | C | 45.4 | D | 43.9 | D | 27.9 | C | 28.3 | C |
| 29 | Isabel Avenue & I-580 WB Ramps | AM | 11.5 | B | 15.2 | B | 14.9 | B | 12.9 | B | 11.2 | B |
| | | PM | 14.4 | B | 16.2 | B | 16.3 | B | 14.3 | B | 14.2 | B |
| 30 | Isabel Avenue & I-580 EB Ramps | AM | 6.1 | A | 8.0 | A | 7.5 | A | 7.4 | A | 6.2 | A |
| | | PM | 6.4 | A | 24.3 | C | 15.7 | B | 6.2 | A | 6.2 | A |
| 31 | Isabel Avenue & Airway Boulevard | AM | 34.3 | C | *77.8* | *E* | *63.2* | *E* | 34.0 | C | 34.8 | C |
| | | PM | 36.4 | D | *82.3* | *F* | *86.2* | *F* | 41.0 | D | 40.9 | D |
| 32 | Isabel Avenue & Jack London Boulevard | AM | 50.6 | D | *57.4* | *E* | 53.0 | D | 50.9 | D | 50.7 | D |
| | | PM | 79.8 | E | 82.2 | F | 78.1 | E | 80.7 | F | 81.8 | F |

**TABLE 3.B-69 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2040 CUMULATIVE CONDITIONS**

| | | | No Project Alternative | | Conventional BART (Proposed Project) | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Time | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 33 | Isabel Avenue Connector & Stanley Boulevard | AM | 40.5 | D | 42.1 | D | 38.2 | D | 38.2 | D | 43.3 | D |
| | | PM | 73.8 | E | 75.4 | E | 77.1 | E | 73.9 | E | 72.6 | E |
| 34 | Murrieta Boulevard/Driveway & Portola Avenue | AM | 14.5 | B | 17.1 | B | 18.2 | B | 14.6 | B | 14.6 | B |
| | | PM | 33.7 | C | 44.3 | D | 34.6 | C | 32.5 | C | 33.5 | C |
| 35 | Murrieta Boulevard & Jack London Boulevard | AM | 25.0 | C | 30.8 | C | 31.1 | C | 24.2 | C | 26.8 | C |
| | | PM | 100.7 | F | **129.8** | **F** | **110.1** | **F** | 75.3 | E | 80.1 | F |
| 36 | Murrieta Boulevard & Stanley Boulevard | AM | 98.3 | F | *104.3* | *F* | 99.8 | F | 80.3 | F | 80.8 | F |
| | | PM | 45.8 | D | *51.2* | *D* | *62.9* | *E* | 46.3 | D | 48.4 | D |
| 37 | Livermore Avenue & I-580 WB Ramps | AM | 23.5 | C | 23.4 | C | 22.5 | C | 21.9 | C | 34.1 | C |
| | | PM | 27.8 | C | 27.6 | C | 26.6 | C | 32.8 | C | 39.3 | D |
| 38 | Livermore Avenue & I-580 EB Ramps | AM | 17.5 | B | 16.3 | B | 16.5 | B | 14.7 | B | 17.5 | B |
| | | PM | 74.3 | E | **90.6** | **F** | 75.7 | E | 75.5 | E | 72.7 | E |
| 39 | Livermore Avenue & Portola Avenue | AM | 43.8 | D | **48.3** | **D** | 41.1 | D | 42.5 | D | 44.4 | D |
| | | PM | 52.6 | D | **88.7** | **F** | **68.5** | **E** | 50.0 | D | 48.9 | D |
| 40 | First Street/Springtown Boulevard & I-580 WB Ramps | AM | 16.3 | B | 10.3 | B | 10.2 | B | 10.2 | B | 16.7 | B |
| | | PM | 14.1 | B | 16.8 | B | 13.0 | B | 14.0 | B | 14.1 | B |
| 41 | First Street & I-580 EB Ramps | AM | 14.5 | B | 12.5 | B | 12.1 | B | 11.9 | B | 14.5 | B |
| | | PM | 47.1 | D | 42.6 | D | 46.2 | D | 47.4 | D | 47.3 | D |
| 42 | First Street & Mines Road | AM | 26.2 | C | 26.4 | C | 25.5 | C | 26.3 | C | 26.4 | C |
| | | PM | 52.1 | D | *105.9* | *F* | *78.4* | *E* | *58.5* | *E* | *60.0* | *E* |
| 43 | Vasco Road / I-580 WB Ramps | AM | 0.7 | A | 0.6 | A | 0.6 | A | 0.7 | A | 0.7 | A |
| | | PM | 1.7 | A | 1.9 | A | 1.9 | A | 1.7 | A | 1.7 | A |
| 44 | Vasco Road / I-580 EB Ramps | AM | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] |
| | | PM | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] | N/A[4] |
| 45 | Vasco Road & East Avenue | AM | 20.9 | C | 20.6 | C | 19.0 | B | 20.8 | C | 21.3 | C |
| | | PM | 87.4 | F | **104.4** | **F** | 88.8 | F | 92.0 | F | 87.6 | F |
| 46 | Greenville Road & I-580 WB Ramps | AM | 8.8 | A | 7.6 | A | 6.8 | A | 7.4 | A | 9.1 | A |
| | | PM | 5.3 | A | 7.1 | A | 5.6 | A | 5.5 | A | 5.5 | A |
| 47 | Greenville Road & I-580 EB Ramps | AM | 4.2 | A | 1.8 | A | 1.9 | A | 4.5 | A | 4.3 | A |
| | | PM | 9.2 | A | 9.2 | A | 7.4 | A | 8.2 | A | 8.7 | A |
| 48 | Greenville Road /Altamont Pass Road | AM | 7.1 | A | 13.3 | B | 15.6 | B | 7.3 | A | 7.1 | A |
| | | PM | 96.1 | F | **118.3** | **F** | **106.6** | **F** | 100.9 | F | 100.2 | F |

**TABLE 3.B-69 INTERSECTION LEVEL OF SERVICE AND CHANGE IN DELAY, 2040 CUMULATIVE CONDITIONS**

| # | Intersection | Time | No Project Alternative | | Conventional BART (Proposed Project) | | DMU Alternative (with EMU Option) | | Express Bus/BRT Alternative | | Enhanced Bus Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| 49 | Greenville Road & Southfront Road | AM | 14.3 | B | 8.4 | A | 8.2 | A | 8.8 | A | 13.8 | B |
| | | PM | 13.9 | B | 14.6 | B | 29.2 | C | 14.0 | B | 14.1 | B |
| 50 | Greenville Road / Patterson Pass Road | AM | 40.6 | D | 44.8 | D | **49.9** | **D** | 39.5 | D | 39.2 | D |
| | | PM | 156.3 | F | **201.3** | **F** | **173.1** | **F** | **183.4** | **F** | **177.2** | **F** |

Notes: EB = eastbound; WB = westbound; LOS = level of service; N/A = not applicable.
**Bold**/gray shading indicates intersection having a significant impact; i*talic*/gray shading indicates policy-exempt intersections having a less-than-significant impact.
[a] The significant impact criteria of the Cities of Dublin and Pleasanton use added vehicle trips as a metric rather than increased delay.
Source: Cambridge Systematics, 2017.

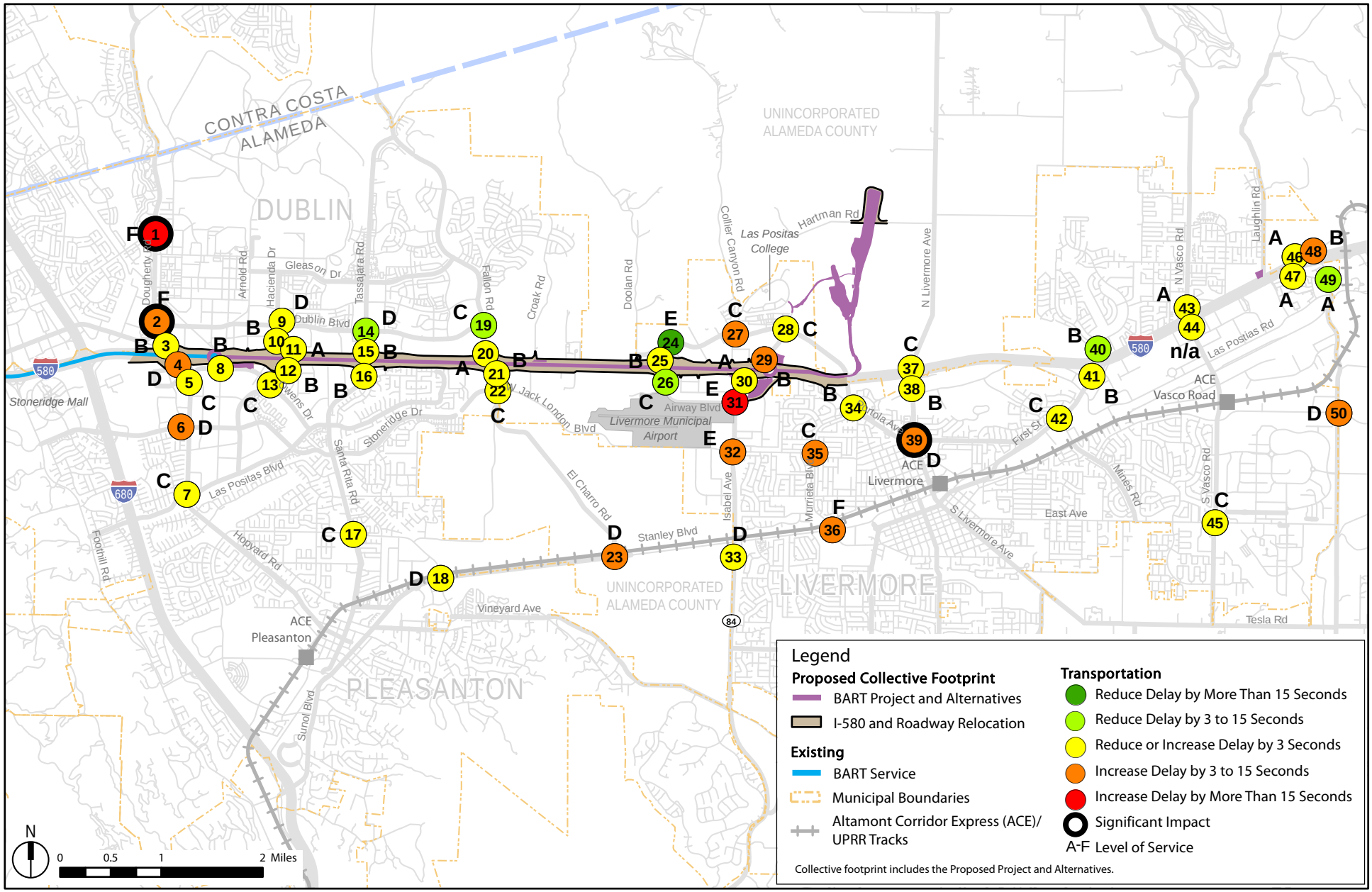
Figures 3.B-35 through 3.B-42 present the results of the intersection LOS analysis for 2040 cumulative conditions.

**No Project Alternative.** As described in **Impact TRAN-8** above, the No Project Alternative would have no impacts related to intersections during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project.** For the Proposed Project under 2040 Cumulative Conditions, thirteen intersections would experience significant impacts. Four of these intersections are exempt by policy from applicable LOS standards.

The policy-exempt intersections are as follows:

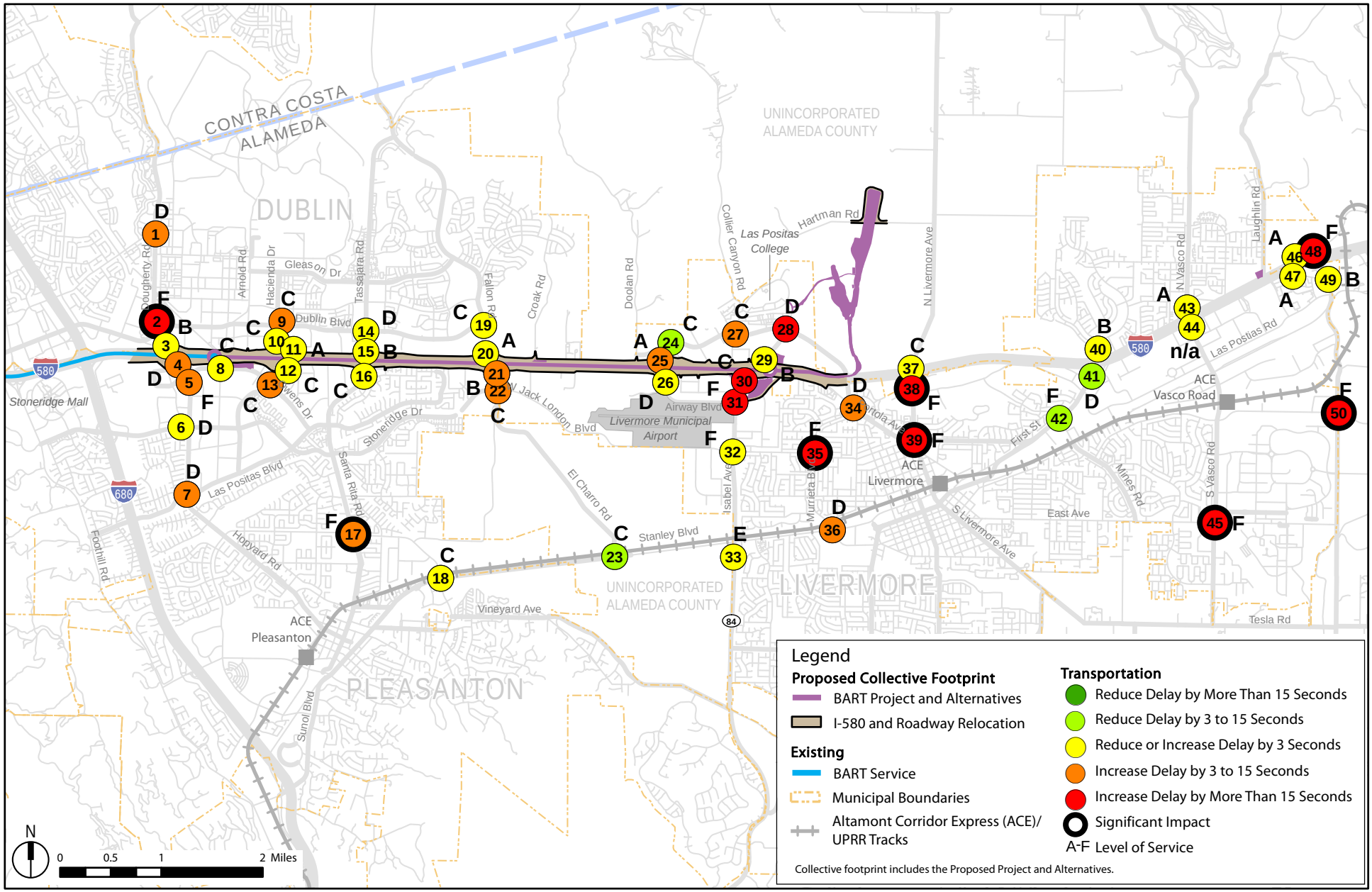
- **Isabel Avenue & Airway Boulevard (Intersection #31)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 77.8 seconds in the AM peak period and an LOS F with a delay of 82.3 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **Isabel Avenue & Jack London Boulevard (Intersection #32)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 57.4 seconds in the AM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

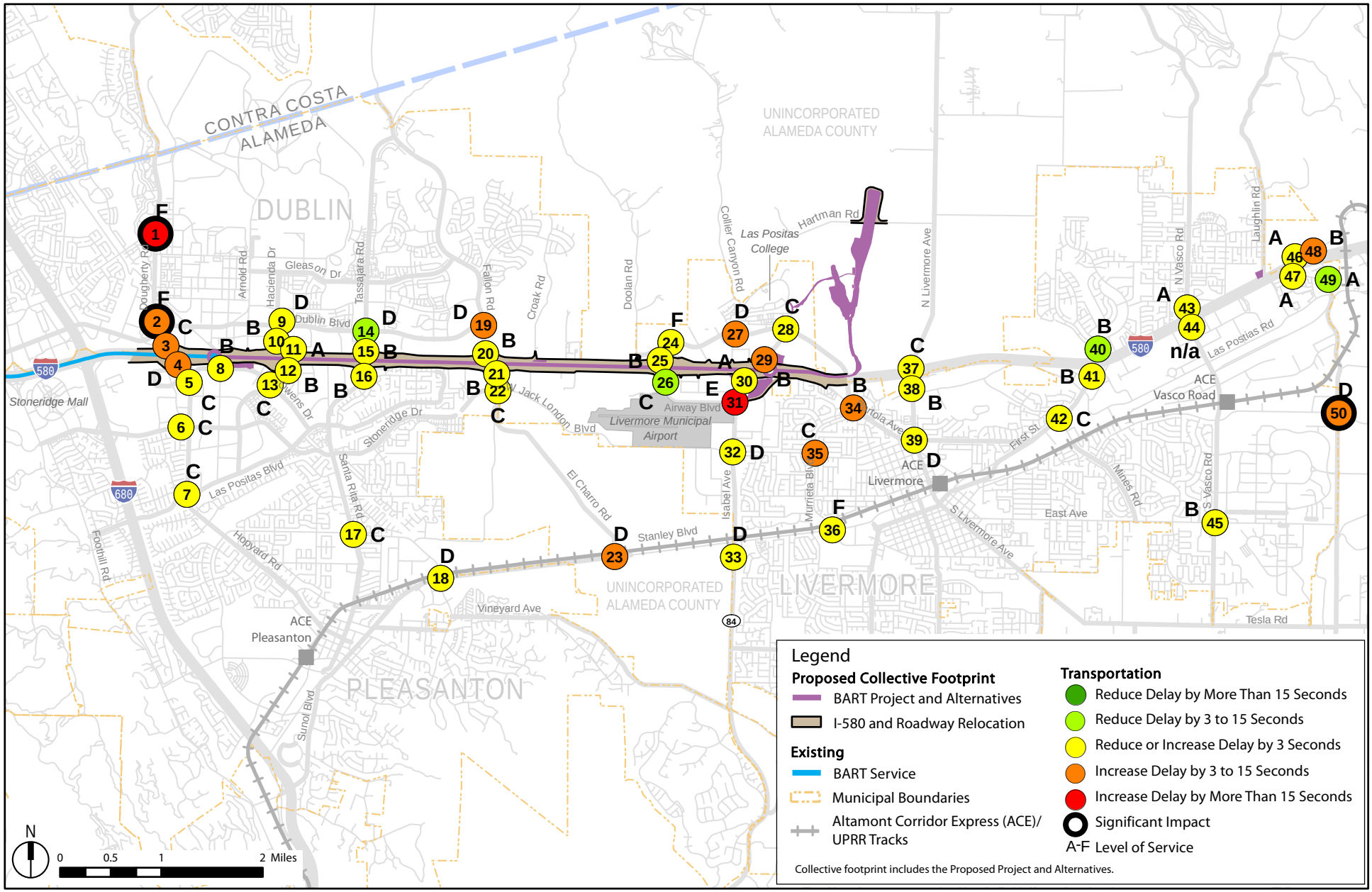
Figure 3.B-35
Transportation
Intersection LOS and Change in AM Delay
2040 Cumulative Conditions, Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

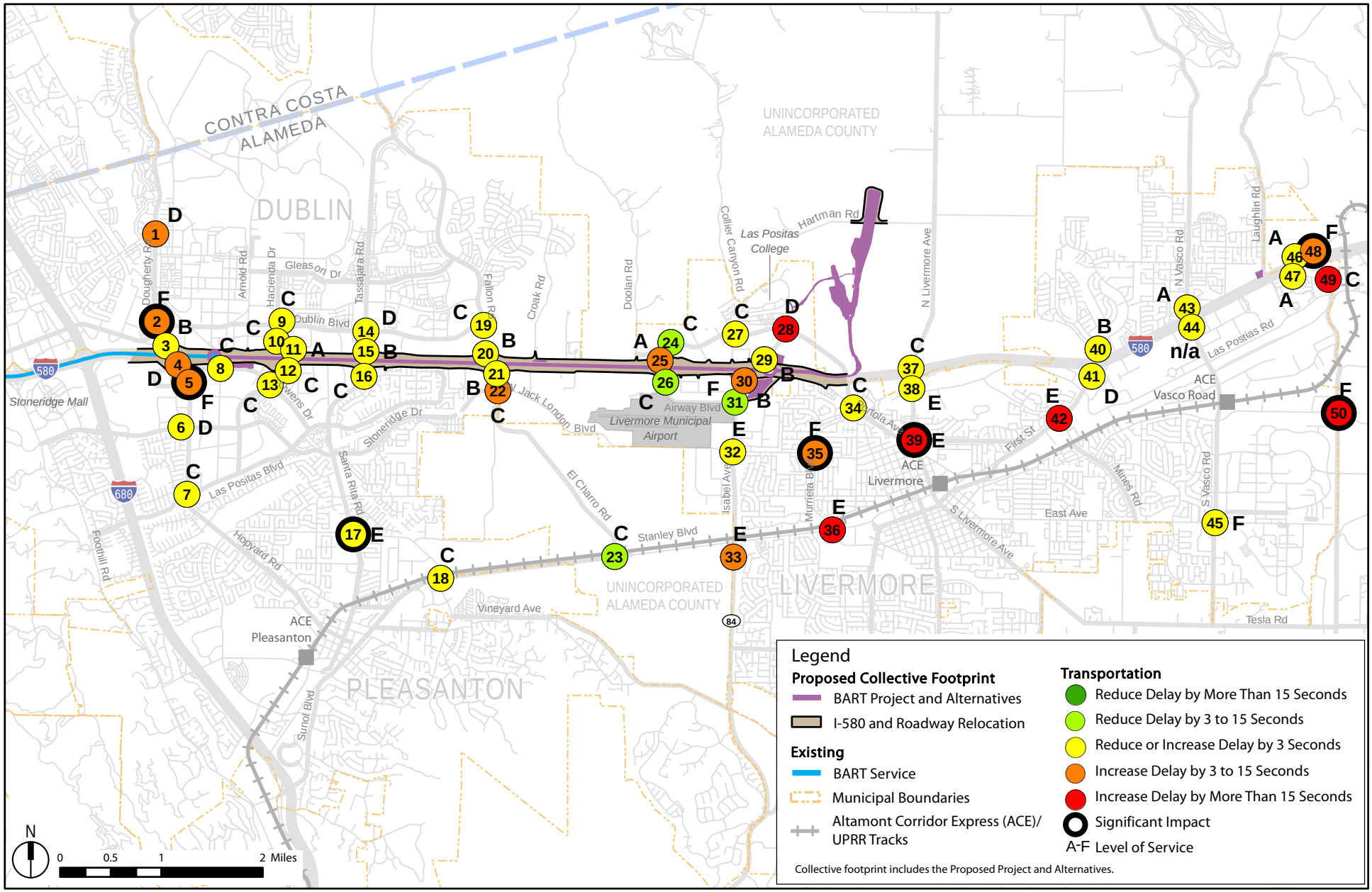
Figure 3.B-36
Transportation
Intersection LOS and Change in PM Delay
2040 Cumulative Conditions, Conventional BART Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

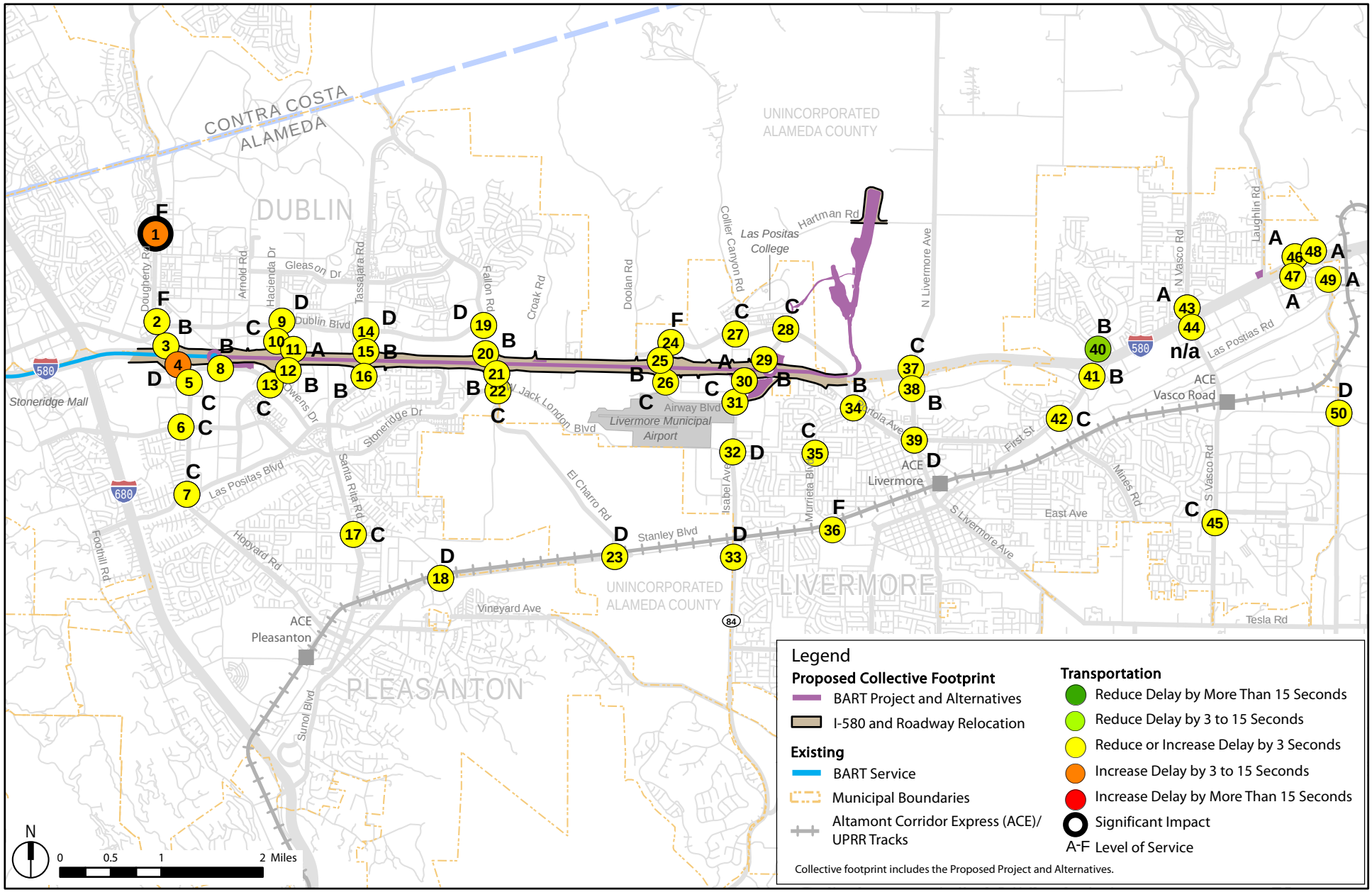
Figure 3.B-37
Transportation
Intersection LOS and Change in AM Delay
2040 Cumulative Conditions, DMU Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

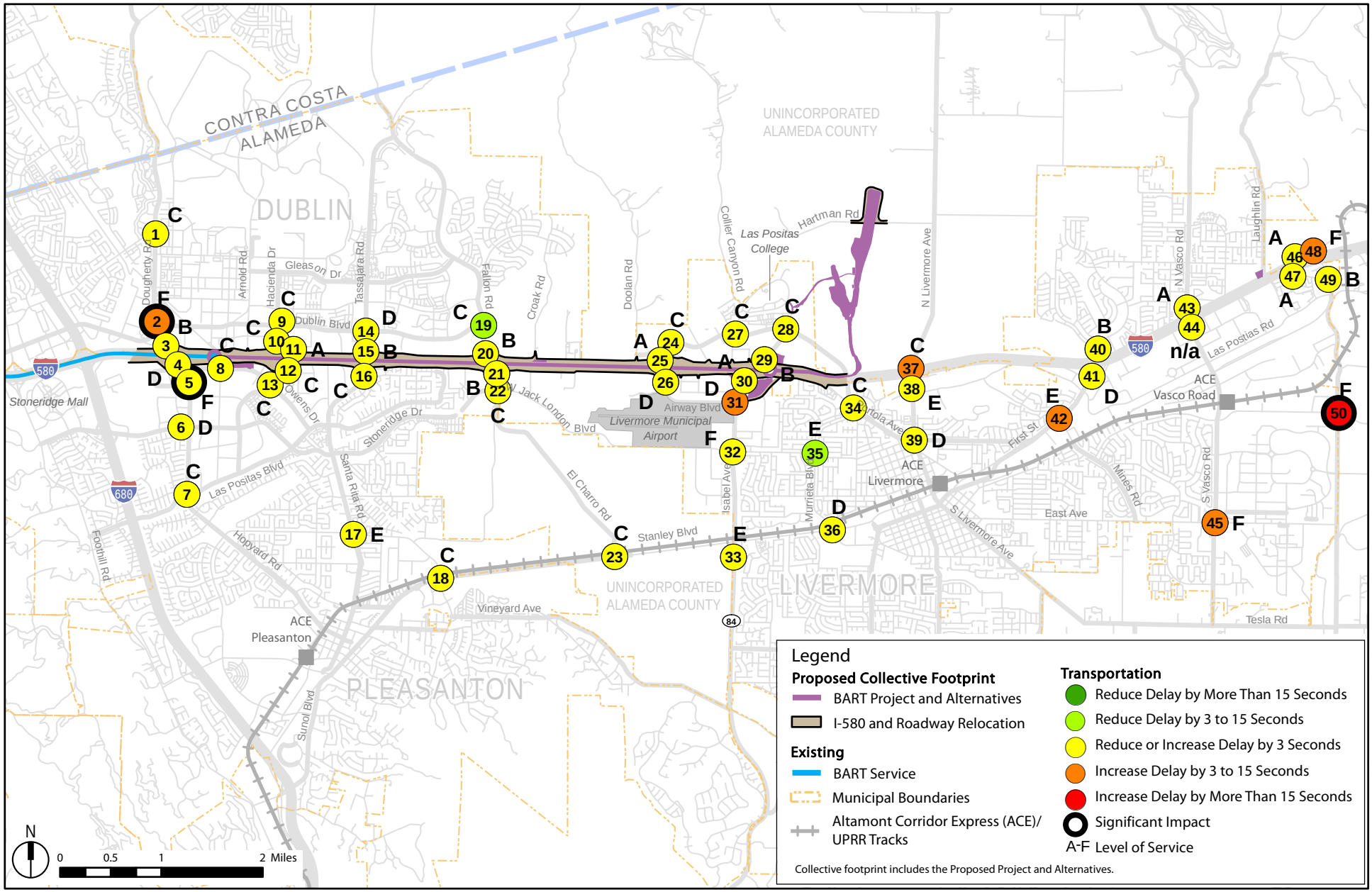
Figure 3.B-38
Transportation
Intersection LOS and Change in PM Delay
2040 Cumulative Conditions, DUM Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

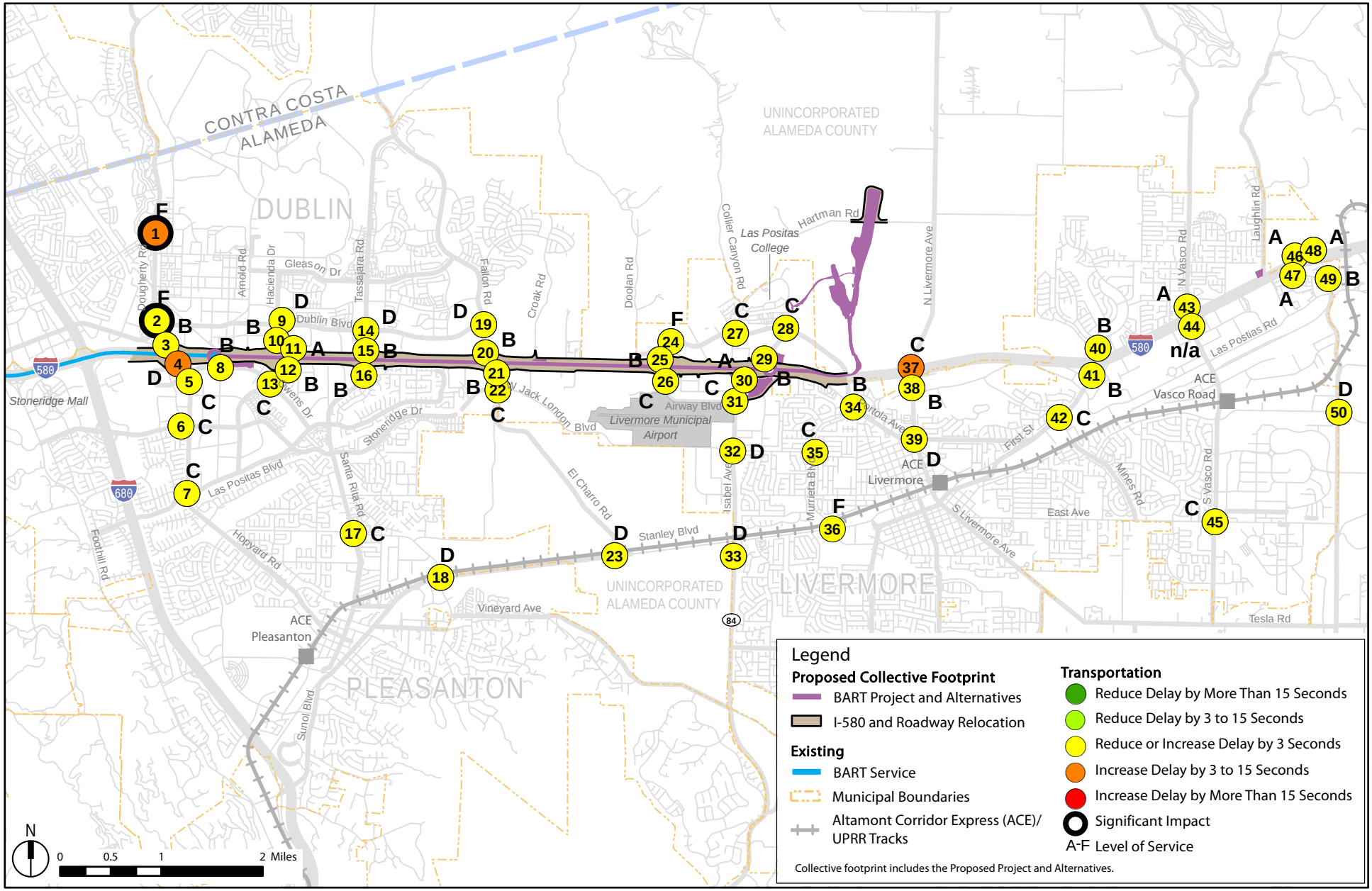
Figure 3.B-39
Transportation
Intersection LOS and Change in AM Delay
2040 Cumulative Conditions, Express Bus/BRT Project




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

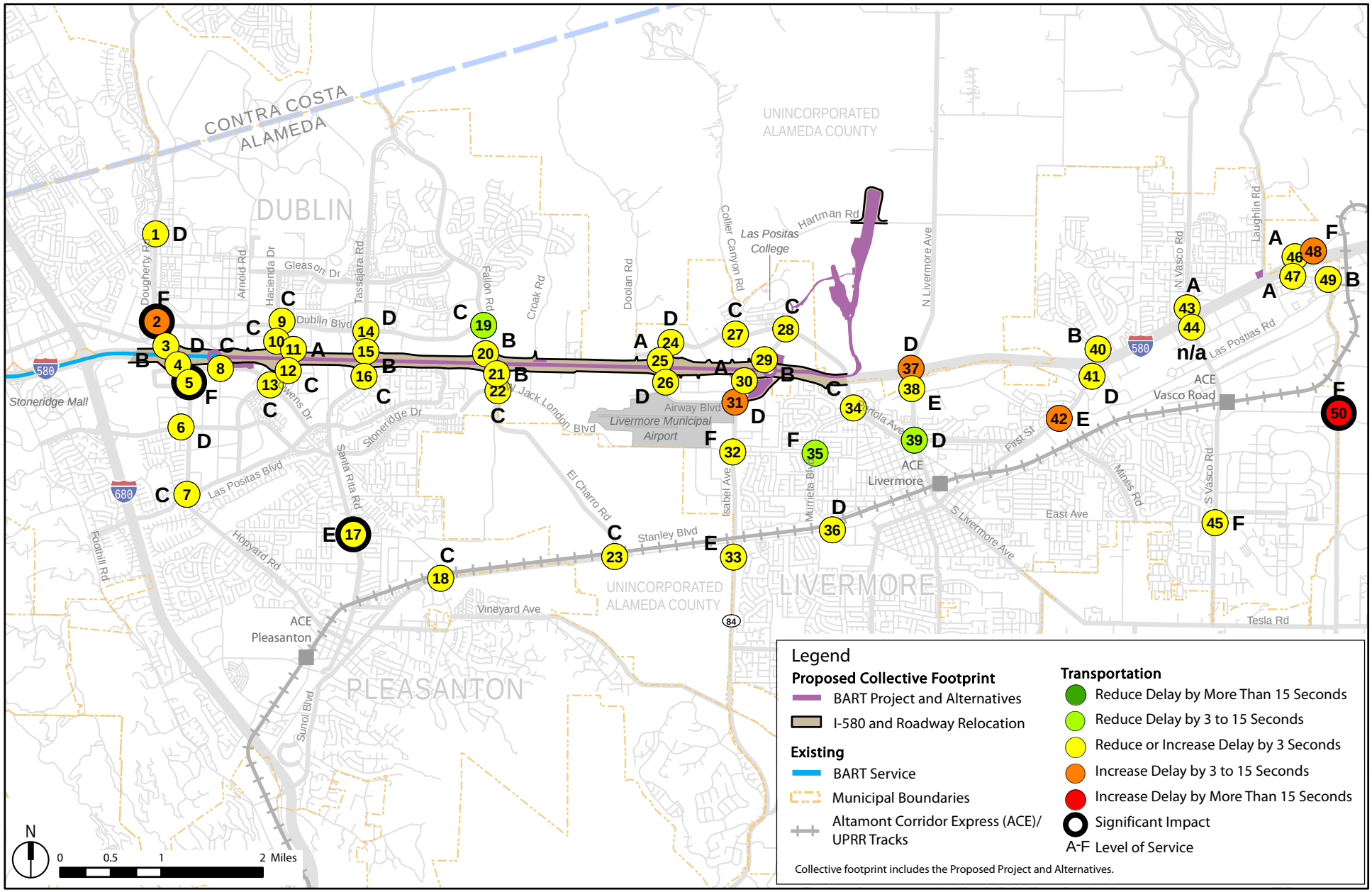
Figure 3.B-40
Transportation
Intersection LOS and Change in PM Delay
2040 Cumulative Conditions, Express Bus/BRT Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-41
Transportation
Intersection LOS and Change in AM Delay
2040 Cumulative Conditions, Enhanced Bus Alternative




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-42
Transportation
Intersection LOS and Change in PM Delay
2040 Cumulative Conditions, Enhanced Bus Alternative

- **Murrieta Boulevard & Stanley Boulevard (Intersection #36)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 104.3 seconds in the AM peak period and an LOS D with a delay of 51.2 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.
- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 105.9 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following nine intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 154.2 seconds in the AM peak period. This intersection also has 360 additional trips under Project Conditions compared to No Project Conditions in the AM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 116.2 seconds in the AM peak period and LOS F with a delay of 177.8 seconds in the PM peak period. This intersection also has 286 additional trips in the AM peak period and 585 additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Santa Rita Road & Valley Avenue (Intersection #17)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 81.0 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Murrieta Boulevard & Jack London Boulevard (Intersection #35)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 129.8 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Livermore Avenue & I-580 EB Ramps (Intersection #38)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 90.6 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

- **Livermore Avenue & Portola Avenue (Intersection #39)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS D with a delay of 48.3 in the AM peak period and an LOS F with a delay of 88.7 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Vasco Road & East Avenue (Intersection #45)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 104.4 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road & Altamont Pass Road (Intersection #48)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 118.3 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Patterson Pass Road (Intersection #50)**. Under 2040 Cumulative Conditions, this intersection would operate at an LOS F with a delay of 201.3 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #39, significant impacts at intersections would be reduced to less than significant with implementation of **Mitigation Measure TRAN-20a,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-20a** requires the addition of a second northbound left-turn lane at Intersection #39. However, this intersection improvement would not be sufficient to reduce impacts to less than significant at Intersection #39, and further lane additions would be infeasible due to physical constraints. Impacts at Intersection #39 would be significant and unavoidable under 2040 Cumulative Conditions. **(SU)**

**DMU Alternative.** For the DMU Alternative under 2040 Cumulative Conditions, eleven intersections would experience significant or less-than-significant impacts. Three of these intersections are exempt by policy from applicable LOS standards. One other intersection of the eight remaining significantly impacted intersections also may be exempt, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersections are as follows:

- **Isabel Avenue & Airway Boulevard (Intersection #31)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 63.2 seconds in the AM peak period and an LOS F with a delay of 86.2 seconds in the PM peak period. However, this intersection is designated as exempt from the City of Livermore's LOS standard because this intersection is near a freeway interchange.
- **Murrieta Boulevard & Stanley Boulevard (Intersection #36)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 62.9 seconds in

the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 78.4 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following eight intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 143.0 seconds in the AM peak period. This intersection also has 284 additional trips under the DMU Alternative compared to No Project Conditions in the AM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 107.5 seconds in the AM peak period and LOS F with a delay of 158.4 seconds in the PM peak period. This intersection also has 197 additional trips in the AM peak period and 351 additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 107.8 seconds in the PM peak period. This intersection also has 92 additional trips under the DMU Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 50 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Santa Rita Road & Valley Avenue (Intersection #17)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 77.9 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Murrieta Boulevard & Jack London Boulevard (Intersection #35)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 110.1 seconds in the PM peak period, which is greater than 45 seconds.

- **Livermore Avenue and Portola Avenue (Intersection #39)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 68.5 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road & Altamont Pass Road (Intersection #48)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 106.6 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Patterson Pass Road (Intersection #50)**. Under 2040 Project Conditions, this intersection would operate at an LOS D with a delay of 49.9 seconds in the AM peak period and an LOS F with a delay of 173.1 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #5 and Intersection #39, significant impacts at intersections would be reduced to less than significant with implementation of **Mitigation Measure TRAN-20b,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-20b** requires full eight-phase signal operations at Intersection #5 and the addition of a second northbound left-turn lane at Intersection #39. However, these respective intersection improvements would not be sufficient to reduce impacts to less than significant at Intersection #5 and Intersection #39, and further lane additions would be infeasible due to physical constraints. Impacts at Intersection #5 and Intersection #39 would be significant and unavoidable under 2040 Cumulative Conditions. **(SU)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2040 Cumulative Conditions, five intersections would experience significant or less-than-significant impacts. One of these intersections is exempt by policy from applicable LOS standards. Another one of the four remaining intersections with significant impacts may also be exempt by policy from LOS standards, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersection is as follows:

- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 60.0 seconds in the PM peak period. However, this intersection is exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following five intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 103.4 seconds in the AM peak period. This intersection also has 50 additional trips under the Express Bus Alternative compared to No Project Conditions in the AM peak period, which is equal to the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 152.5 seconds in the PM peak period. This intersection also has 64 additional trips under the Express Bus Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 102.7 seconds in the PM peak period. This intersection also has 92 additional trips under the Express Bus Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Greenville Road/Patterson Pass Road (Intersection #50)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 183.4 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

With the exception of Intersection #5, impacts at the intersections above would be reduced to less than significant with implementation of **Mitigation Measure TRAN-20c,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-20b** requires full eight-phase signal operations at Intersection #5; however, this intersection improvement would not be sufficient to reduce impacts to less than significant at Intersection #5. Further lane additions would be infeasible due to physical constraints at this location; therefore, impacts at Intersection #5 would be significant and unavoidable under 2040 Cumulative Conditions. **(SU)**

**Enhanced Bus Alternative** For the Enhanced Bus Alternative under 2040 Cumulative Conditions, six intersections would experience significant impacts. One of these intersections is exempt by policy from applicable LOS standards. Another one of the five remaining intersections with significant impacts may be exempt by policy from LOS standards, but is treated here as non-exempt until the exemption is confirmed by the relevant jurisdiction.

The policy-exempt intersection is as follows:

- **First Street & Mines Road (Intersection #42)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 60.0 seconds in the PM peak period. However, this intersection may be exempt from the City of Livermore's LOS standard because of environmental constraints, ROW constraints or cut-through traffic volumes or other City of Livermore policies that prevent the implementation of improvements that would achieve the City's LOS standards.

Significant impacts would occur at the following five intersections:

- **Dougherty Road & Amador Valley Road (Intersection #1)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 104.7 seconds in the AM peak period. This intersection also has 59 additional trips under the Enhanced Bus Alternative compared to No Project Conditions in the AM peak period, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road/Dougherty Road & Dublin Boulevard (Intersection #2)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 101.7 seconds in the AM peak period and LOS F with a delay of 151.4 seconds in the PM peak period. This intersection also has 70 additional trips in the AM peak period and 58 additional trips in the PM peak period under Project Conditions compared to No Project Conditions, which is greater than the City of Dublin's threshold of 50 additional trips.
- **Hopyard Road & Owens Road (Intersection #5)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 102.7 seconds in the PM peak period. This intersection also has 29 additional trips under the Enhanced Bus Alternative compared to No Project Conditions in the PM peak period, which is greater than the City of Pleasanton's threshold of 10 additional trips. However, this intersection is designated a Gateway Intersection and may be exempt from the City of Pleasanton's LOS standard if vehicular capacity improvements would be contrary to other City goals.
- **Santa Rita Road & Valley Avenue (Intersection #17)**. Under 2040 Project Conditions, this intersection would operate at an LOS E with a delay of 79.9 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.
- **Greenville Road/Patterson Pass Road (Intersection #50)**. Under 2040 Project Conditions, this intersection would operate at an LOS F with a delay of 177.2 seconds in the PM peak period, which is greater than 45 seconds, the significance threshold identified for this intersection.

Impacts at all intersections except Intersection #5 would be reduced to less than significant with implementation of **Mitigation Measure TRAN-20d,** which requires intersection improvements such as additional turning and through lanes. **Mitigation Measure TRAN-20b** requires full eight-phase signal operations at Intersection #5; however, this intersection improvement would not be sufficient to reduce impacts to less than significant at Intersection #5. Further lane additions would be infeasible due to physical constraints at this location; therefore, impacts at Intersection #5 and would be significant and unavoidable under 2040 Cumulative Conditions. **(SU)**

**Mitigation Measures**. As described above, the Proposed Project and Alternatives would have potentially significant cumulative impacts to intersections under 2040 Cumulative Conditions. **Mitigation Measure TRAN-20a**, **Mitigation Measure TRAN-20b**, **Mitigation Measure TRAN-20c**, and **Mitigation Measure TRAN-20d** would require BART to participate and coordinate with local jurisdictions in implementing intersection improvements and contribute funding. With implementation of these mitigation measures, potential impacts would be reduced to a less-than-significant level. Impacts associated with the Proposed Project and the DMU Alternative at Intersection #39 would be significant and unavoidable. Impacts associated with the DMU Alternative, Express Bus/BRT Alternative, and the Enhanced Bus Alternative at Intersection #5 would be significant and unavoidable. Additional mitigation is infeasible due to physical constraints at these intersections that prevent the addition of new turning lanes or through lanes.

**Mitigation Measure TRAN-20a: Improvements for Intersections #1, #2, #17, #35, #38, #39, #45, #48, and #50 under 2040 Cumulative Conditions (Conventional BART Project)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Santa Rita Road & Valley Avenue (Intersection #17) – Add a third southbound left-turn lane.
- Murrieta Boulevard & Jack London Boulevard (Intersection #35) – Add an eastbound right-turn overlap phase.
- Livermore Avenue & I-580 EB Ramps (Intersection #38) – Add dedicated northbound right-turn lane.
- Livermore Avenue & Portola Avenue (Intersection #39) – Add a second northbound left-turn lane.

- Vasco Road & East Avenue (Intersection #45) – Operate eastbound and westbound phases as split phases. Reconfigure eastbound lanes to include one left-turn lane, one shared left-turn/through lane, and one shared through/right-turn lane.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

**Mitigation Measure TRAN-20b: Improvements for Intersections #1, #2, #5, #17, #35, #39, #48, and #50 under 2040 Cumulative Conditions (DMU Alternative/EMU Option)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Santa Rita Road & Valley Avenue (Intersection #17) – Add a third southbound left-turn lane.
- Murrieta Boulevard & Jack London Boulevard (Intersection #35) – Add an eastbound right-turn overlap phase.
- Livermore Avenue & Portola Avenue (Intersection #39) – Add a second northbound left-turn lane.
- Greenville Road & WB I-580 Ramps (Intersection #48) – Add a second eastbound through lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

**Mitigation Measure TRAN-20c: Improvements for Intersections #1, #2, #5, and #50 under 2040 Cumulative Conditions (Express Bus/BRT Alternative)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

**Mitigation Measure TRAN-20d: Improvements for Intersections #1, #2, #5, #17, and #50 under 2040 Cumulative Conditions (Enhanced Bus Alternative)**

BART shall coordinate with local jurisdictions to implement and contribute its fair share toward funding the following improvements at the following intersections:

- Dougherty Road & Amador Valley Road (Intersection #1) – Add an eastbound right-turn overlap phase.
- Dougherty Road & Dublin Boulevard (Intersection #2) – Add a third southbound left-turn lane and a second westbound right-turn lane.
- Hopyard Road & Owens Road (Intersection #5) – Create a full eight-phase signal operation. Alternatively, if this intersection is confirmed to be exempt from the City of Pleasanton's LOS standard following consultation with the City, no mitigation is required.
- Santa Rita Road & Valley Avenue (Intersection #17) – Add a third southbound left-turn lane.
- Greenville Road & Patterson Pass Road (Intersection #50) – Add a second eastbound through lane and a dedicated eastbound right-turn lane.

### Transit

***Impact TRAN-21(CU): Impede the ability to improve transit access to BART, improve surrounding transit system inefficiencies, or improve ridership on surrounding transit services, under 2025 or 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

Transit access to BART and the ability of surrounding transit services to reduce system inefficiencies for the Proposed Project and Build Alternatives under Cumulative Conditions

would be similar to that under Project Conditions (similar or better than No Project Conditions).

Table 3.B-70 below presents the daily ridership projections under 2025 Cumulative Conditions for surrounding transit services; ACE ridership is expected to drop under the Proposed Project and DMU Alternative. Once BART is extended to Santa Clara County, some ACE riders traveling to southern Alameda County and Santa Clara County may prefer to ride BART but may be unable to find parking at the Dublin/Pleasanton Station. However, under the Proposed Project and DMU Alternative, these riders would switch from ACE to BART due to the available parking spaces at Isabel Station.

The ridership projects do not include a BART-ACE rail connection. ACE ridership could increase if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented.

**TABLE 3.B-70 SURROUNDING TRANSIT SERVICES RIDERSHIP (WEEKDAY), 2025 CUMULATIVE CONDITIONS**

| | Systemwide Boardings (Change from No Project) | | | |
|---|---|---|---|---|
| | **Conventional BART Project** | **DMU Alternative** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| ACE | 4,600 (-1000) | 4,700 (-900) | 5,400 (-200) | 5,600 (0) |
| LAVTA | 10,800 (+400) | 11,200 (+800) | 11,600 (+1,200) | 10,100 (-300) |
| RTD | 30 (-330) | 70 (-290) | 80 (-280) | 360 (0) |

Notes: ACE = Altamont Corridor Express; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District.
ACE ridership numbers only include boardings in San Joaquin County and the Bay Area. These numbers do not reflect boarding along potential future ACE extensions into Stanislaus and Merced Counties.
Source: Cambridge Systematics, 2017.

For a similar reason, RTD ridership would also drop under multiple BART Livermore Extension Build Alternatives. LAVTA ridership is expected to increase under the rail alternatives, as extended BART service increases the appeal of connecting bus service. LAVTA ridership is expected to increase the most under the Express Bus/BRT Alternative—the assumed LAVTA bus routes using the median bus/HOT lanes would attract some of the riders that would have taken the extended rail service.

Table 3.B-71 below presents the daily ridership projections under 2040 Cumulative Conditions for surrounding transit services. Similar to 2025 Project Conditions, ACE and RTD ridership would decrease, a result of BART extended service competing with those

services, and LAVTA ridership is expected to increase under the rail alternatives, as the extended service increases the attractiveness of connecting bus service.

**TABLE 3.B-71 SURROUNDING TRANSIT SERVICES RIDERSHIP SYSTEMWIDE BOARDINGS (WEEKDAY), 2040 CUMULATIVE CONDITIONS**

| | Change from No Project | | | |
|---|---|---|---|---|
| | **Conventional BART Project** | **DMU Alternative** | **Express Bus/BRT Alternative** | **Enhanced Bus Alternative** |
| ACE | 4,600 (-2,300) | 4,700 (-2,200) | 5,400 (-1,200) | 5,600 (-1,000) |
| LAVTA | 10,800 (400) | 11,200 (-3,500) | 11,600 (-3,100) | 10,100 (-4,600) |
| RTD | 30 (-310) | 70 (-270) | 80 (-260) | 360 (20) |

Notes: ACE = Altamont Corridor Express; LAVTA = Livermore-Amador Valley Transit Authority; RTD = San Joaquin Regional Transit District.
ACE ridership numbers only include boardings in San Joaquin County and the Bay Area. These numbers do not reflect boarding along potential future ACE extensions into Stanislaus and Merced Counties.
Source: Cambridge Systematics, 2017.

**No Project Alternative.** As described in **Impact TRAN-9** above, the No Project Alternative would have no impacts related to transit access to BART, surrounding transit system inefficiencies, or ridership on surrounding transit services during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project.** For the Proposed Project under 2025 and 2040 Cumulative Conditions, the modified routes operated by LAVTA would experience higher ridership as a result of the improved BART and local transit service coverage. However, ACE and the RTD bus route serving the area would experience a decrease in ridership. ACE ridership could increase if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented. Because the cumulative changes in ridership are small compared to overall ridership for these transit services, the cumulative impact to these transit services is not expected to be significant. Therefore, the Proposed Project would have a less-than-significant impact related to surrounding transit service ridership under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(LS)**

**DMU Alternative.** The DMU Alternative's impact under 2025 and 2040 Cumulative Conditions on other area transit routes is very similar to that of the Proposed Project. The modified routes operated by LAVTA would experience higher ridership as a result of the improved BART and local transit service coverage under the Proposed Project. ACE and the RTD bus route serving the area would experience a decrease in ridership. ACE ridership could increase

if any of the BART-ACE rail connection alternatives considered in the ACEforward Draft EIR analysis are implemented. Because the cumulative changes in ridership are small compared to overall ridership for these transit services, the cumulative impact to these transit services is not expected to be significant. Overall, the DMU Alternative would have a less-than-significant impact related to surrounding transit service ridership under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** For the Express Bus/BRT Alternative under 2025 and 2040 Cumulative Conditions, LAVTA routes would experience increased ridership, with the assumed R-B and X-B routes seeing higher ridership due to their high frequency and direct service to the Dublin/Pleasanton Station. However, RTD would see lower ridership. Because the cumulative changes in ridership are small compared to overall ridership for these transit services, the cumulative impact to these transit services is not expected to be significant. Therefore, the Express Bus/BRT Alternative would have a less-than-significant impact related to surrounding transit service ridership under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** For the Enhanced Bus Alternative under 2025 and 2040 Cumulative Conditions, other area transit services would experience the same or higher ridership as a result of the improved transit service coverage under the Enhanced Bus Alternative. Therefore, the Enhanced Bus Alternative would have no impacts related to surrounding transit service ridership under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to the surrounding transit service ridership under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required.

**Bicycles**

***Impact TRAN-22(CU): Worsen bicycle level of traffic stress, circulation and access, or safety hazards, under 2025 or 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: B; DMU Alternative: B; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact TRAN-10** above, the No Project Alternative would have no impacts related to bicycle LTS, circulation and access, or safety hazards during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project.** Bicycle LTS for the Proposed Project under Cumulative Conditions is shown in Figure 3.B-43.

The Proposed Project would, under Cumulative Conditions, provide improved LTS compared with No Project Conditions. The improvement would result from the INP's new street network that would provide new routes with low LTS, as well as additional bicycle and pedestrian crossings of barriers and key locations such as Isabel Avenue and I-580. Therefore, the Proposed Project would have no negative impacts on bicycle LTS.

With the INP calling for increased development and bicycle-supportive street design, and the proposed Las Positas Trail, bicycle access to the proposed Isabel Station would improve under the Proposed Project.

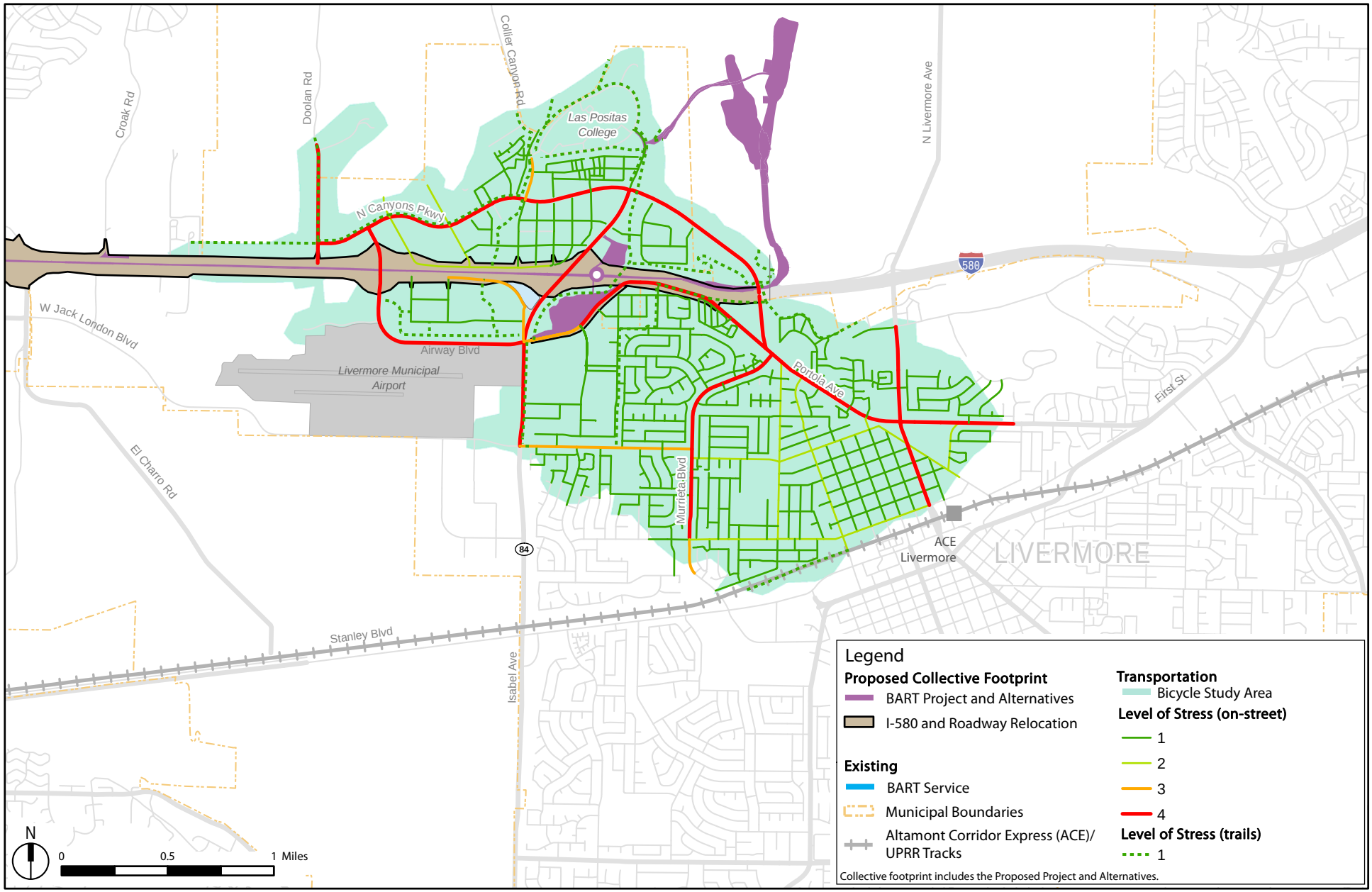
The Proposed Project under Cumulative Conditions would have similar less-than-significant impacts to bicycle safety hazards as described under Project Conditions. Therefore, the Proposed Project would have a beneficial impact related to bicycle LTS, circulation and access, and safety hazards under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(B)**

**DMU Alternative.** The DMU Alternative would be similar to the Proposed Project, because this alternative would be accompanied by the same INP improvements. Therefore, the DMU Alternative's impact to bicycle LTS, circulation and access, and safety hazards under 2025 and 2040 Cumulative Conditions would be beneficial, similar to the Proposed Project, and no mitigation measures are required. **(B)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative under Cumulative Conditions would not make any changes to the bicycle study area, and therefore would have no impact on bicycle LTS, circulation and access, or safety hazards in the area. Therefore, the Express Bus/BRT Alternative would have no impacts related to bicycle LTS, circulation and access, and safety hazards under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative under Cumulative No Project Conditions would not make any changes to the bicycle study area. Therefore, the Enhanced Bus Alternative would have no impacts related to bicycle LTS, circulation and access, and safety hazards under 2025 and 2040 Cumulative Conditions, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to bicycle LTS, circulation and access, or safety under 2025 or 2040 Cumulative Conditions, and no mitigation measures are required.




Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.B-43
Transportation
Bicycle Level of Stress
2025 and 2040 Cumulative Conditions, Conventional BART Project and DMU Alternative

### Pedestrians

***Impact TRAN-23(CU): Worsen pedestrian crossing distance or delay, circulation and access, or safety hazards, under 2025 or 2040 Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Around the proposed Isabel Station, the City of Livermore is planning for the INP. The new area would feature a mix of development from office and retail to residential development, and would promote pedestrian movement. Many of the streets would be enhanced with pedestrian-oriented features that contribute to the identity and character of the Isabel neighborhood. There would be an emphasis on wide sidewalks, buildings close to the street with doors and windows facing the street, and landscaped walkways and stoops on street frontages to promote walking. This walkable neighborhood would be connected to the new Isabel Station through a pedestrian/bike overcrossing of I-580.

**No Project Alternative.** As described in **Impact TRAN-11** above, the No Project Alternative would have no impacts related to pedestrian crossing distance or delay, circulation and access, or safety hazards during operation. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternative.** As described in **Impact TRAN-11** above, the Proposed Project and Build Alternatives would have no impact to pedestrian crossing distance or delay, circulation and access, or safety hazards during operation. Therefore, the Proposed Project and Build Alternatives would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts related to pedestrian crossing distance, circulation and access, or safety under 2025 or 2040 Cumulative Conditions, and no mitigation measures are required.

# C. LAND USE AND AGRICULTURAL RESOURCES

## 1. Introduction

This section describes the setting and existing conditions with regard to land uses, land use planning, and agricultural resources as they relate to the BART to Livermore Extension Project, discusses the regulations relevant to land use, and assesses the potential impacts to land use from construction and operation of the Proposed Project and Alternatives.

The study area for the land use and agricultural resource analysis encompasses the area within approximately 0.25 mile of the collective footprint—the combined footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative —and within approximately 0.5 mile of the Dublin/Pleasanton Station and proposed Isabel Station. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder buses for the Proposed Project and other Build Alternatives, which are anticipated to extend along existing streets and within the street rights-of-way (ROW), are addressed programmatically in this analysis, as described in Chapter 2, Project Description. This section describes land uses within the geographic subareas along the project corridor. The subareas are described in Section 3.A, Introduction to Environmental Analysis.

Consistent with the BART policy of coordinating system expansion with local land use planning, this section includes a brief discussion of applicable local land use policies, plans, and zoning to document the consistency of the Proposed Project and Build Alternatives with those plans and policies, as well as identify any potential inconsistencies. However, under California Government Code Sections 53090 and 53091, rapid transit districts such as BART are exempt from complying with local land use plans, policies, and zoning ordinances; thus, any potential land use or policy inconsistencies are presented for informational purposes only and are not considered significant impacts under CEQA.

Comments pertaining to land use were received in response to the Notice of Preparation for this EIR or during the scoping meeting held for the EIR. These comments cover the following topics: consistency with the BART System Expansion Policy; housing in the proposed Isabel Station area; and potential impacts to agricultural land. See Section 3.A, Introduction to Environmental Analysis and Section 3.D, Population and Housing for information related to housing and the Isabel Neighborhood Plan (INP). See Chapter 5, Project Merits for information related to the System Expansion Policy.

## 2. Existing Conditions

This subsection provides a regional overview of the study area and describes the local setting, including land uses and agricultural resources, in the study area.

### a. Regional Overview

The urban pattern in Alameda County is characterized by higher population densities in the western cities (particularly Oakland, Berkeley, and Alameda), and by lower population densities to the east (e.g., Dublin, Pleasanton, and Livermore) and south (e.g., Hayward and Fremont). Large undeveloped, unincorporated areas remain in the center of the county, primarily consisting of East Bay Regional Park District land. Between 2010 and 2016, Dublin had the highest residential growth in the county (25 percent), while Livermore and Pleasanton had residential growth rates of 9 percent and 7 percent, respectively, similar to that of the county as a whole (8 percent).[1] As described in Section 3.D, Population and Housing, Table 3.D-2, the population of Alameda County is expected to increase by approximately 27 percent, to a total of 1.99 million by 2040.[2, 3]

### b. Local Setting

This subsection describes existing land uses and general plan and zoning designations for each geographic subarea along the project corridor.

#### (1) Overview Existing Land Uses

The land uses described below for each geographic subarea are identified in Figures 3.C-1a and 3.C-1b.

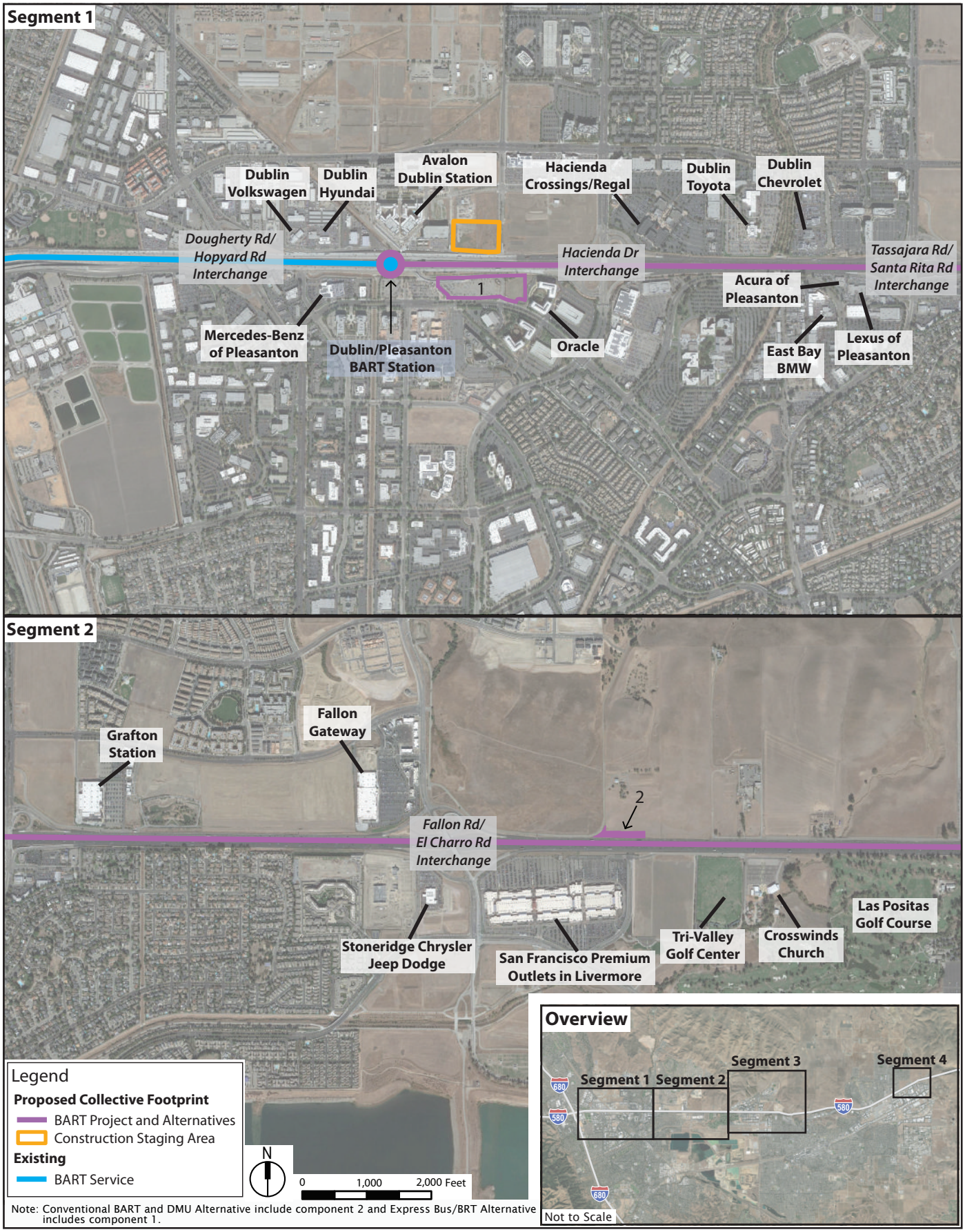
#### (a) Dublin/Pleasanton Station Area

The Dublin/Pleasanton Station Area, which includes the existing BART station, extends from west of the Dougherty Road/Hopyard Road interchange to the Hacienda Drive/ Interstate Highway (I-) 580 interchange. The city of Dublin is north of I-580, while the city of Pleasanton is south of I-580. Land uses in the area are generally commercial, and building heights generally range from one to seven stories. Representative photos of the Dublin/Pleasanton Station Area are shown in Figure 3.C-2.

[1] California Department of Finance (DOF), 2016. E-4 Population Estimates for Cities, Counties, and the State, 2011-2016, with 2010 Census Benchmark. May.

[2] United States Census Bureau, 2014. 2010-2014 American Community Survey. Available at: https://factfinder.census.gov/, accessed March 1, 2017.

[3] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

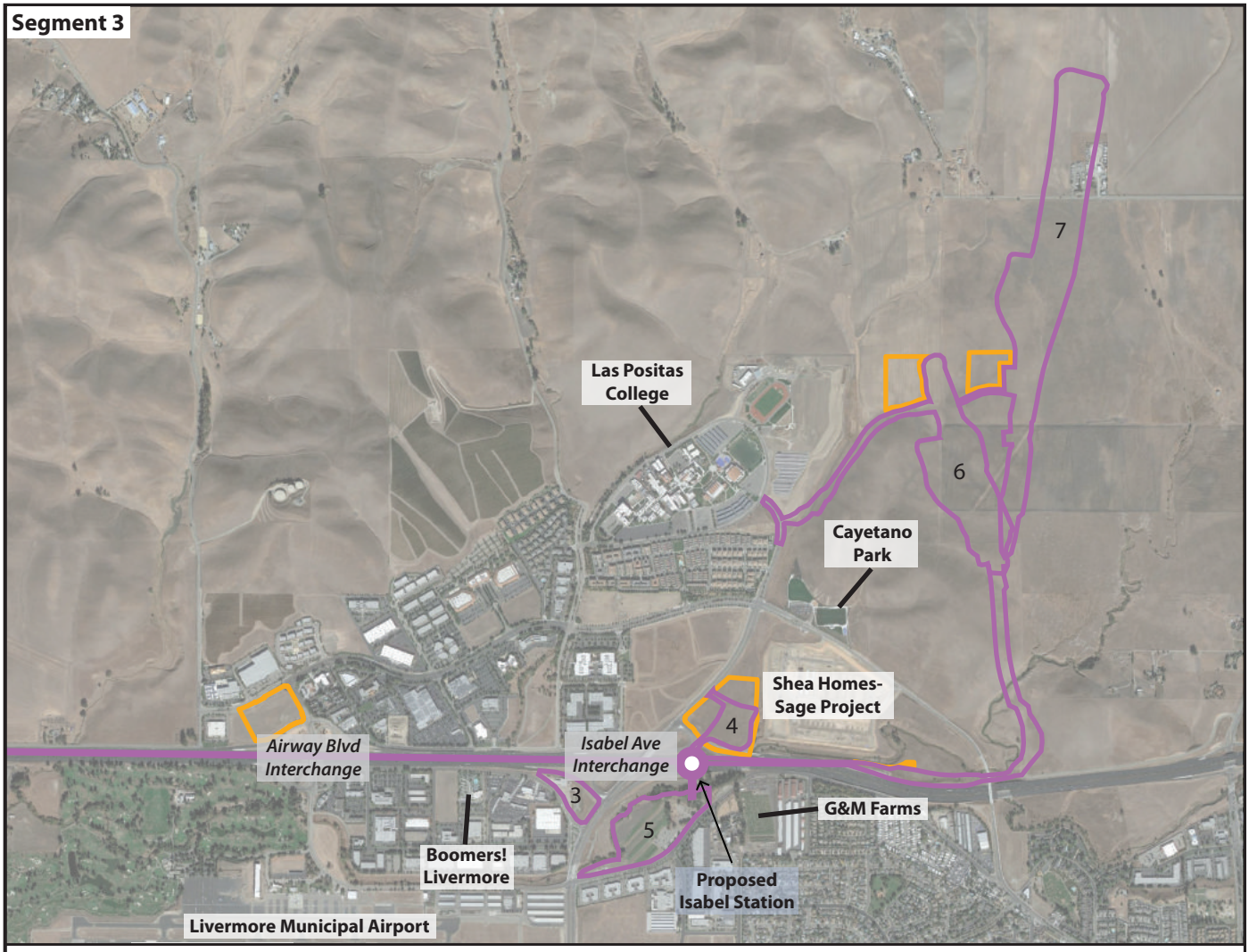



Note: Conventional BART and DMU Alternative include component 2 and Express Bus/BRT Alternative includes component 1.

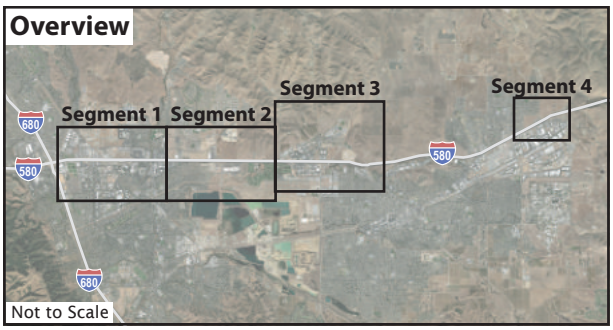
Source: Arup, 2017; Google Earth, 2016.

BART to Livermore Extension Project EIR

Figure 3.C-1a
Land Use and Agricultural Resources
Existing Land Uses








N

0 1,000 2,000 Feet

Note: Conventional BART includes components 3, 4, 5, and 7; DMU Alternative includes component 3, 4, 5, and 6; and Express Bus/BRT Alternative includes component 8.

Legend
- Proposed BART Project and Alternatives
- Construction Staging Area

Source: Arup, 2017; Google Earth, 2016.

BART to Livermore Extension Project EIR

Figure 3.C-1b
Land Use and Agricultural Resources
Existing Land Uses

## Dublin/Pleasanton Station Area

North of I-580 in Dublin, Dublin/Pleasanton Station entrance (right) and Avalon residential complex (left).

Dublin/Pleasanton Station parking lot south of I-580 in Pleasanton.

Oracle office complex along Owens Drive.

Chabot Canal immediately to the south of the Dublin/Pleasanton Station.

Source: Urban Planning Partners, 2016, 2017.



Figure 3.C-2
Land Use and Agricultural Resources
Dublin/Pleasanton Station Area Photos

Existing uses within the collective footprint include the Dublin/Pleasanton Station and surface parking lots—the location of the proposed diesel multiple unit (DMU) transfer platform and additional BART car storage (under the DMU Alternative) and the location of the proposed bus transfer platforms and replacement parking (under the Express Bus/Bus Rapid Transit [BRT] Alternative). The station consists of two levels, as follows:
(1) concourse (lower level), which houses the passenger entry and ticket area; and
(2) upper level within the I-580 median, which consists of the BART platform with tracks on both sides.

Land uses in the study area north of the Dublin/Pleasanton Station and I-580 include the following: residential apartment buildings, such as the Avalon Dublin Station residential complex; BART surface parking lots and parking structure; and two automobile dealerships (Dublin Volkswagen and Dublin Hyundai). A large parcel to the west of Hacienda Drive remains undeveloped. Land uses in the study area to the south of I-580 include the following: office buildings, such as the Oracle business complex; an automobile dealership (Mercedes-Benz of Pleasanton); and the primary Dublin/Pleasanton Station parking lot along Owens Drive. Land uses farther south include office, hotel, and mixed-use residential.

### (b) I-580 Corridor Area

The I-580 Corridor Area extends along I-580 from the Hacienda Drive/I-580 interchange to the Portola Avenue/I-580 overcrossing. North of I-580, the area extends through the city of Dublin, unincorporated Alameda County, and the city of Livermore. South of I-580, the area is within the cities of Pleasanton and Livermore.

The collective footprint includes the freeway and immediately adjacent areas north and south of the freeway. The area within the proposed median widening would be the location of the proposed rail extension (under the Proposed Project and DMU Alternative) and portion of the corridor would be the location of the proposed additional BART car storage (under the Express Bus/BRT Alternative).

The study area is characterized by commercial development, including shopping malls and automobile dealerships, as well as business parks, residential, industrial, recreational uses, and some undeveloped parcels. Representative photos of the I-580 Corridor Area are shown in Figure 3.C-3. There are three residential developments: one at the western end of the project corridor directly east of Tassajara Road/Santa Rita Road, and two at the eastern end just west of the Portola Avenue overcrossing, one north and one south of I-580. One of the residential areas at the eastern end, the Shea Homes – Sage Project (under construction), is north of I-580, and the other is south of I-580.

## I-580 Corridor Area

Regal Cinemas from the Hacienda Drive/I-580 interchange.

Looking north of I-580 at undeveloped land with a residential subdivision beyond.

Looking west at Las Positas Golf Course from Airway Boulevard.

## Isabel North Area

Looking west from Isabel Avenue at undeveloped land and commercial uses beyond (behind the trees).

Looking south from Portola Avenue, view of Isabel North Area (center) with Shea Homes-Sage Project under construction (left).

Source: Urban Planning Partners, 2016, 2017.



Figure 3.C-3
Land Use and Agricultural Resources
I-580 Corridor Area and Isabel North Area Photos

Land uses north of I-580, from west to east, are as follows:

- From Hacienda Drive to Tassajara Road/Santa Rita Road, land uses comprise commercial developments, business parks, and automobile dealerships. This segment has the Hacienda Crossings shopping complex, including the Regal Cinemas movie theater; several automobile dealerships, including Dublin Toyota and Dublin Chevrolet; and office buildings. Building heights in this area generally range from one to two stories.
- From Tassajara Road/Santa Rita Road to Fallon Road/El Charro Road, land uses are largely residential, commercial, and undeveloped, with several large parcels of undeveloped land interspersed with two shopping centers—Grafton Station and Fallon Gateway.
- East of Fallon Road/El Charro Road to Airway Boulevard, existing land uses generally consist of agricultural, grazing, and undeveloped land in unincorporated Alameda County.
- East of Airway Boulevard to Portola Avenue, existing land uses are generally residential and commercial with areas of undeveloped parcels. Limited agricultural uses are also along this segment of the I-580 Corridor Area.

Land uses south of I-580, from west to east, are as follows:

- From Hacienda Drive to Tassajara Road/Santa Rita Road, land uses consist of retail and shopping complexes; business parks, which generally have large parking lots fronting I-580, are substantially set back from I-580, and largely screened from view by trees; and automobile dealerships, including East Bay BMW, Acura of Pleasanton, and Lexus of Pleasanton. Building heights in this area generally range from one to two stories.
- From Tassajara Road/Santa Rita Road to Fallon Road/El Charro Road, land uses are largely residential, commercial, and undeveloped, with a large single-family housing development and the Stoneridge Chrysler Jeep Dodge dealership.
- East of Fallon Road/El Charro Road to Airway Boulevard, the San Francisco Premium Outlets in Livermore are just east of El Charro Road, and the Tri-Valley Golf Center, Crosswinds Church, and Las Positas Golf Course are farther east. Livermore Municipal Airport is slightly over 0.25 mile south of I-580 and just outside of the study area.
- East of Airway Boulevard to Portola Avenue, existing land uses are generally residential and commercial with areas of undeveloped parcels. A large single-family housing development is south of I-580 between Isabel Avenue and Portola Avenue. Limited agricultural uses are also along this segment of the I-580 Corridor Area.

### (c) Isabel North Area

The Isabel North Area is north of I-580 at the Isabel Avenue/I-580 interchange in the city of Livermore. The collective footprint currently consists of undeveloped land immediately north of I-580 and east of Isabel Avenue—the location of the proposed Isabel Station pedestrian touchdown structure and bus transfer facility (under the Proposed Project and DMU Alternative). The Shea Homes – Sage Project, a residential development, is under construction farther east of Isabel Avenue. Immediately west of Isabel Avenue, there currently is undeveloped land. Commercial uses are farther west of Isabel Avenue along I-580 and a residential subdivision is located to the northwest of the intersection of Isabel Avenue and Portola Avenue. Cayetano Park is northeast of the intersection. Representative photos of the Isabel North Area are shown in Figure 3.C-3.

### (d) Isabel South Area

The Isabel South Area is located in the city of Livermore, south of I-580, on both the east and west side of Isabel Avenue. The area is characterized by commercial uses, undeveloped land, and agricultural uses. Arroyo las Positas creek flows under I-580 and runs east to west though the Isabel South Area, and then crosses underneath Isabel Avenue. Representative photos of the Isabel South Area are shown in Figure 3.C-4.

Existing uses within the collective footprint north of East Airway Boulevard include agricultural uses and BART's park-and-ride lot, which is the location of the proposed Isabel Station parking facility (under the Proposed Project and DMU Alternative). Riparian vegetation lines both sides of Arroyo las Positas, with numerous trees, including eucalyptus and oaks. The collective footprint at Isabel Avenue/Kitty Hawk Road—the location of the proposed wayside facility under the Proposed Project and DMU Alternative—consists of undeveloped land.

Commercial office and warehouse buildings are south of Kitty Hawk Road and south of East Airway Boulevard along both sides of Isabel Avenue. West of Isabel Avenue and farther west along Kitty Hawk Road is Boomers! Livermore (an amusement park). East of Isabel Avenue and south of East Airway Boulevard is an area of unincorporated county land used for farming operations (G&M Farms) (see Section 3.F, Cultural Resources for a discussion of G&M Farms, referred to therein as the Gandolfo Ranch Historic District). Farther south and east along East Airway Boulevard are single-family residences and a residential trailer park.

## Isabel South Area

Location of proposed wayside facility at Isabel Avenue/Kitty Hawk Road, consisting of undeveloped land, with commercial uses beyond. (Proposed Project and DMU Alternative)

Location of proposed parking garage along East Airway Boulevard with existing agricultural uses. (Proposed Project and DMU Alternative)

Location of proposed parking garage along East Airway Boulevard with the BART park-and-ride lot. (Proposed Project and DMU Alternative)

Agricultural uses south of East Airway Boulevard (G&M Farms).

Commercial uses south of East Airway Boulevard.

Source: Urban Planning Partners, 2016, 2017.



Figure 3.C-4
Land Use and Agricultural Resources
Isabel South Area Photos

### (e) Cayetano Creek Area

The Cayetano Creek Area is north of I-580, beginning just west of the Portola Avenue/I-580 overcrossing and extending north along the Livermore city boundary into unincorporated county land. The collective footprint and the surrounding area consist of undeveloped agricultural land. Cayetano Creek runs generally north-south through this area. Farther to the west are Las Positas College and a residential subdivision, generally west and north of Campus Hill Drive. The Cayetano Creek Area would be the location of the proposed storage and maintenance facility (under the Proposed Project and DMU Alternative). Representative photos of the Cayetano Creek Area are shown in Figure 3.C-5.

### (f) Laughlin Road Area

The Laughlin Road Area is north of I-580 in the city of Livermore, bounded by Northfront Road to the south and Laughlin Road to the east. The area is generally characterized by agricultural and undeveloped land, with residential development farther to the north and west. Existing uses within the collective footprint include a go-cart race track, viewing stands, and associated parking lot—the location of the proposed surface parking lot (under the Express Bus/BRT Alternative). Storage and light industrial uses are immediately to the east, across Laughlin Road. Farther to the east of Laughlin Road, the area generally is undeveloped grazing land and rural agricultural uses on unincorporated county land. To the west of Laughlin Road, undeveloped land lies just north and west of the collective footprint with a large residential subdivision farther north along Laughlin Road. Office/commercial uses lie to the south, across I-580. Representative photos of the Laughlin Road Area are shown in Figure 3.C-6.

## (2) Land Uses Affected

Table 3.C-1 shows land uses within the collective footprint classified by the type of land use. A large proportion of the collective footprint is composed of existing transportation uses, primarily California Department of Transportation (Caltrans) ROW along I-580, and BART-owned parcels, as shown in Table 2-1 in Chapter 2, Project Description. Table 3.C-1 shows only the land uses in the remainder of the footprint, which would need to be acquired by BART, as further discussed in Section 3.D, Population and Housing, and does not include property already owned by BART. However, it is noted that agricultural land is identified within the collective footprint on BART-owned parcels in the Isabel South Area. This land is discussed below in the Important Farmland subsection and shown in Figure 3.C-9.

A detailed representation of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative is shown in Appendix B. In addition, a detailed list of the affected parcels within the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative and their respective land uses is presented in Appendix C of this EIR.

## Cayetano Creek Area

Looking east from Las Positas College towards the proposed storage and maintenance facility location. (Proposed Project and DMU Alternative)

Looking west from North Livermore Avenue towards the proposed storage and maintenance facility location in the background.

Source: Urban Planning Partners, 2016, 2017.

BART to Livermore Extension Project EIR

Figure 3.C-5
Land Use and Agricultural Resources
Cayetano Creek Area Photos

## Laughlin Road Area

Go-Kart race track at Laughlin Road, location of proposed Laughlin parking lot. (Express Bus/BRT Alternative)

Looking south on Laughlin Road towards the proposed Laughlin parking lot. (Express Bus/BRT Alternative)

Looking northwest towards the proposed Laughlin parking lot from Northfront Road and Laughlin Road. (Express Bus/BRT Alterantive)

Laughlin Road Area and adjacent industrial uses.

Source: Urban Planning Partners, 2016, 2017.



Figure 3.C-6
Land Use and Agricultural Resources
Laughlin Road Area Photos

**TABLE 3.C-1 AFFECTED LAND USES WITHIN THE COLLECTIVE FOOTPRINT (NON-BART OWNED PARCELS)**

| | Conventional BART Project | | | DMU Alternative (with EMU Option) | | | Express Bus/BRT Alternative | | |
|---|---|---|---|---|---|---|---|---|---|
| **Land Use Category** | **Parcels** | **Acres** | **Percent of Total** | **Parcels** | **Acres** | **Percent of Total** | **Parcels** | **Acres** | **Percent of Total** |
| Agricultural | 15 | 100.87 | 68.6% | 11 | 54.64 | 53.7% | - | - | - |
| Commercial and Office | 26 | 6.72 | 4.6% | 38 | 10.26 | 10.1% | 13 | 4.18 | 41.8% |
| Government/ Public Property | 30 | 15.64 | 10.6% | 38 | 18.02 | 17.7% | 15 | 5.62 | 56.2% |
| Industrial | 7 | 0.64 | 0.4% | 7 | 0.64 | 0.6% | - | - | - |
| Residential | 10 | 11.03 | 7.5% | 8 | 2.68 | 2.6% | - | - | - |
| Undeveloped | 23 | 9.87 | 6.7% | 28 | 13.84 | 13.6% | 2 | 0.42 | 4.2% |
| Other | 6 | 1.85 | 1.3% | 7 | 1.65 | 1.6% | 4 | 0.18 | 1.8% |
| **Total** | **117** | **147** | 100.0% | **137** | **102** | 100.0% | **34** | **10** | 100.0% |

Notes:
- = Not applicable; Other = Includes uses such as motels, parking lots, golf courses, and warehouses.
This table does not include parcels owned by BART, nor parcels that are currently occupied by existing transportation uses (i.e., within the Caltrans ROW or roadways).
Land use categories are based on Alameda County Assessor's property ownership information and do not always correspond to the underlying zoning.
The Enhanced Bus Alternative, as well as the bus infrastructure improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, would be constructed in the street ROW and no parcels are listed in the table for these improvements.
Sources: Alameda County Assessor's Office, 2017.

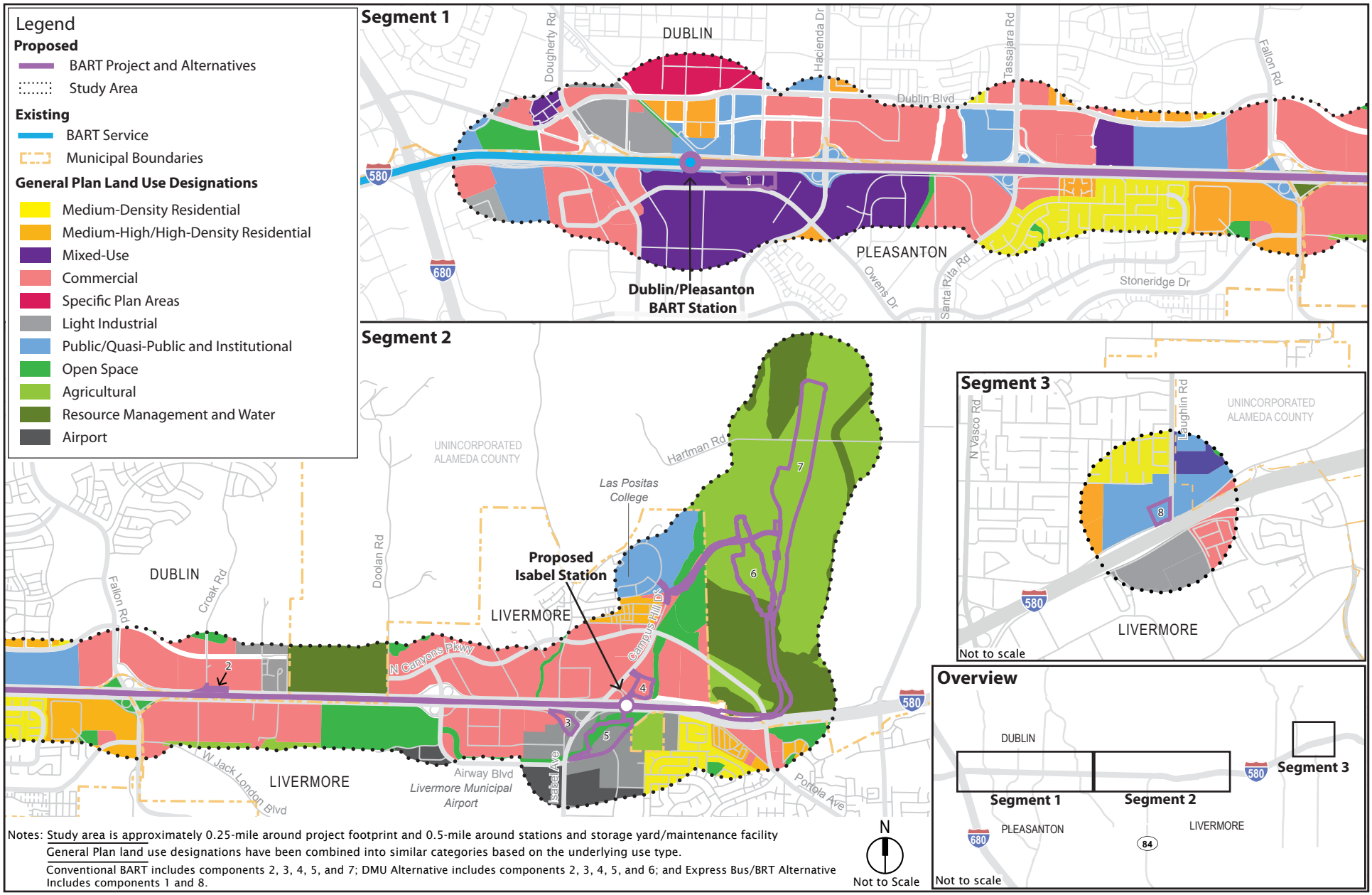
The majority of the 147 acres that would be affected under the Proposed Project would consist of agricultural uses, representing approximately 69 percent of the non-BART-owned parcels (approximately 101 acres). The other uses listed in Table 3.C-1 each account for approximately 1 to 10 percent. For the DMU Alternative, approximately 54 percent of the 102 acres that would be affected consist of agricultural uses (approximately 55 acres), 10 percent consist of government/public property, and the remainder of the uses each account for approximately 1 to 18 percent. Under the Express Bus/BRT Alternative, 10 acres would be affected; 56 percent are government/public property and 42 percent are commercial and office.

### (3) General Plan Land Use Designations

General plan land use designations represent a community's intention for future development in terms of land use and density. The land use designations in the study area encompass a variety of uses. Most land within the cities is designated for residential, commercial, industrial uses, and open space, while areas within unincorporated Alameda County are primarily designated for resource management or large-parcel agricultural uses. The generalized land use designations for the study area are presented in Figure 3.C-7 and listed in Table 3.C-2.

General plan land use designations within the study area are as follows:

- **Dublin/Pleasanton Station Area.** Primarily mixed-use, commercial, and community facility uses, with a small area designated for residential directly north of the Dublin/Pleasanton Station and open space west of the station along I-580.
- **I-580 Corridor Area.** Varies from west to east along the corridor. Within the city of Dublin and north of I-580, designations are generally commercial with some mixed-use. Within the city of Pleasanton and south of I-580, land uses include medium- to high-density residential as well as some commercial and mixed-use. Farther east in unincorporated Alameda County, north of I-580 between the Dublin and Livermore city limits (Doolan Canyon), are resource management and public land. General Plan designations within the city of Livermore, along both sides of I-580, are generally commercial, medium-density residential, and medium-high-/high-density residential, with some open space. Some land at the eastern end of the corridor is also agricultural.
- **Isabel North Area.** Mainly commercial use and medium-high-/high-density residential, with a few areas of open space.
- **Isabel South Area.** Light industrial and medium-density residential. There are also a few designations for community facilities, agricultural, open space, and commercial.




Notes: Study area is approximately 0.25-mile around project footprint and 0.5-mile around stations and storage yard/maintenance facility
General Plan land use designations have been combined into similar categories based on the underlying use type.
Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative Includes components 1 and 8.

Source: Arup, 2017; Alameda County, 2016; City of Dublin, 2016; City of Livermore, 2016; City of Pleasanton, 2016.

BART to Livermore Extension Project EIR

Figure 3.C-7
Land Use and Agricultural Resources
General Plan Designations in the Study Area

**TABLE 3.C-2 GENERAL PLAN LAND USE DESIGNATIONS**

| Site | General Plan Land Use Designation | |
|---|---|---|
| Dublin/Pleasanton Station Area | Dublin:<br>Public/Quasi-Public and Institutional<br>Open Space<br>Mixed-Use<br>Commercial<br>Light Industrial<br>Medium-High-/High-Density Residential<br>Specific Plan Areas | Pleasanton:<br>Commercial<br>Public/Quasi-Public and Institutional<br>Mixed-Use |
| I-580 Corridor Area | Dublin:<br>Commercial<br>Public/Quasi-Public and Institutional<br>Mixed-Use<br>Open Space<br>Light Industrial<br><br>Pleasanton:<br>Mixed-Use<br>Open Space<br>Commercial<br>Medium-Density Residential<br>Medium-High-/High-Density Residential<br>Public/Quasi-Public and Institutional<br>Light Industrial | Livermore:<br>Commercial<br>Open Space<br>Light Industrial<br><br>Unincorporated Alameda County:<br>Resource Management and Water |
| Isabel North Area | Livermore:<br>Commercial<br>Open Space | |
| Isabel South Area | Livermore:<br>Medium-Density Residential<br>Commercial<br>Light Industrial<br>Open Space<br>Airport | Unincorporated Alameda County:<br>Agricultural |
| Cayetano Creek Area | Livermore:<br>Medium-High-/High-Density Residential<br>Commercial<br>Public/Quasi-Public and Institutional<br>Open Space | Unincorporated Alameda County:<br>Agricultural<br>Resource Management and Water |
| Laughlin Road Area | Livermore:<br>Medium-Density Residential<br>Medium-High-/High-Density Residential<br>Commercial<br>Light Industrial<br>Public/Quasi-Public and Institutional | Unincorporated Alameda County:<br>Public/Quasi-Public and Institutional<br>Resource Management and Water<br>Mixed-Use |

Note: General Plan land use designations have been generalized into broader categories based on the specific use designation of the jurisdiction to provide comparison across jurisdictions.
Sources: County of Alameda, 2016; City of Dublin, 2016; City of Pleasanton, 2016; City of Livermore, 2016.

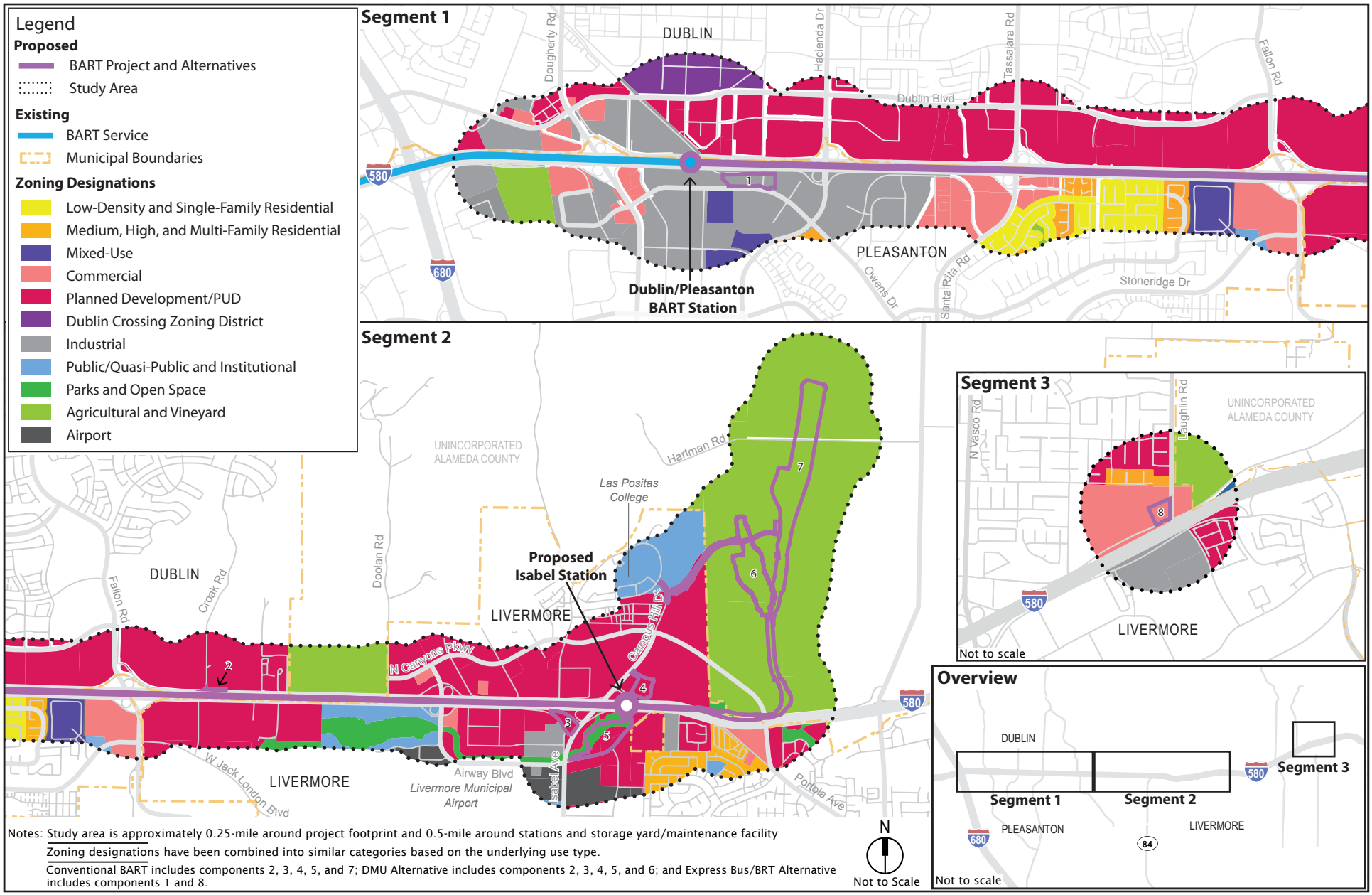
- **Cayetano Creek Area.** Primarily agricultural. A few areas are also designated for open space, resource management, and community facilities.
- **Laughlin Road Area.** Medium-density residential, light industrial, public/quasi-public and institutional, and commercial.

### (4) Zoning Designations

While there are many different zoning designations throughout the study area, planned development is the main designation along the I-580 corridor. Other common zoning designations include commercial, industrial, and residential. The designations for the cities of Dublin, Pleasanton, and Livermore, and for Alameda County, are shown in Figure 3.C-8.

Zoning designations within the study area are as follows:

- **Dublin/Pleasanton Station Area**
  - Dublin: Industrial, planned development, and Dublin Crossing Zoning District
  - Pleasanton: Industrial, mixed-use, and agricultural
- **I-580 Corridor Area**
  - Dublin: Predominantly planned development
  - Pleasanton: Planned development; commercial; low-density and single-family residential; medium, high, and multi-family residential; public/quasi-public and institutional
  - Livermore: Planned development; commercial; medium-/high-density and multi-family residential; public/quasi-public and institutional; parks and open space; and airport designations
  - Unincorporated Alameda County: Agricultural and vineyard
- **Isabel North Area**
  - Livermore: Planned development (allowing business park, commercial, residential and junior college uses)
- **Isabel South Area**
  - Livermore: Planned development and residential, with some industrial, parks and open space, and airport
  - Unincorporated Alameda County: Planned development




Notes: Study area is approximately 0.25-mile around project footprint and 0.5-mile around stations and storage yard/maintenance facility

Zoning designations have been combined into similar categories based on the underlying use type.

Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017; Alameda County, 2016; City of Dublin, 2016; City of Livermore, 2016; City of Pleasanton, 2016.

BART to Livermore Extension Project EIR

Figure 3.C-8
Land Use and Agricultural Resources
Zoning Designations in the Study Area

- **Cayetano Creek Area**
  - Livermore: Public/quasi-public and institutional
  - Unincorporated Alameda County: Agricultural and vineyard
- **Laughlin Road Area**
  - Livermore: Commercial, residential, industrial, and planned development
  - Unincorporated Alameda County: Agricultural and vineyard

### c. Agricultural Resources

According to the Alameda County Farm Bureau, the total value of agricultural production in the county for 2016 was approximately $40 million. The five leading agricultural commodities were as follows (ordered by descending value): wine grapes, woody ornamentals, cattle and calves, range, and hay.[4] Most of the agricultural lands in the study area are in the East County Planning Area in unincorporated Alameda County, outside the Urban Growth Boundary (UGB) of the East County Planning Area.

Agricultural resources considered in this EIR include Important Farmland, designated by the California Department of Conservation's Division of Land Resource Protection, and land under California Land Conservation Act contract (commonly known as the Williamson Act), as described below.

#### (1) Important Farmland

The California Department of Conservation's Division of Land Resource Protection maintains the Farmland Mapping and Monitoring Program (FMMP), which rates land throughout California based on soil quality, irrigation status, and potential for productivity. Land of the highest agricultural quality is called Prime Farmland. Prime Farmland—along with Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance—is generally described here as "Important Farmland." The FMMP categories are defined in Table 3.C-3.

According to the most recent California Department of Conservation survey, Alameda County contained 247,970 acres of agricultural land in 2014.[5] Of that total, 241,169 acres (97 percent) was devoted to grazing. In 2014, the county contained 6,801 acres of Important Farmland, which consisted of 3,433 acres of Prime Farmland, 1,109 acres of

[4] California Farm Bureau Federation, 2016. Alameda County Farm Bureau. Available at: http://www.cfbf.com/alameda-fb, accessed September 13, 2016.

[5] California Department of Conservation, 2016a. Alameda County 2012-2014 Land Use Conversion, Table A-1. Available at: http://www.conservation.ca.gov/dlrp/fmmp/Pages/Alameda.aspx, accessed April 25, 2017.

Farmland of Statewide Importance, and 2,259 acres of Unique Farmland; as of 2014, there was no Farmland of Local Importance in Alameda County.[6]

**TABLE 3.C-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 time during the 4 years prior to the mapping date. |
| Farmland of Statewide Importance | Land similar to Prime Farmland but with minor shortcomings, such as greater slopes or lesser ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date. |
| Unique Farmland | Land with lower-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 4 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. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. |
| 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. |
| Water | Perennial water bodies with an extent of at least 40 acres. |
| Other Land | Land not included in any other mapping category. Common examples include low-density rural developments, vegetative and riparian areas not suitable for livestock grazing, confined animal agriculture 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. |

Note: FMMP = Farmland Mapping and Monitoring Program.
Source: California Department of Conservation, 2015.

[6] Ibid.

Within the collective footprint, approximately 6.3 acres of Prime Farmland and approximately 5.5 acres of Unique Farmland are located in the Isabel South Area on BART-owned property, as shown in Figure 3.C-9. In addition, the relocation to the south of a portion of East Airway Boulevard would encroach into G&M Farms, a 20-acre parcel of Prime Farmland in the Isabel South Area. Only a small portion of G&M Farms (approximately 0.2 acre) would be within the collective footprint and this portion is used as a parking lot. No other land designated by the FMMP as Important Farmland is within the collective footprint.

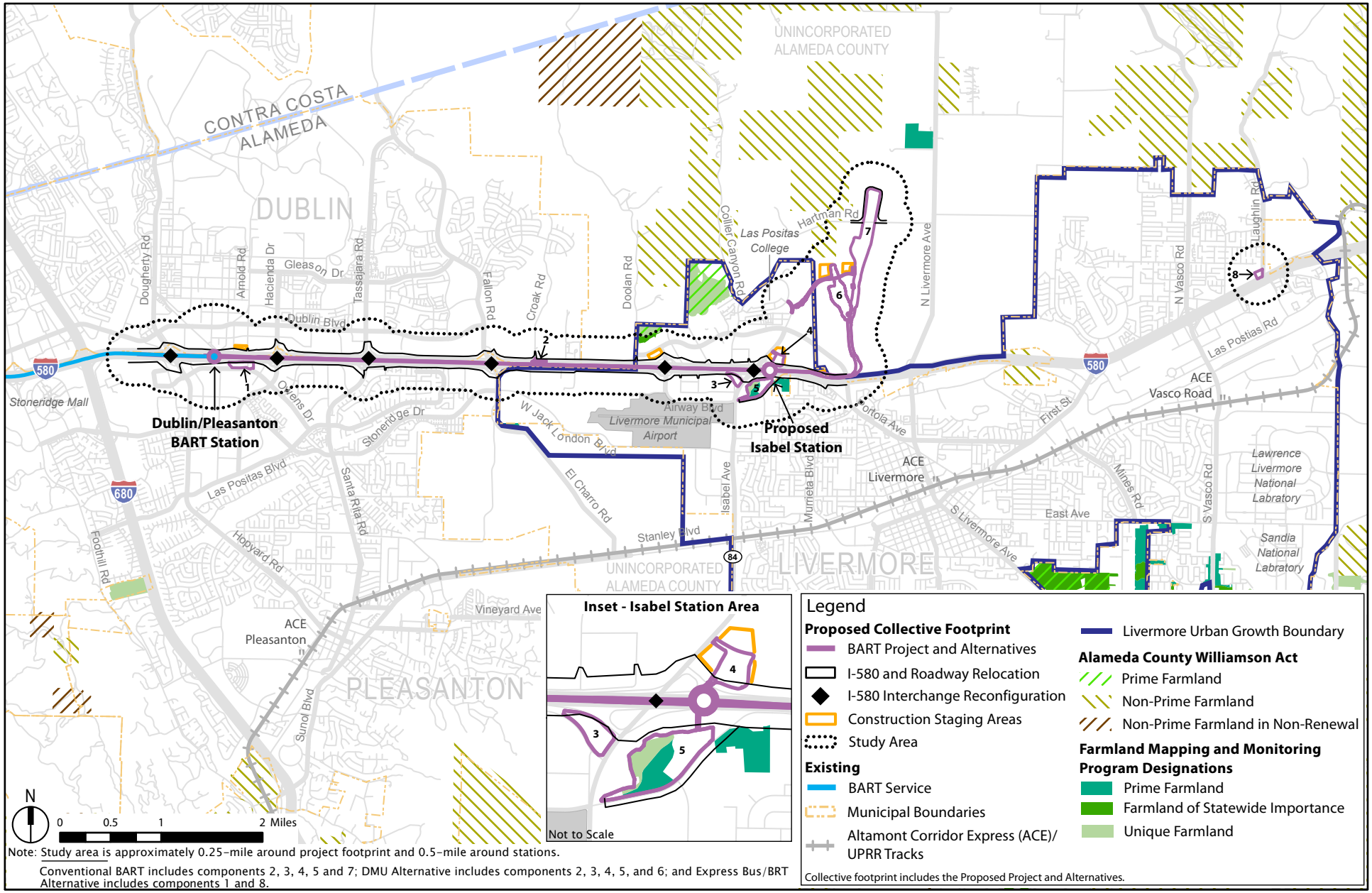
In addition, two areas of Important Farmland are within the broader study area but outside the collective footprint. Of these two, the area nearest to the collective footprint is the remaining portion of G&M Farms, which is used for agriculture. An area of Farmland of Statewide Importance and Unique Farmland is located in the study area near North Canyons Parkway, approximately 1,000 feet from the proposed roadway relocation and rail alignment under the Proposed Project and DMU Alternative.

### (2) Williamson Act Contracts

As established in the California Land Conservation Act of 1965 (commonly known as the Williamson Act), local governments may enter into contracts with private landowners 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. These contracts automatically renew each year. Tax assessment of contracted lands is based on farming and open space uses rather than full market value.[7]

The Williamson Act distinguishes between Prime and Non-Prime Farmland. Its definition of Prime Farmland, codified in Government Code Section 51201(c), is unrelated to Prime Farmland as defined by the FMMP. Non-Prime Farmland may include but is not limited to land used for grazing or dry farming. In addition, Williamson Act land can be in non-renewal, a process initiated either by the landowner or the county through which a Williamson Act contract stops self-renewing each year, but all terms and conditions of the contract/Act remain in effect for the remainder of the term (California Government Code Section 51246).

[7] California Department of Conservation, 2016b. Williamson Act: Questions and Answers. Available at: http://www.conservation.ca.gov/dlrp/lca/Documents/WA%20fact%20sheet%2006.pdf, accessed September 14, 2016.




Note: Study area is approximately 0.25-mile around project footprint and 0.5-mile around stations.

Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source:Arup, 2017; BART, 2010; Department of Conservation, 2015.

Approximately 16 million acres of farm and ranch land in California is protected under this legislation.[8] In 2014, approximately 135,647 acres of land in Alameda County were enrolled in Williamson Act contracts.[9] As shown in Figure 3.C-9, there is no land enrolled in Williamson Act contracts within the collective footprint. However, there is land under Williamson Act contract in the study area, along the northwest portion of the Cayetano Creek Area.

## 3. Regulatory Framework

As described in the Introduction subsection above, BART is not required to comply with local land use plans, policies, and zoning ordinances, pursuant to California Government Code Sections 53090 and 53091. However, for informational purposes—and consistent with BART's policy of coordinating system expansion with local land use planning—this section includes a discussion of relevant county and local land use policies and regulations. In addition, this subsection describes the relationship of Plan Bay Area 2013 (Plan Bay Area) to the BART to Livermore Extension Project, as it is not exempt from Plan Bay Area, which was adopted pursuant to State law (Senate Bill 375). The locations and boundaries of the specific plans, area plans, and other special planning areas and regulations discussed below are shown in Figure 3.C-10.

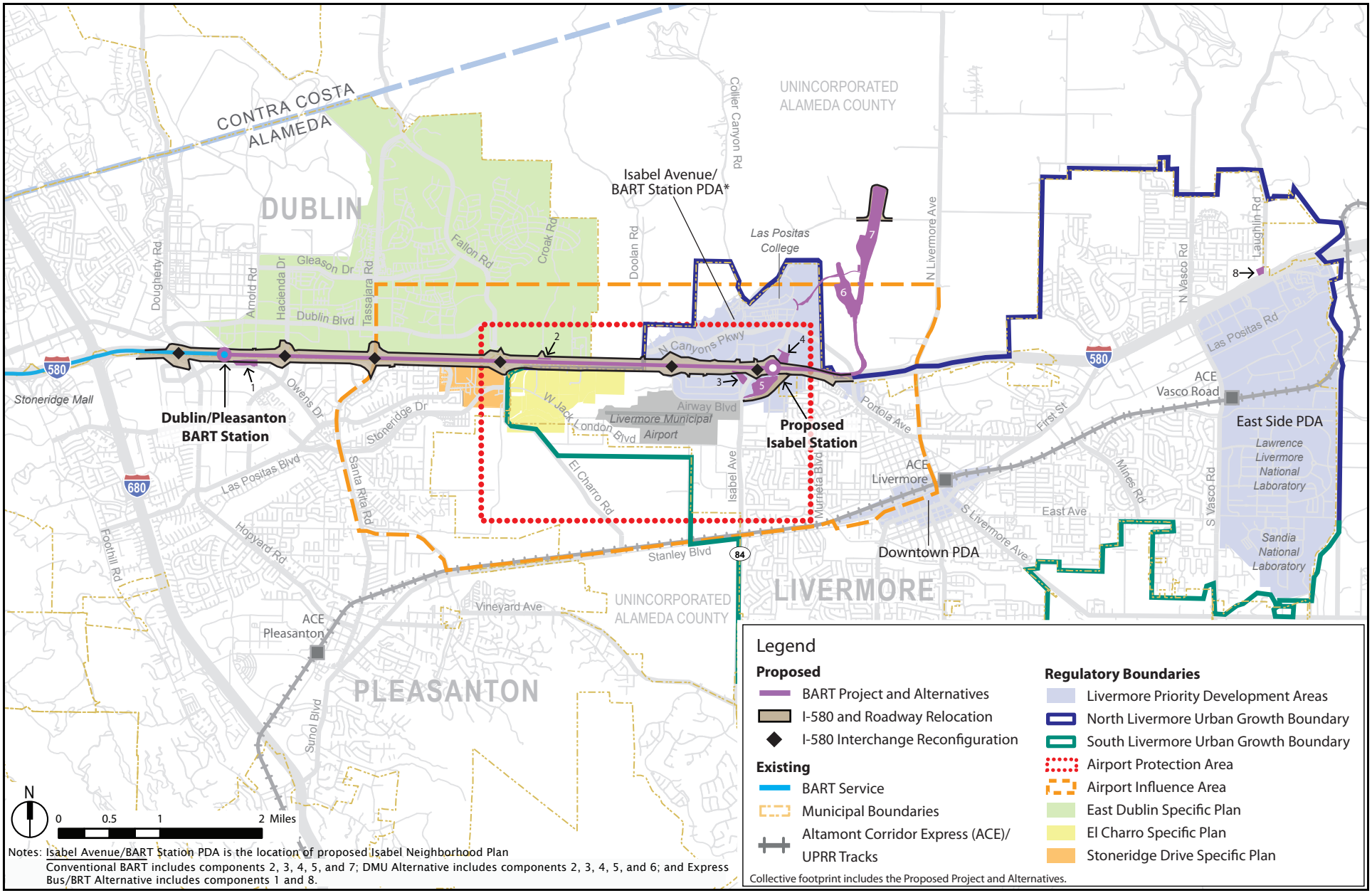
### (1) Plan Bay Area

Plan Bay Area was jointly adopted by the Metropolitan Transportation Commission and the Association of Bay Area Governments Executive Board in July 2013. Plan Bay Area responds to the requirements of Senate Bill 375, which sets goals to decrease greenhouse gas emissions from vehicles and accommodate increased density of housing growth. See Section 3.L, Greenhouse Gas Emissions for additional information regarding Senate Bill 375.

As the nine-county San Francisco Bay Area's Regional Transportation Plan (RTP) and Sustainable Communities Strategy, Plan Bay Area represents the regional framework for coordinating local and regional land use and transportation planning. It specifically supports continued investment in public transit operations and capital projects. The BART to Livermore Extension Project is listed in both Plan Bay Area and the (final) draft of its update, Plan Bay Area 2040, which was published in July 2017. Because BART has not yet adopted the Proposed Project or one of the alternatives, the BART to Livermore Extension Project was not included in the Plan Bay Area 2040 project performance assessment or transportation conformity modeling. Should the BART Board of Directors adopt either the Proposed Project, the DMU Alternative/EMU Option, or the Express Bus/BRT Alternative and desire discretionary

[8] Ibid.

[9] California Department of Conservation, 2014. The California Land Conservation Act 2014 Status Report, p.34.




Notes: Isabel Avenue/BART Station PDA is the location of proposed Isabel Neighborhood Plan
Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Alameda County Airport Land Use Commission, 2012; Arup, 2017; BART, 2010.



Figure 3.C -10
Land Use and Agricultural Resources
Regulatory Boundaries and Special Planning Areas

regional funding to design and construct it, the adopted project would be subject to MTC's project performance assessment process, assuming MTC continues to use this process to prioritize discretionary regional funding in future updates to Plan Bay Area. See Chapter 1, Introduction for additional information regarding MTC's project performance assessment process.

Plan Bay Area identifies Priority Development Areas (PDAs) as the implementing framework for housing and job development and anticipates that 78 percent of new housing and 62 percent of new jobs would be developed in PDAs.[10] Within the study area, there are seven PDAs as follows: three in Dublin, one in Pleasanton, and three in Livermore. Due to the nature of the Proposed Project, which would extend BART service 5.5 miles to the east of the Dublin/Pleasanton Station to a new terminus station at Isabel Avenue, this discussion focuses on the PDAs in the city of Livermore. The PDAs, which are shown in Figure 3.C-10, are as follows: (1) Livermore Downtown PDA; (2) Livermore East Side PDA; and (3) Livermore Isabel Avenue BART Station PDA, located at the proposed Isabel Station and the location of the proposed INP. See Section 3.D, Population and Housing for a discussion of growth projections associated with these PDAs.

- The Livermore Isabel Avenue BART Station PDA is a 1,131-acre Potential PDA envisioned as a transit-oriented neighborhood with a mix of housing types close to transit and trail connections, an expanding employment center, and Las Positas College. This PDA encompasses the proposed Isabel Station, as well as portions of the project corridor just to the west and east. Bus transit would provide local and regional transit connections for residents, commuters, college students, and faculty. This area would serve commuters, new residential development, and the college.
- The Livermore East Side PDA is a 785-acre Potential PDA next to two major employment centers in the city, the Lawrence Livermore and Sandia National Laboratories, and includes the Altamont Corridor Express (ACE) rail station (an existing regional transit connection). This PDA extends south of I-580 and west of Greenville Road to Vasco Road. The overall vision for the area integrates a revitalized research and technology center with affordable housing of varied types and commercial services.
- The Livermore Downtown PDA is a 252-acre Planned PDA envisioned as a mixed-use district that includes affordable infill housing, streetscape and pathway enhancements, improved bicycle and pedestrian connections to transit (including an ACE Station and a Livermore-Amador Valley Transit Authority [LAVTA] transit center), significant live-work opportunities, employment, shopping, and a variety of cultural and entertainment venues. The Downtown PDA is approximately 1.3 miles south of the collective footprint.

[10] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

### (2) Alameda County General Plan

The Alameda County General Plan consists of several documents. Three area plans (Eden Area, Castro Valley Area, and East County) contain land use and circulation elements for their respective geographic areas, as well as area specific goals, policies, and actions for circulation, open space, conservation, safety, and noise. The East County Area Plan, adopted by the Alameda County Board of Supervisors in May 1994 and amended in May 2002, describes the County's plan for long-range development and resource conservation within the unincorporated 418-square-mile plan area, which includes the study area.[11] In addition, the countywide housing, conservation, open space, noise, seismic and safety, and scenic route elements contain goals, policies, and actions that apply to the entire unincorporated county. Relevant goals, policies, and programs are summarized below.

#### (a) Alameda County Open Space Element

The Alameda County Open Space Element presents policy proposals for the protection and preservation of major open areas with Alameda County. [12]

- **Designate Agricultural Open Space**. As a means of limiting urban growth and preserving agricultural lands and other natural resources, all areas shown as cultivated and uncultivated agriculture on the County General Plan should be designated as permanent agricultural open space on the Open Space Plan.
- **Limit Development in Agricultural Areas**. Agricultural areas should be free of urban type development with dwellings permitted only for those persons involved in agricultural production.

#### (b) East County Area Plan

The East County Area Plan discusses issues that directly address physical development, as well as social, environmental, and economic issues related to land use considerations.[13]

- **Land Use Policy 1.** The County shall identify and maintain a County Urban Growth Boundary 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.C-10).

[11] County of Alameda, 1994. East County Area Plan. Adopted May. Amended November 2000.
[12] County of Alameda, 1973. Alameda County General Plan, Open Space Element. Adopted May 30. Amended May 5, 1994.
[13] County of Alameda, 1994. East County Area Plan. Adopted May. Amended November 2000.

- **Land Use Policy 17.** The County shall support the eventual city annexation or incorporation of all existing and proposed urban development within the Urban Growth Boundary consistent with the East County Area Plan.
- **Land Use Policy 51.** The County shall work with East County cities to preserve a continuous open space system outside the Urban Growth Boundary with priority given to the permanent protection of the Resource Management area between Dublin and North Livermore and the area north of the Urban Growth Boundary in North Livermore […].
- **Land Use Policy 54**. The County shall approve only open space, park, recreational, agricultural, limited infrastructure, public facilities (e.g., limited infrastructure, hospitals, research facilities, landfill sites, jails, etc.) and other similar and compatible uses outside the Urban Growth Boundary.
- **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 Urban Growth Boundary.
- **Land Use Policy 73.** The County shall require buffers between those areas designated for agricultural use and new non-agricultural uses within agricultural areas or abutting parcels. The size, configuration and design of buffers shall be determined based on the characteristics of the project site and the intensity of the adjacent agricultural uses, and if applicable, the anticipated timing of future urbanization of adjacent agricultural land where such agricultural land is included in a phased growth plan. The buffer shall be located on the parcel for which a permit is sought and shall provide for the protection of the maximum amount of arable, pasture, and grazing land feasible.
- **Land Use Policy 86.** The County shall not approve cancellation of Williamson Act contracts within or outside the County Urban Growth Boundary 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 Urban Growth Boundary, 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.
- **Land Use Policy 88.** The County shall encourage the cities in East County to adopt policies and programs (such as mitigation fees for the conversion of agricultural lands within city boundaries and on lands to be annexed to a city) to fund the Alameda

County Open Space Land Trust for protection of resources and the preservation of a continuous open space system outside the Urban Growth Boundary.

- **Land Use Policy 89.** The county shall retain rangeland in large, contiguous blocks of sufficient size to enable commercially viable grazing.
- **Land Use Policy 95**. Outside the Urban Growth Boundary, the County may approve divisions of parcels only to the extent […] consistent with the Initiative, and, if applicable, the criteria set forward in Table 5 Standards for Subdivision and Site Development Review for Agricultural Parcels.
- **Land Use Program 29**. The County shall develop guidelines for establishing buffers between existing agricultural uses and potentially incompatible uses. Buffers may take the form of precluding incompatible uses within a certain distance of agricultural operations, erecting physical barriers to nuisances such as berms or foliage, or mitigation of impacts to non-agricultural uses (e.g., noise insulation). Buffers may consist of a topographic feature, a substantial tree stand, watercourse, or similar feature.
- **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.
- **Transportation Policy 206.** The County shall encourage BART to extend service to the Livermore area by 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 sub-regional transportation fee being developed by the Tri-Valley Transportation Council.

### (c) East County Urban Growth Boundary

The East County Area Plan includes a UGB that limits the encroachment of urban development onto open spaces and agricultural lands (see Land Use Policy 1, above). Urban development is defined as development with a density of one residential unit per acre or higher, or equivalent industrial or commercial densities. The goal of the UGB is to focus urban development in or near existing cities where it will be efficiently served by existing facilities. Policy 54 of the East County Area Plan provides that "The County shall approve only open space, park, recreational, agricultural, limited infrastructure, public

facilities (e.g., limited infrastructure, hospitals, research facilities, landfill sites, jails, etc.) and other similar and compatible uses outside the Urban Growth Boundary." [14]

In November 2000, Alameda County voters approved the Save Agriculture and Open Space Lands Initiative (Measure D), which redrew the UGB and established it in its current form. The initiative's intent was to further preserve agricultural lands, maintain the natural environment, and protect local wildlife and habitat areas outside of the UGB. Included in the initiative were amendments to portions of the existing East County Area Plan.

### (3) Local Land Use Plans

Land use patterns within the study area are determined largely by the general plans and specific plans of the cities of Dublin, Pleasanton, and Livermore, in addition to the countywide plans described above. Various special planning areas and regulatory boundaries are also in place in each city to achieve targeted development goals in specific areas.

#### (a) City of Livermore General Plan

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 Livermore through 2025. The Land Use Element includes a number of goals, policies, and objectives pertinent to the evaluation of the BART corridor extension and associated sites. The Community Character, Circulation and Open Space and Conservation Elements also contain relevant goals, policies, and objectives, as summarized below: [15, 16, 17]

- *Objective LU-1.1.* Locate new development so as to create a consolidated pattern of urbanization, maximizing the use of existing public services and facilities.
- *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.
- *Objective LU-4.4.* Protect the Municipal Airport from encroachment by incompatible uses.
    - Policy 2. Development in the Airport Influence Area [...] shall be in conformance with the Livermore Airport Land Use Compatibility Plan (ALUCP), dated August 2012. Land uses shall be consistent with this General Plan, the Livermore

[14] Ibid.
[15] City of Livermore, 2013a. City of Livermore General Plan: 2003-2025, Land Use Element. Adopted 2004, amended 2013.
[16] City of Livermore, 2014. City of Livermore General Plan: 2003-2025, Circulation Element. Adopted 2004, amended 2014.
[17] City of Livermore, 2004. City of Livermore General Plan: 2003-2025, Open Space and Conservation Element.

Development Code, and the Land Use and Safety Compatibility Criteria contained in Table 2-3 and Table 3-2 of the ALUCP. Existing Land Uses, as defined in Section 2.4 of the ALUCP, are not subject to the policies of the Airport Land Use Commission (ALUC). ALUCP Section 2.7.5.7 lists other special conditions where ALUC authority may be limited (see Figure 3.C-10).

- Policy 5. New residential land use designations or the intensification of existing residential land use designations shall be prohibited within the Airport Protection Area (APA).[18] 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.C-10).

- *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.
  - Policy 4. 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, rental 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;

[18] The ALUCP does make an exception for possible TOD around Isabel Avenue, as described below in the Livermore Municipal Airport Land Use Compatibility Plan subsection.

(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 or facilities, and repair shops primarily for agriculture;

(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-2.1.* Provide viable alternatives to single-occupant vehicle travel.
  - Action 4. Preserve ROW adjacent to I-580 to allow widening for high-occupancy vehicle lanes, auxiliary lanes, and BART.
  - Action 7. Advocate for a first-stage extension of BART along the I-580 freeway to a station at Isabel Avenue/I-580 with an eventual extension to a station at Greenville Road/I-580 as the City's preference.
- *Objective OSC-3.1*. Preserve agricultural land, a vital part of Livermore's open space network and an irreplaceable natural resource.
  - Policy 1. Undeveloped lands that are State-designated as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland shall be preserved, to the greatest extent feasible, for open space or agricultural use.
  - Policy 2. The City shall encourage the County to preserve agricultural activities outside the Urban Growth Boundary.
  - Policy 5. The City shall encourage agricultural landowners to enter the agricultural preserve program established under the Land Conservation Act, particularly in areas adjacent to patterns of urbanization encouraged by the General Plan.
- *Objective OSC-6.1.* Minimize air pollution emissions.
  - Policy 7. 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) the funding and construction of a BART or light/commuter rail extension to Livermore […];

### (b) Livermore Urban Growth Boundary

The provisions of the UGB contained in the East County Area Plan protect land outside of the UGB from urban development. However, the East County Area Plan no longer protects these areas if they are annexed to Livermore. Therefore, the City of Livermore has adopted its own UGB limits—one for north Livermore and one for south Livermore. The north Livermore UGB connects to the existing south Livermore UGB to form a continuous UGB around the entire city (see Figure 3.C-10). The UGBs for these areas were approved by Livermore voters as initiatives in 2002 and 2000, respectively. 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.

Even if lands outside the north Livermore UGB were annexed to the City of Livermore, they would remain subject to the East County Area Plan development regulations. These regulations prescribe minimum parcel sizes and restrict permitted uses to single-family dwelling units, agricultural uses, very limited commercial uses, institutional and non-profit uses, and "[c]ity and other government facilities and infrastructure, and public utilities, that are limited to meeting the needs created by permitted uses in North Livermore, except if the City Council reasonably finds more extensive public need that cannot be met outside North Livermore [….]"(North Livermore Urban Growth Boundary Initiative, Section 12(7)).[19]

### (c) City of Livermore – 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 and is thereby roughly contiguous with the I-580 corridor. It is also bordered by El Charro Road to the west, Livermore Municipal Airport and Municipal Golf Course to the east, and mining quarries to the south. The specific plan is a land use framework that includes 152 acres of regional serving retail and 97 acres of open space.[20] The northwest portion of the plan area is developed with the 57-acre San Francisco Premium Outlets in Livermore. The Crosswinds

[19] City of Livermore, 2013b. City of Livermore General Plan: 2003-2025, Land Use Element. Appendix A, North Livermore Urban Growth Boundary Initiative. December. Adopted 2004, amended 2013.

[20] City of Livermore, 2007. El Charro Specific Plan. July.

Church and Tri-Valley Golf Center are located to the east, and two commercial centers are approved but not yet constructed to the east and south, respectively, of the San Francisco Premium Outlets.

### (d) Livermore Municipal Airport Land Use Compatibility Plan

The Livermore Municipal Airport is approximately 0.25 mile south of I-580 along the project corridor. The Livermore Municipal ALUCP identifies a number of different zones around the Livermore Municipal Airport that are defined to ensure that surrounding land uses are compatible with airport activities. These zones include the Airport Influence Area (AIA), which is under the jurisdiction of the ALUC, and the APA, which is under the jurisdiction of the City of Livermore.

The AIA is the area in which current or future airport-related noise, overflight, safety, and/or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses. This is the area within which the ALUC is authorized to review local land use actions affecting the area, including adoption or amendments of general plans, specific plans, zoning ordinances, and building regulations. The AIA includes the I-580 corridor from Tassajara Road/Santa Rita Road through North Livermore Avenue, and includes a large portion of the collective footprint (the majority of the I-580 Corridor Area, Isabel North Area, Isabel South Area, and much of the Cayetano Creek Area), as shown in Figure 3.N-3 in Section 3.N, Public Health and Safety. The Dublin/Pleasanton Station Area and the Laughlin Road Area are not located within any airport zones.

The APA was established by the City of Livermore in 1991. The APA extends 5,000 feet beyond the runways to the north, south, and east, and 7,000 feet to the west (typically the takeoff direction). The APA includes the I-580 corridor from just west of Fallon Road/El Charro Road to east of Isabel Avenue, which includes portions of the collective footprint (a portion of I-580 Corridor Area, Isabel North Area, and Isabel South Area), as shown in Figure 3.N-3. The Livermore Municipal ALUCP generally prohibits new residential uses within the APA; however, the APA may be modified by the City of Livermore to allow transit-oriented residential development around the proposed Isabel Station.[21] See Section 3.N, Public Health and Safety for further analysis related to airport safety.

### (e) City of Pleasanton General Plan

The City of Pleasanton General Plan, adopted in July 2009, guides land use and development in Pleasanton through 2025. The project corridor extends approximately 1.5

[21] Alameda County Airport Land Use Commission, 2012. Livermore Executive Airport Land Use Compatibility Plan, p. 3-10. August.

miles along the city boundaries, from just west of the Dublin/Pleasanton Station to just west of the El Charro Road interchange at Las Positas Boulevard.

The following goals, objectives, policies and actions from the City of Pleasanton General Plan are relevant to the land use evaluation:[22]

- *Land Use Policy 18.* Establish a well-planned mixture of land uses around the BART Stations.
- *Circulation 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 transit-oriented development (TOD).
- *Circulation 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 Altamont Commuter Express rail service.

**(f) City of Pleasanton – Stoneridge Drive Specific Plan Amendment/Staples Ranch**

The Stoneridge Drive Specific Plan was originally adopted in October 1989.[23] The 293-acre plan area is located in the northeast corner of the city of Pleasanton, bounded by I-580 to the north and El Charro Road to the east. The 124-acre Staples Ranch property lies in the northeast portion of this area. Although the entire plan area is within Pleasanton's sphere of influence, 196 acres are within unincorporated Alameda County. In August 2010, the Stoneridge Drive Specific Plan was amended to address the future development on the Staples Ranch property.

The Stoneridge Drive Specific Plan proposed the following uses for the plan area: an automobile mall, retail commercial, a continuing care community, a neighborhood park, and a community park. The specific plan acknowledges BART's planned extension along the I-580 ROW; however, no specific policies reference the extension. As of 2016, the plan area has been largely built out with primarily residential uses as well as an automobile dealership in the northeast corner of the Staples Ranch property.

**(g) City of Dublin General Plan**

The City of Dublin General Plan, the City's overarching land use policy document, was adopted in 1985 (as amended 2015) and is effective through 2025. The project corridor

[22] City of Pleasanton, 2015. Pleasanton General Plan 2005–2025.
[23] City of Pleasanton, 1989. Stoneridge Drive Specific Plan. October 3.

extends over 3 miles along the city boundaries, from just east of the Dublin/Pleasanton Station to east of Fallon Road. As a result, the following policies for Dublin's Eastern Extended Planning Area are relevant to the land use evaluation:[24]

- *Circulation Policy 5.3.1.A.1.* Support improved local transit as essential to a quality urban environment, particularly for residents who do not drive.
- *Circulation Policy 5.3.1.A.2*. Support the development of a community that facilitates and encourages the use of local and regional transit systems.
- *Circulation Policy 5.3.1.B.1.* 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.
- *Circulation Policy 5.3.1.B.4.* Capitalize on opportunities to connect into and enhance ridership on regional transit systems, including BART, LAVTA, and any future light rail systems.
- *Circulation Policy 5.5.1.A.3.* Enhance the multi-modal circulation network to better accommodate alternative transportation choices, including BART, bus, bicycle, and pedestrian transportation.

### (h) City of Dublin—Eastern Dublin Specific Plan

The Eastern Dublin Specific Plan area, on the eastern edge of the city of Dublin, is bordered by I-580 to the south and the Alameda/Contra Costa County line to the north, as shown in Figure 3.C-10. Although the specific plan was approved in 1993, subsequent amendments, such as the addition of the Dublin Transit Center and portions of Fallon Village, have increased the size of the plan area. The specific plan designates significant portions of the area for employment-generating uses, which are generally adjacent to freeways and transit facilities. Large-scale projects at freeway interchanges are designated as gateways into the plan area.[25]

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, summarizes the impacts, and provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

[24] City of Dublin, 2015. City of Dublin General Plan.
[25] City of Dublin, 1994. Eastern Dublin Specific Plan. Available at: http://dublinca.gov/DocumentCenter/View/7776.

### a. Standards of Significance

For the purposes of this EIR, impacts related to land use and agricultural resources are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- Physically divide an established community
- Conflict with existing zoning for or cause rezoning of forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))
- Result in the loss of forest land or conversion of forest land to non-forest use
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (collectively referred to herein as Farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use
- Conflict with a Williamson Act contract
- Conflict with existing zoning for agricultural use
- Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use or conversion of forest land to non-forest use

CEQA Guidelines Appendix G directs lead agencies to evaluate whether a proposed project could conflict with applicable land use plans, policies and regulations, including zoning ordinances. BART is exempt under State law from compliance with local land use ordinances—including local zoning—as described in the Introduction subsection above. Furthermore, CEQA grants lead agencies broad discretion to develop their own standards of significance. [26] Therefore, BART would typically not consider conflicts with existing zoning for agricultural use a significant impact under CEQA. In this case, however, BART acknowledges that the Proposed Project and DMU Alternative would result in a conversion of a substantial amount of agriculturally zoned land, as described under **Impact AG-3** below. Under these unusual circumstances, BART has elected in this instance to utilize zoning for agricultural use as a standard of significance.

In addition, an evaluation of consistency with applicable local land use plans, policies, or regulations is provided at the end of the section; this analysis is provided for informational purposes only as BART is exempt from local land use regulations as

[26] Save Cuyama Valley v County of Santa Barbara (2013) 213 Cal. 4th 1059, 1068.

described above. See Chapter 5, Project Merits for an evaluation of the Proposed Project's and each alternative's potential to satisfy objectives of Plan Bay Area.

See Section 3.I, Biological Resources for an analysis of consistency with conservation plans and natural community conservation plans.

### b. Impact Methodology

The methodology used to evaluate the significance of land use impacts is described below under each respective impact analysis. The Electric Multiple Unit (EMU) Option would result in the same impacts as the DMU Alternative; therefore, the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service for the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

### c. Summary of Impacts

Table 3.C-4 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.C-4 SUMMARY OF LAND USE IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| | | | **Project Analysis** | | |
| Impact LU-1: Result in conversion of forest land to non-forest use during construction | NI | NI | NI | NI | NI |
| Impact LU-2: Physically divide an established community | NI | LS | LS | LS | NI |

**TABLE 3.C-4 SUMMARY OF LAND USE IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| Impact AG-1: Directly convert Farmland during construction | NI | SU | SU | NI | NI |
| Impact AG-2: Conflict with a Williamson Act contract during construction | NI | NI | NI | NI | NI |
| Impact AG-3: Conflict with zoning for agricultural use during construction | NI | SU | SU | NI | NI |
| **Cumulative Analysis** | | | | | |
| Impact LU-3(CU): Physically divide an established community under Cumulative conditions | NI | LS | LS | LS | NI |
| No cumulative impacts related to forest land or Williamson Act contract. (NI) Cumulative impacts related to Farmland and land zoned for agricultural use are discussed in Impact AG-5(CU). | | | | | |
| **Operation** | | | | | |
| **Project Analysis** | | | | | |
| Impact AG-4: Indirectly result in conversion of Farmland or Williamson Act lands | NI | LS | LS | NI | NI |
| **Cumulative Analysis** | | | | | |
| Impact AG-5(CU): Convert or result in conversion of Farmland | NI | SU | SU | NI | NI |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation; SU=Significant and unavoidable, even with mitigation or no feasible mitigation available.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts related to construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts related to project construction are described below, followed by cumulative construction impacts.

Impacts related to direct conversion of forest land, Farmland, or Williamson Act land, conflicts with zoning for agricultural use, or physical division of an existing community would be the same during construction and operation of the Proposed Project or Build Alternatives. These impacts would commence during construction and continue during operation. Therefore, these construction-related impacts described below are considered to be permanent (rather than temporary).

#### (a) Construction – Project Analysis

***Impact LU-1: Conflict with existing zoning for or cause rezoning of forest land, timberland, or timberland zoned Timberland Production; result in the loss of forest land or conversion of forest land to non-forest use; or involve other changes in the existing environment that, due to their location or nature, could result in conversion of forest land to non-forest use, during construction.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and the LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including construction of both residential and commercial uses. Similar to the Proposed Project and Build Alternatives, there are no forest lands within or in the vicinity of the study area. Therefore, the No Project Alternative would not result in new impacts related to forest land. **(NI)**

**Conventional BART Project and Build Alternatives.** According to land cover maps prepared by the California Department of Forestry and Fire Protection, there are no forest lands within or in the vicinity of the study area.[27] Furthermore, as shown in Figure 3.C-8, no land in the vicinity of the study area is zoned forest land or timberland. The Proposed Project and Build Alternatives would not result in the loss or conversion of forest land or involve other changes that could result in conversion of forest land to non-forest use. Therefore, the Proposed Project, DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative would have no impacts related to forest land or timberland. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to forest land, timberland, or timberland zoned Timberland Production, and no mitigation measures are required.

***Impact LU-2: Physically divide an established community.***

***(No Project Alternative: NI: Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

Physical division of established communities refers to the potential of a project to physically sever or interrupt the connections between parts of a community. A potential impact on a community or neighborhood could occur if a project serves as a physical barrier that would effectively isolate one part of an established community from another, thus potentially disrupting community cohesion. Types of projects that can physically divide a community include new highways through existing communities.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented; the relocation of I-580 would not occur, the mainline track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses would occur. While these projects associated with the No Project Alternative could physically divide existing communities, these effects have been or will be addressed in environmental documents prepared for these projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to the physical division of communities. **(NI)**

[27] California Department of Forestry and Fire Protection (CAL FIRE), 2006. Fire and Resource Assessment Program, Land Cover. Available at: http://frap.fire.ca.gov/data/frapgismaps/pdfs/fvegwhr13b_map.pdf.

**Conventional BART Project.** The majority of the Proposed Project's components would be located in the I-580 median or along the existing I- 580 corridor, adjacent to and surrounded by existing transportation infrastructure. The location of the Proposed Project generally within the I-580 corridor, which already serves as a physical barrier, would not result in further separation of the communities along the corridor in Dublin, Pleasanton, or Livermore. The Proposed Project would relocate the lanes of I-580 to the north and south of the existing freeway location, as described in Chapter 2, Project Description. In addition, some surface frontage roads and structures adjacent to I-580 would also be relocated outward. Access to properties would be maintained. The location of the mainline BART tracks and proposed Isabel Station within the I-580 median would be consistent with the location of existing BART facilities to the west, and would not result in divisions to existing communities.

Several components of the Proposed Project would not be located in the I-580 median or immediately along the transportation corridor, as described below. The proposed facilities at Isabel Station at would be north of I-580 include the pedestrian touchdown structure, a new access loop road from Isabel Avenue, and the bus transfer facility. Facilities south of I-580 include the pedestrian touchdown structure and the BART parking structure and surface parking lots. All of these structures would be located on undeveloped land or land currently developed with a surface parking lot. The structures would primarily consist of discrete buildings, overhead structures, and uncovered areas; therefore, they would not constitute physical barriers to existing communities. The tail tracks, storage and maintenance facility, and access road from Campus Hill Drive would also be located outside of the I-580 median and transportation corridor. These project components would be on currently undeveloped land, outside of residential areas, and would not divide an existing community or create physical barriers for existing communities. In addition, the Proposed Project would include new and modified bus routes as well as bus infrastructure, including bus shelters, bus bulbs, and signage. The bus infrastructure would be constructed within the existing street ROW, and no physical barriers to established communities would be erected.

For these reasons, the Proposed Project would not result in the physical division of existing communities. Therefore, the Proposed Project would have less-than-significant impacts pertaining to physical division of an established community, and no mitigation measures are required. **(LS)**

**DMU Alternative.** Similar to the Proposed Project, the majority of the DMU Alternative would be located in the existing I-580 transportation corridor and would not result in further separation of the communities along the corridor. The components under this alternative include the improvements at the Dublin/Pleasanton Station Area, including the DMU transfer platform, which would be constructed in the I-580 median adjacent to the existing BART platform and associated I-580 and surface road relocation. Similar to the

Proposed Project, access to properties would be maintained. Other components under the DMU Alternative would be as described for the Proposed Project above. These facilities would be located on undeveloped land and would not create physical barriers for existing communities.

Therefore, similar to the Proposed Project, the impact related to physical division of an established community under the DMU Alternative would be less than significant, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** Similar to the Proposed Project, the majority of the components under the Express Bus/BRT Alternative would be located in the existing I-580 transportation corridor and would not result in further separation of the communities along the corridor. The major components of this alternative would involve improvements at the Dublin/Pleasanton Station Area, including the bus transfer platform, new bus ramps from the I-580 express lanes (which would be constructed in the I-580 median adjacent to the existing BART platform), associated I-580 and surface road relocation, and replacement parking at the Dublin/Pleasanton Station. Similar to the Proposed Project, access to properties would be maintained. In addition, a new surface parking lot would be constructed at Laughlin Road, which is surrounded primarily by undeveloped and agricultural land. The new parking lot would increase the footprint of the currently developed area. This parking lot would not constitute a physical barrier that could divide an established community. In addition, the Express Bus/BRT Alternative would include new and modified bus routes as well as minor bus infrastructure improvements, which would be constructed within the existing street ROW and would not serve as physical barriers to established communities.

Therefore, the impact pertaining to physical division of an established community under the Express Bus/BRT Alternative would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, bus service improvements would be constructed within the existing street ROW, and no physical barriers to established communities would be erected. In contrast to the Proposed Project and the other two Build Alternatives, for which this impact was determined to be less than significant, the Enhanced Bus involves no construction of new physical infrastructure outside existing streets. Therefore, the Enhanced Bus Alternative would have no potential for impacts pertaining to physical division of an established community, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to physical division of an established community, and no mitigation measures are required.

***Impact AG-1: Directly convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use, during construction.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

Impacts to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (collectively referred to herein as Farmland) may be either direct or indirect. A direct impact would result from the siting of a facility on Farmland and would occur with the commencement of construction upon a parcel of Farmland; therefore, direct impacts are examined in here. Indirect impacts could result from the siting of a facility near Farmland, which could create effects heightening the possibility of the conversion of adjacent agricultural land. Indirect impacts could only occur during operation and are therefore examined in **Impact AG-3** below.

The western half of the study area is located in urbanized areas within the cities of Dublin and Pleasanton. In these areas, the Proposed Project and Build Alternatives would not impact Farmland. However, a portion of the Proposed Project and Build Alternatives footprint in the Isabel South Area is located within Farmland, as described below.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses, would occur. The effects of the projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to conversion of Farmland. **(NI)**

**Conventional BART Project and DMU Alternative.** Approximately 6.3 acres of Prime Farmland and approximately 5.5 acres of Unique Farmland are located in the footprints of the Proposed Project and DMU Alternative at the Isabel South Area, as shown in Figure 3.C-9. This area would serve as the parking facility for the proposed Isabel Station. Therefore, in total, construction of the Proposed Project or DMU Alternative would permanently remove approximately 11.8 acres of Farmland from agricultural use.

These parcels were acquired by BART in 1987-1988 for a station site for the future extension of BART. As an interim use, BART constructed a park-and-ride lot with feeder bus service to the Dublin/Pleasanton BART Station provided by LAVTA. Other portions of

the site have been leased for agricultural use. These parcels were mapped as Other Land by the FMMP as of 2012. However, in 2014, they were re-mapped as Prime Farmland and Unique Farmland because they had been used for irrigated agricultural production.[28, 29] These parcels are within the city of Livermore and are surrounded by urban and transportation uses; I-580 is immediately to the north of the parcels and East Airway Boulevard and office buildings are to the south. With the exception of G&M Farms, a 20-acre parcel of Prime Farmland to the east along East Airway Boulevard, the area is generally urban and surrounded by urban uses.

In addition, under the Proposed Project and DMU Alternative, the relocation of a segment of East Airway Boulevard would encroach into an approximately 0.2-acre portion of G&M Farms. The 0.2-acre portion of G&M Farms that would be affected by the relocation is designated as Prime Farmland; however, it is used as a parking lot and no direct conversion of agricultural land would occur.

The loss of approximately 12 acres of Farmland in the Isabel South Area (which conservatively includes the portion of G&M Farms that is used as a parking lot) would be a significant impact. This impact would be reduced with the implementation of **Mitigation Measure AG-1**, which requires preservation of Farmland at a 1-to-1 ratio and would protect Farmland in perpetuity through agricultural easements or other permanent protection. However, because the Proposed Project and DMU Alternative would nevertheless result in a decrease in the total amount of Farmland in the study area, this impact is conservatively assumed to remain significant and unavoidable. **(SU)**

**Express Bus/BRT Alternative.** There is no Farmland within the footprint for the Express Bus/BRT Alternative, including in the Laughlin Road Area. Therefore, there would be no impact related to conversion of Farmland to non-agricultural use, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would be constructed within the existing street ROW. It would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. Therefore, there would be no impacts under the Enhanced Bus Alternative, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have potentially significant direct impacts related to conversion of Farmland. This

[28] California Department of Conservation, Division of Land Resource Protection, 2014. Alameda County Important Farmland 2012. April. Available at: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2012/ala12.pdf.

[29] California Department of Conservation, Division of Land Resource Protection, 2016. Alameda County Important Farmland 2014. December. Available at: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2014/ala14.pdf.

impact would be reduced with the implementation of **Mitigation Measure AG-1**, which requires preservation of Farmland at a 1-to-1 ratio for Farmland removed from agricultural use and would protect Farmland in perpetuity through agricultural easements or other permanent protection. However, this impact is conservatively assumed to remain significant and unavoidable because the Proposed Project and DMU Alternative would nevertheless result in a decrease in the total amount of Farmland in the study area.

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for these alternatives.

**Mitigation Measure AG-1: Provide Compensatory Farmland under Permanent Protection (Conventional BART Project and DMU Alternative/EMU Option).**

BART shall mitigate the loss of agricultural land, including Prime Farmland, Unique Farmland, and land zoned for agricultural use by providing for permanent agricultural use at an off-site location at a 1-to-1 ratio. The land shall have similar agricultural value to the acreage lost. The preferred location for the mitigation property shall be in Eastern Alameda County, although other locations are possible. The protection will be in perpetuity through agricultural land easements or other permanent protection.

***Impact AG-2: Conflict with a Williamson Act contract during construction.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses would occur. The effects of the projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, while the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to conflicts with a Williamson Act contract. **(NI)**

**Conventional BART Project and Build Alternatives**. As shown in Figure 3.C-9, there are no lands under a Williamson Act contract within the collective footprint. Furthermore, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the Proposed Project and other Build Alternatives, are anticipated to extend along existing street ROWs and would not affect Williamson Act contract lands. Therefore, there

would be no construction impacts under the Proposed Project or Build Alternatives, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to conflicts with a Williamson Act contract, and no mitigation measures are required.

***Impact AG-3: Conflict with existing zoning for agricultural use during construction.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

As shown in Figure 3.C-8, there are four areas with agricultural zoning in the study area: (1) at the western end of the project alignment, south of I-580 and west of Hopyard Road; (2) north of I-580 just west of Doolan Road and the western Livermore city limit; (3) north of I-580 on unincorporated county land west of North Livermore Avenue; (4) and north of I-580 east of Laughlin Road. The collective footprint would encroach into agriculturally zoned land north of I-580 east of the eastern Livermore city limit, in the Cayetano Creek Area.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes to the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, ACE, and the LAVTA would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. These improvements and development projects could result in potential conflicts with agricultural zoning. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, while the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to conflicts with existing zoning for agricultural use during construction. **(NI)**

**Conventional BART Project.** A substantial portion of the Proposed Project footprint, including the new mainline track and the proposed Isabel Station, would be located in the I-580 ROW. Proposed components associated with the Isabel Station, such as the wayside facility northeast of Kitty Hawk Road, the bus transfer facility in the Isabel North Area, and the parking facility in the Isabel South Area, would be located on land zoned for planned development and open space. However, the proposed tail tracks and storage and maintenance facility would be located on unincorporated county land zoned for

agricultural uses (Agricultural [A] district). This land consists of open grasslands with intermittent cattle grazing, with some agricultural production uses.

While the tail tracks and storage and maintenance facility would be consistent with the types of uses conditionally allowed in the Agricultural district zoning designation as described in the Consistency with Applicable Local Plans and Land Use Policy subsection below, the tail tracks and storage and maintenance facility would cover approximately 104 acres of agriculturally zoned land.[30] Within this area, the Proposed Project footprint would only cover a portion of some of the agriculturally zoned parcels. However, in some cases BART may need to acquire the entire parcel, as described in Section 3.D, Population and Housing. Therefore, if BART is unable to acquire only the needed portions of the parcels, and instead acquires the entire parcels, a larger area could be removed from grazing use. As described in the Standards of Significance subsection above, BART has elected to find these effects on agriculturally zoned land a significant impact, although BART is not subject to local land use regulations. This impact would be reduced with the implementation of **Mitigation Measure AG-1**, which requires preservation of agricultural land at a 1-to-1 ratio for land removed from agricultural use and would protect agricultural land in perpetuity through agricultural easements or other permanent protection. Even with implementation of this mitigation measure, the conversion of agriculturally zoned land to non-agricultural uses is conservatively considered to remain a significant and unavoidable impact. **(SU)**

**DMU Alternative.** Similar to the Proposed Project, a substantial portion of the Proposed Project footprint would be located in the I-580 ROW. This land consists mostly of open grasslands with intermittent cattle grazing, with some agricultural production uses. However, similar to the Proposed Project, the tail tracks and storage and maintenance facility would be constructed on land currently zoned for agriculture. Approximately 56 acres of agriculturally-zoned land would be permanently converted to other uses, resulting in a significant impact.[31] Within this area, the DMU Alternative footprint would only cover a portion of some of the agriculturally zoned parcels. However, in some cases BART may need to acquire the entire parcel, as described in Section 3.D, Population and Housing. Therefore, if BART is unable to acquire only the needed portions of the parcels, and instead acquires the entire parcels, a larger area could be removed from grazing use. This impact would be reduced with the implementation of **Mitigation Measure AG-1**, which requires preservation of agricultural land at a 1-to-1 ratio for land removed from agricultural use and would protect agricultural land in perpetuity through agricultural easements or other permanent protection. Even with implementation of this mitigation

[30] This amount conservatively includes the entire footprint of the Proposed Project within the agricultural zoning district; however, other uses such as residential may exist in this district.
[31] This amount conservatively includes the entire footprint of the DMU Alternative within the agricultural zoning district; however, other uses such as residential may exist in this district.

measure, the conversion of agriculturally zoned land to non-agricultural uses is conservatively considered to remain a significant and unavoidable impact. **(SU)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would not encroach onto agriculturally zoned land. Improvements under the Express Bus/BRT Alternative would be limited to the I-580 ROW, industrially zoned land south of I-580 in the Dublin/Pleasanton Station area, and commercially zoned land west of Laughlin Road in the Laughlin Road area. Therefore, the Express Bus/BRT Alternative would not conflict with land zoned for agricultural uses. There would be no impacts under the Express Bus/BRT Alternative, and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would be constructed within the existing street ROW and it would not conflict with land zoned for agricultural uses. Therefore, there would be no impacts under the Enhanced Bus Alternative, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have significant direct impacts related to conflicts with zoning for agricultural use. This impact would be reduced with the implementation of **Mitigation Measure AG-1** (listed above under **Impact AG-1)**, which requires preservation of agricultural land at a 1-to-1 ratio for land removed from agricultural use and would protect agricultural land in perpetuity through agricultural easements or other permanent protection. However, this impact is conservatively assumed to remain significant and unavoidable because the Proposed Project and DMU Alternative would result in a decrease in the overall amount of agricultural land in the study area.

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for these alternatives.

### (b) Construction – Cumulative Analysis

As described in **Impact LU-1** above, the Proposed Project and Alternatives would have no impacts related to conversion of forest land to non-forest uses. In addition, as described in **Impact AG-2** above, the Proposed Project and Alternatives would have no impacts related to conflicts with Williamson Act contracts. Therefore, the Proposed Project and Alternatives would not contribute to cumulative forest land or Williamson Act contract impacts.

Cumulative impacts pertaining to direct conversion of Farmland during construction (addressed in **Impact AG-1**) and conflicts with agricultural zoning during construction (addressed in **Impact AG-3**) are analyzed together with indirect operations-related impacts in **Impact AG-5(CU)** below, because both direct and indirect conversion of any type of

agricultural land can contribute to a broader cumulative impact related to loss of farmland.

The geographic study area for cumulative impacts related to division of existing communities is the same as that identified in the Introduction subsection above.

***Impact LU-3(CU): Physically divide an established community under cumulative conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact LU-2** above, the No Project Alternative would have no impacts related to physically dividing an established community. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** The Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would not contribute to divisions of existing communities, as described in **Impact LU-2** above. Furthermore, it is not expected that the probable future projects combined with the Proposed Project or these alternatives would result in physical division of an established community. Strategies in the planning documents for the study area address the installation of infrastructure and roadways required to serve the probable future development. The various housing developments that are planned, approved, or under construction in the cities of Dublin, Pleasanton, and Livermore would develop undeveloped or underutilized infill parcels, thereby connecting existing gaps in the urban environment, creating connections between communities, and fostering greater community cohesion. During the approval process for the cumulative projects/plans, the potential for those projects/plans to result in the division of local communities has or will be considered and addressed.

Therefore, cumulative impacts related to the physical division of established communities from the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative combined with past, present, or probable future projects would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would have no project impacts related to physical division of existing communities, as described in **Impact LU-2,** and would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, and probable future projects, would not result in significant cumulative impacts related to physical division of an existing community, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts pertaining to project operations are described below, followed by cumulative operations impacts.

#### (a) Operations – Project Analysis

***Impact AG-4: Indirectly involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland or Williamson Act land to non-agricultural use.***

***(No Project Alternative: NI, Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

As discussed in **Impact AG-1** above, impacts to Farmland or Williamson Act land may be either direct or indirect. Direct impacts are analyzed in **Impact AG-1** above. Indirect impacts, analyzed here, could result from the siting of a facility near a parcel of Farmland or Williamson Act land, which could increase the possibility of the conversion of adjacent agricultural land. Indirect conversion of agricultural land generally occurs when incompatible uses, such as residential and commercial uses, encroach upon agriculture and generate pressure to develop the non-urban land in their proximity. This can occur when new residents or business owners complain about noise, odors, or other aspects of agricultural activities, or if the incompatible uses affect adjacent lands in ways that substantially reduce their utility for agriculture, such as by interfering with water supplies.

**No Project Alternative.** Under the No Project Alternative, the relocation of I-580 would not occur, the rail track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. There would be no extension of BART, and thus no new TOD at Isabel Station under the No Project Alternative. However, substantial growth is forecast for Livermore and indirect impacts to farmland within the UGB could occur. These effects have been or will be addressed in environmental documents prepared for those projects before they are implemented, while the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact pertaining to changes in the existing environment that, due to their location or nature, could result in conversion of Farmland or Williamson Act land to non-agricultural use. **(NI)**

**Conventional BART Project and DMU Alternative.** As shown in Figure 3.C-9, four areas of farmland/Williamson Act contract lands are located within or near the study area. Although they would not be directly affected by the Proposed Project or DMU Alternative, these areas could be indirectly affected if there is pressure for them to be developed with non-agricultural uses as described below.

- **G&M Farms.** The Farmland closest to the footprint of the Proposed Project and DMU Alternative is G&M Farms, a 20-acre area of Prime Farmland within the Isabel South Area study area, across East Airway Boulevard from the proposed Isabel Station parking facility. The Proposed Project or DMU Alternative is intended to promote TOD, and thus could accelerate the conversion of the parcel. However, this parcel is located near I-580, surrounded by land that is developed with residential and light industrial uses. While this parcel is within unincorporated Alameda County, it is located within Livermore's UGB. Livermore's General Plan designates it as Limited Agriculture; however, it has been pre-zoned as Planned Development by the City of Livermore (see Figure 3.C-8). This zoning designation is "applied to areas of the City appropriate for residential, commercial, and industrial planned development projects that require more flexible design standards."[32]
- **Doolan Road and Collier Canyon Road.** Two additional areas of Farmland and/or Williamson Act land are within the UGB, north of North Canyons Parkway; one is along Doolan Road and the other is along Collier Canyon Road. The Farmland along Doolan Road includes Unique Farmland and Farmland of Statewide Importance as designated by the FMMP, as well as Prime Farmland as designated by the Williamson Act. The area designated as Farmland of Statewide Importance is just inside the study area. The Farmland along Collier Canyon Road, entirely outside of the study area, is partially designated as Unique Farmland by the FMMP, and the entire area (including the Unique Farmland) is designated as Prime Farmland by the Williamson Act. These areas are zoned Planned Development Industrial, and thus are not constrained by zoning to agricultural uses. However, it would be unlikely that the Proposed Project or DMU Alternative would indirectly result in the conversion of these areas to non-agricultural use given their location almost entirely outside of the study area and the length of the distance to the proposed Isabel Station (approximately 1.25 miles and 0.9 mile, respectively).
- **Hartman Road.** An area of Williamson Act land, classified as Non-Prime Farmland, is near the proposed storage and maintenance facility in the Cayetano Creek Area. This land is located outside of the UGB. Agricultural land located outside of the UGB would be protected from the possibility of urban development, as described in the East County Urban Growth Boundary subsection above. Therefore, there would be no indirect impacts to this land from the Proposed Project or DMU Alternative. Furthermore, the storage and maintenance facility would be an industrial/public facility use with operations limited to the storage and maintenance of BART cars or DMU vehicles. The facility would not indirectly lead to the conversion of adjacent agricultural lands, because it would not put pressure on adjacent uses to remove agriculture, unlike residential and commercial uses, which can have this effect.

[32] City of Livermore, 2010. Livermore Development Code, §3.04.030

For the above reasons, the Proposed Project and DMU Alternative would have less-than-significant impacts pertaining to changes in the existing environment that, due to their location or nature, could result in conversion of farmland or Williamson Act land to non-agricultural use, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** With the exception of the Laughlin Road parking lot, the footprint of the Express Bus Alternative would be confined to Dublin and Pleasanton, which are entirely urbanized and have no agricultural land nearby. The agricultural land closest to Laughlin Parking Lot includes an area of Non-Prime Williamson Act land approximately 0.8 mile to the east and area of Non-Prime Williamson Act land approximately 1 mile to the north. The sole purpose of the Laughlin Road parking lot is to allow westbound commuters to park there and then take a bus to the Dublin/Pleasanton Station. This type of use is not likely to generate any pressure to indirectly convert the Williamson Act land, which is a considerable distance from the proposed parking lot. Therefore, the Express Bus/BRT Alternative would have no impacts pertaining to changes in the existing environment that could result in conversion of Farmland or Williamson Act land to non-agricultural use. **(NI)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would be constructed within the existing street ROW. It would involve minimal, low-cost infrastructure that would have no potential for indirectly converting Farmland or Williamson Act land. Therefore, there would be no impacts under the Enhanced Bus Alternative, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to changes in the existing environment that, due to their location or nature, could result in conversion of farmland or Williamson Act land to non-agricultural use, and no mitigation measures are required.

### (b) Operations – Cumulative Analysis

The geographic study area for cumulative impacts to agricultural resources, including Important Farmland, Williamson Act land, and agriculturally zoned land, encompasses Alameda County because the loss of agricultural land is a countywide concern.

The probable future projects described in both Section 3.A, Introduction to Environmental Analysis and Appendix E—including the INP, Dublin/Pleasanton BART Parking Expansion, Kaiser Dublin Medical Center, Grafton Plaza Mixed-Use Development, IKEA Retail Center/Project Clover, Fallon Gateway, and Crosswinds Site—would result in future development in the study area. In particular, the INP would provide for denser development around the proposed Isabel Station area than is currently permitted by the City of Livermore General Plan. For the purpose of this EIR, it is assumed the INP would be implemented under the Proposed Project or DMU Alternative, but not under the Express

Bus/BRT Alternative or Enhanced Bus Alternative. The INP is projected to be fully built out by 2040 and would entail new development consisting of 4,095 residential housing units, 1,656,000 square feet of office space, 241,000 square feet of business park, 324,000 square feet of neighborhood commercial space, 296,000 square feet of general commercial space, and 9,148 jobs.

***Impact AG-5(CU): Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use, conflict with a Williamson Act contract, or conflict with land zoned for agricultural use under cumulative conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impacts AG-1**, **AG-2**, **AG-3**, and **AG-4**, the No Project Alternative would have no direct or indirect impacts related to conversion of farmland, conflicts with Williamson Act contracts, or conflicts with agricultural land. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and DMU Alternative.** Over the past three decades, Alameda County has experienced, and continues to experience, the conversion of agricultural land to urban uses.[33] According to the California Department of Conservation, Alameda County lost 22,137 acres of agricultural land from 1984 through 2014, including 6,068 acres of Important Farmland.[34, 35] From 2012 to 2014 alone, 251 acres of Important Farmland were converted to non-agricultural uses.[36] As described in Section 3.D, Population and Housing, Alameda County's population is projected to grow by 27 percent between 2014 and 2040, while Livermore's population is forecasted to grow by 24 percent between 2014 and 2040.[37, 38] Therefore, substantial growth in the future is anticipated to occur and it is likely that land currently designated as agricultural will experience further development pressures. Depending on policy decisions made by the local jurisdictions, this growth

[33] California Department of Conservation, 2016c. Alameda County 1984–2014 Land Use Summary. Available at: http://www.conservation.ca.gov/dlrp/fmmp/Pages/Alameda.aspx, accessed April 25, 2017.
[34] Ibid.
[35] Under the "Important Farmland" designation, the California Department of Conservation includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance.
[36] California Department of Conservation, 2016a. Alameda County 2012–2014 Land Use Conversion, Table A–1. Available at: http://www.conservation.ca.gov/dlrp/fmmp/Pages/Alameda.aspx, accessed April 25, 2017.
[37] United States Census Bureau, 2014. 2010–2014 American Community Survey. Available at: https://factfinder.census.gov/, accessed March 1, 2017.
[38] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

could either occur in dense land use patterns around transit nodes or take the form of sprawl, causing the impacts to be more widely distributed.

Given the prior loss of agricultural land and Important Farmland in the county and continuing development pressure, there has been and may continue to be a substantial decline in Important Farmland or land under a Williamson Act contract. Therefore, cumulative impacts on agricultural resources could be significant. However, the probable future projects would generally not contribute to this ongoing loss, as their footprints do not overlap with land designated as Farmland or Williamson Act land. The only exception is G&M Farms, which is discussed in **Impact AG-4** and could be converted to non-agricultural uses under the INP.

As explained in **Impact AG-1** above, the Proposed Project and DMU Alternative would directly convert approximately 6.3 acres of Prime Farmland and approximately 5.5 acres of Unique Farmland currently in agricultural uses, and approximately 0.2 acre of Prime Farmland currently not in agricultural use in the Isabel South Area. As explained in **Impact AG-3** above, the Proposed Project would entail the placement of the tail tracks and storage and maintenance facility on 104 acres of agriculturally zoned land in the Cayetano Creek Area, and the DMU Alternative would entail the placement of the tail tracks and storage and maintenance facility on 56 acres of agriculturally zoned land in the Cayetano Creek Area. In addition, the Proposed Project and DMU Alternative could indirectly accelerate the conversion of G&M Farms, a 20-acre parcel of Prime Farmland, to non-agricultural uses as the proposed INP designates this parcel for residential uses and proposes new roadways through the parcel, further increasing the likelihood that this parcel would be converted. The Proposed Project and DMU Alternative would be required to mitigate for the loss of Farmland in the Isabel South Area and the loss of grazing land in an agricultural zoning district in the Cayetano Creek Area at a ratio of 1-to-1 (see **Mitigation Measure AG-1** above). Similarly, if any proposed project resulted in the conversion of G&M Farms, it would likely be required to mitigate the loss of that Farmland.

Any potential impacts to Farmland under the Proposed Project and DMU Alternative would occur in the vicinity of the proposed Isabel Station, and inside the UGB. One of the main project objectives of the BART to Livermore Extension Project is to create opportunities for TOD in the Livermore Isabel Avenue BART Station PDA. Similarly, the proposed INP would create a TOD plan for the area around the proposed Isabel Station, allowing for denser development than currently permitted by the City of Livermore. Therefore, the Proposed Project or DMU Alternative and INP would work in tandem to create a more dense land use pattern in the Livermore Isabel Avenue BART Station PDA. The development of dense residential and mixed-use districts in close proximity to transit represents an environmental benefit compared to less dense patterns of growth. Furthermore, by concentrating more of the projected growth in a smaller infill area within the UGB, such growth would be consistent with the UGB's directive to reserve areas outside the UGB for

long-term protection of natural resources, agriculture, public health and safety, and buffers between communities.

However, overall, the Proposed Project and DMU Alternative could combine with past, present, and probable future projects to result in a cumulative loss of farmland, which is a finite resource, including Important Farmland and land in agricultural use within an agricultural zoning district. This would be a significant cumulative impact. There are no feasible mitigation measures to reduce this impact. The Proposed Project and DMU Alternative would have a cumulatively considerable contribution to this impact, even after project-level mitigation identified in **Impacts AG-1** and **AG-3**. Therefore, impacts would remain significant and avoidable. **(SU)**

**Express Bus/BRT Alternative and Enhanced Bus Alternative**. The Express Bus/BRT Alternative and Enhanced Bus Alternative would have no project-level impacts related to converting or involving other changes that could result in conversion, as described in **Impacts AG-1**, **AG-2**, **AG-3,** and **AG-4** above, and thus would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, even after the implementation of project-level mitigation measures, the Proposed Project and DMU Alternative would contribute to a potentially significant cumulative impact on agricultural resources. No additional feasible mitigation measures are available, and the Proposed Project and DMU Alternative would have a cumulatively considerable contribution (significant and unavoidable).

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not contribute to cumulative impacts, and no mitigation measures are required for these alternatives.

### Consistency with Applicable Local Plans and Land Use Policy

As noted earlier in this section, California Government Code Sections 53090 and 53091 exempt 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 and any potential conflicts with applicable plans are discussed in this section.

The following analysis includes a discussion of the consistency of the Proposed Project and Alternatives with local general plans, the UGB, and zoning. See the Regulatory Framework subsection above, for the full text of these policies and regulations. Consistency with other regulations is reviewed in the pertinent sections. For example, Livermore General Plan policies intended to protect scenic views, resources, and corridors are discussed in Section 3.E, Visual Quality; regulations of the Livermore Municipal Airport

are reviewed in Section 3.N, Public Health and Safety; and consistency with Plan Bay Area is reviewed in Chapter 5, Project Merits.

As described below, the Proposed Project and Alternatives would primarily be consistent with applicable land use plans and policies and would fulfill or support the policies related to TOD, extension of BART, and agricultural land to varying degrees. However, the Proposed Project and DMU Alternative could conflict with East County Area Plan Land Use Policy 89 pertaining to rangeland, and Livermore General Plan Objective OSC-3.1, Policy 1, pertaining to farmland designated by the FMMP, as noted below.

**No Project Alternative.** The No Project Alternative would not be expected to induce development beyond that reflected in the General Plans and other planning documents of the County and cities. The long-term projections for development within the project corridor would not change significantly under the No Project Alternative. However, the No Project Alternative would not be effective in encouraging transit-oriented development and higher density infill development patterns within the project corridor or in the INP area. Specifically, the No Project Alternative would not promote Transportation Policies 203-206 of the East County Area Plan, which support a BART extension along the I-580 corridor to Livermore, and Livermore General Plan's Objective CIR-2.1, which calls for the provision of viable alternatives to single-occupant vehicle travel through actions such as supporting a BART extension along the I-580 freeway to a station at Isabel Avenue.

**Conventional BART Project.** Applicable general plan policies, UGB policies, and zoning are described below.

- **General Plan Policies.** The East County Area Plan and the general plans of the cities of Dublin, Pleasanton, and Livermore contain goals, policies and/or programs related to transit and TOD—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 Plan contains specific policies in support of a BART extension along the I-580 corridor to Livermore (Transportation Policies 203–206) and the Livermore General Plan encourages a BART extension into the city, including Actions 4 and 7 of Objective CIR-2.1 and Policy 7 of Objective OSC-6.1. Similarly, the Pleasanton General Plan Circulation Policy 18 encourages the extension of BART to Livermore and beyond. The proposed Isabel Station, including its main components north and south of I-580—the bus transfer facilities and parking lot—would be consistent with Action 7 of Objective CIR-2.1, which advocates for an extension of BART to a station at Isabel Avenue/I-580 interchange.

  Additionally, the East County Area Plan, Livermore General Plan, Dublin General Plan, Pleasanton General Plan, and Alameda County Open Space Element contain policies intended to protect agricultural resources, including Important Farmland and parcels

under Williamson Act contracts. Specifically, the East County Area Plan contains the following policies:

- Land Use Policy 52, which directs the County to preserve open space areas for the protection of public health and safety, provision of recreational opportunities, production of natural resources (e.g., agriculture, windpower, and mineral extraction), protection of sensitive viewsheds, preservation of biological resources, and the physical separation between neighboring communities
- Land Use Policy 54, which permits only open space, park, recreational, agriculture, limited infrastructure, public facilities and other similar and compatible uses outside the UGB
- Land Use Policy 71, which targets the conservation of Prime Farmland, Farmland of Statewide Importance, and Unique Farmland outside the UGB
- Land Use Policy 73 and Land Use Program 29, which require buffers between those areas designated for agricultural uses and new non-agricultural uses within agricultural areas or abutting parcels
- Land Use Policy 86, which prohibits the cancellation of Williamson Act contracts outside the UGB
- Land Use Policy 87, which encourages the establishment and permanent protection of existing and new cultivated agriculture through the use of homesite clustering, agricultural easements, density bonuses, or other means
- Land Use Policy 88, which pertains to policies, including mitigation fees for the conversion of agricultural lands within city boundaries, to fund the Alameda County Open Space Land Trust
- Land Use Policy 89, which requires the County to retain rangeland in blocks of sufficient size to enable commercially viable grazing.

Furthermore, the Livermore General Plan open space and conservation goal (OSC-3.1) targets the general protection of open space in the city of Livermore.

As explained below under Zoning, the proposed tail tracks and storage and maintenance facility would be a use similar to a public utility; therefore, the Proposed Project would generally be consistent with Land Use Policies 52 and 54. The Proposed Project would not affect any Prime Farmland, Farmland of Statewide Importance, or Unique Farmland outside the UGB, and therefore would be generally consistent with Land Use Policy 71. Land use buffers are designed to both reduce agricultural impacts to non-residential uses (dust, odors, hazardous materials, such as pesticides) and preserve the “right to farm” for producers who may find their operations being constrained by new development in what was previously a solely agricultural area. As an industrial facility, the operation of the storage yard and maintenance facility would

not be hampered by adjacent agricultural activities. No buffer would be necessary. The Proposed Project would generally be consistent with Land Use Policy 73 and Land Use Program 29. No Williamson Act land would be affected by the Proposed Project. While there is Williamson Act land just to the northwest of the storage and maintenance facility, the facility would be a stand-alone facility with impacts largely limited to its footprint. Therefore, the Proposed Project would generally not conflict with Land Use Policy 86.

The Proposed Project could conflict with the Livermore General Plan Objective OSC-3.1, Policy 1, which states "undeveloped lands that are State-designated as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland shall be preserved, to the greatest extent feasible, for open space or agricultural use." The Proposed Project would directly convert Prime Farmland and Unique Farmland in the Isabel South area (at the proposed Isabel Station parking facility). However, the Proposed Project would be consistent with Land Use Policy 87 and 88 by mitigating this direct loss of Prime Farmland and Unique Farmland in the Proposed Project footprint at a 1-to-1 ratio and protecting farmland in perpetuity through agricultural easements or other permanent protection.

The Proposed Project could conflict with Land Use Policy 89 pertaining to rangeland. The tail tracks and storage and maintenance facility would require the either partial or full acquisition of several agricultural parcels, as further discussed in Section 3.D, Population and Housing. In some cases, partial acquisition of a parcel could result in the division of the parcel into two unconnected halves or otherwise decrease the economic viability of the parcel.

Therefore, as described above, the Proposed Project would generally be consistent with the East County Area Plan and the general plans of Dublin, Pleasanton, and Livermore, with the exception of East County Area Plan Land Use Policy 89 pertaining to rangeland, and Livermore General Plan Objective OSC-3.1, Policy 1.

- **Urban Growth Boundary.** Both the City of Livermore General Plan and the East County Area Plan include UGBs intended to restrict urban development to certain desired areas and limit such development beyond those specified areas. As shown in Figure 3.C-10, components of the Proposed Project within the Cayetano Creek Area—including the tail tracks, storage and maintenance facility, and access road—would be located outside the north Livermore UGB, which is generally similar to the East County Area Plan UGB in this location. The regulations of the East County Area Plan pertaining to the UGB apply. The tail tracks and storage and maintenance facility would be a public facility, which is one of the types of uses permitted outside the UGB by the East County Area Plan's Policy 54.
- **Zoning.** The majority of the Proposed Project would be constructed in the existing I-580 ROW, which is owned by a state entity (Caltrans) and thus has no applicable zoning. The proposed bus transfer facility and parking facility at Isabel Station would

be located on land zoned by Livermore as Planned Development or Planned Unit Development, a designation assigned to areas of the City appropriate for residential, commercial, and industrial planned development projects that require more flexible design standards—in particular, in areas near a freeway or freeway interchange. The proposed bus transfer facility and parking facility would be consistent with the broad development standards prescribed by this zoning designation.

As shown in Figure 3.C-8, the proposed tail tracks and storage and maintenance facility would be located on unincorporated county land zoned for agricultural uses (Agricultural [A] district). This land consists of open grasslands with intermittent cattle grazing. Uses permitted in an agricultural district include agriculture, trails, and agricultural caretaker dwellings.[39] Conditional uses include air strips, cemeteries, oil and gas drilling, public utility buildings, and radio and television transmission facilities.

While the proposed tail tracks and storage and maintenance facility are not standard uses described in most zoning regulations, they are part of the transportation infrastructure, and would be considered a public use similar to a public utility. The tail tracks and storage and maintenance facility would be consistent with the types of uses conditionally allowed in the Agricultural district zoning designation. Therefore, the Proposed Project would not conflict with the existing agricultural zoning.

**DMU Alternative.** The DMU Alternative would extend transit services and support implementation of TOD policies in a similar manner to the Proposed Project. The DMU Alternative would be generally consistent with East County Area Plan Land Use Policies 54, 71, 73, 86, 88, 89, and Land Use Program 29; East County Area Plan Transportation Policies 203-206; Livermore General Plan's Objective CIR-2.1 (Actions 4 and 7) and Objective OSC-6.1 (Action 7); and Pleasanton General Plan Circulation Policy 18. However, it could conflict with East County Area Plan Land Use Policy 89 pertaining to rangeland, and Livermore General Plan Objective OSC-3.1, Policy 1 pertaining to farmland designated by the FMMP, for the same reasons described for the Proposed Project above.

Similar to the Proposed Project, the DMU Alternative would be consistent with the zoning of the respective municipalities. As shown in Figure 3.C-8, the proposed tail tracks and storage and maintenance facility would be located on unincorporated county land zoned for agricultural uses (Agricultural [A] district). This land mostly consists of open grasslands with intermittent cattle grazing. The only agricultural uses within the collective footprint are located at the far northwestern corner, in the construction staging area for the storage and maintenance facility. The tail tracks and storage and maintenance facility would be consistent with the types of uses conditionally allowed in the Agricultural district zoning designation.

[39] Alameda County Code of Ordinances, Title 17, Chapter 17.06.

**Express Bus/BRT Alternative.** Similar to the Proposed Project, the Express Bus/BRT Alternative would extend transit services and support implementation of TOD policies outlined in the East County Area Plan and the general plans of the cities along the project corridor. Specifically, it would connect regional transit systems (BART, LAVTA, and ACE) and enhance the multi-modal circulation network, supporting the circulation policies listed in the Dublin General Plan. Under this alternative, the proposed Isabel Station would not be constructed, and the City of Livermore would not adopt the INP. Because it would not extend BART into the city of Livermore, it would only partially achieve the goals enumerated in the East County Area Plan and the general plans of the cities along the project corridor.

The Express Bus/BRT Alternative footprint is not located in agricultural land; therefore, it would not present any conflicts with the policies in the East County Area Plan and Livermore General Plan intended to protect agricultural resources. Unlike the Proposed Project, the Express Bus/BRT Alternative would not construct any project components outside of the Livermore UGB.

The replacement Dublin/Pleasanton parking lot or parking garage under the Express Bus/BRT Alternative would generally be located in the same area as the existing Dublin/Pleasanton parking lot, an area zoned Planned Unit Development – Mixed Use by Pleasanton and marked 'BART parking lots' on the Pleasanton zoning map. Therefore, the proposed replacement parking lot or parking garage would remain consistent with the zoning designation. The Laughlin parking lot would be constructed in an area of Livermore zoned Commercial Service. A parking lot would not conflict with the permitted uses or development standards of this zoning district. Therefore, the Express Bus/BRT Alternative generally would not conflict with applicable land use policies.

**Enhanced Bus Alternative.** Similar to the Express Bus/BRT Alternative, the Enhanced Bus Alternative would not extend BART into the city of Livermore nor would it construct a new station. Therefore, similar to the Express Bus/BRT Alternative, the Enhanced Bus Alternative would not conflict with applicable land use policies, but it would only partially achieve the goals enumerated in the East County Area Plan and the general plans of the cities along the project corridor related to TOD, extension of transit service to Livermore, minimizing air pollution and providing viable alternatives to single-occupant vehicle travel.

# D. POPULATION AND HOUSING

## 1. Introduction

This section describes the setting and existing conditions with regard to population and housing as they relate to BART to Livermore Extension Project, discusses regulations relevant to population and housing, and assesses the potential impacts to population and housing from construction and operation of the Proposed Project and Alternatives. Future population, housing, and employment projections are presented, and potential impacts of the Proposed Project and Alternatives on housing supply and population are analyzed.

The study area for population impacts is defined as the cities of Dublin, Pleasanton, and Livermore, as well as Alameda County as a whole. The study area for the analysis of potential impacts related to displacement of people, housing, or businesses is limited to the collective footprint—the combined footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative. The bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder buses for the Proposed Project and other Build Alternatives, which are anticipated to extend along existing streets and within the street ROWs, are addressed programmatically in this analysis, as described in Chapter 2, Project Description.

Data for existing conditions are based on several sources, which vary depending on the topic. Population, housing, age, and income data presented in this section at the county and city level are based on the 2010–2014 American Community Survey, a multi-year estimate that represents information collected over the course of each year and then aggregated over the 5-year survey period; i.e., these data are not estimates for only 2014 (or any single interim year), but rather the entirety of 2010 to 2014.[1] Housing data presented for Priority Development Areas (PDAs) represent existing conditions in 2010 and are based on the Association of Bay Area Governments' (ABAG) and Metropolitan Transportation Commission's (MTC) Final Forecast of Jobs, Population, and Housing[2] and Plan Bay Area Projections 2013, a supplementary report for the region's long range transportation and land use plan, known as Plan Bay Area.[3] Employment data presented in

[1] U.S. Census Bureau, 2014. 2010-2014 American Community Survey 5-Year Estimates. Available at: https://factfinder.census.gov/.

[2] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), 2013. Draft Plan Bay Area, Final Forecast of Jobs, Population and Housing, July.

[3] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

this section are based on the 2012 Economic Census and related programs and represent existing conditions in 2012.[4, 5]

Data for future years (2025 and 2040) are based on population, housing, and employment projections from the Final Forecast of Jobs, Population, and Housing and Plan Bay Area Projections 2013.[6, 7]

No scoping comments pertaining to population and housing were received in response to the Notice of Preparation for this EIR or during the public scoping meeting held for the EIR.

## 2. Existing Conditions

This subsection describes the existing population, housing, and employment characteristics in the study area, followed by population, housing, and employment projections for 2025 and 2040.

### a. Existing Characteristics

Demographic characteristics of BART riders are provided below, followed by the population, housing, and employment characteristics for the study area.

#### (1) BART Rider Characteristics

BART serves a wide range of customers. BART's 2015 Station Profile Study provides demographic information regarding the riders throughout the BART system. Over 44,000 BART riders were surveyed on weekdays at all the stations in the system. Relevant characteristics of the riders are described for comparison with the demographic information for the study area.

The following information is provided as a percent of the riders surveyed:[8]

- **Persons per Household**. The highest percentage of BART riders (31 percent) have two people in their household followed by: 24 percent in three-person households;

[4] U.S. Census Bureau, 2012. Economic Census and 2012 Non-employer Statistics. Available at: https://www.census.gov/programs-surveys/economic-census.html.

[5] Some of the data were in the form of employment ranges rather than discrete numbers; in these cases, the median of the range was used.

[6] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

[7] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), 2013. Draft Plan Bay Area, Final Forecast of Jobs, Population and Housing, July.

[8] San Francisco Bay Area Rapid Transit District (BART), Office of External Affairs, 2015. BART Station Profile Study, Preliminary Data. Available at: http://www.bart.gov/about/reports/profile, accessed March 2, 2017.

20 percent in four-person households; 13 percent of BART riders have five or more people in their households; and 13 percent have one person in their household.[9]

- **Household Income.** Approximately 26 percent of BART riders reported total annual household incomes of less than $50,000; 28 percent had incomes between $50,000 and $74,999; and 46 percent had incomes of $75,000 or more.
- **Age.** Approximately 74 percent of riders are under age 45.
- **Household Vehicle Ownership.** Approximately 13 percent of BART riders have no vehicle within their household.

### (2) Population and Housing

The demographic profile for the study area is summarized below and shown in Table 3.D-1.

**TABLE 3.D-1 EXISTING DEMOGRAPHIC PROFILE FOR THE STUDY AREA**

| | Alameda County | Dublin | Pleasanton | Livermore |
|---|---|---|---|---|
| **Population** | | | | |
| Persons | 1,559,308 | 49,694 | 73,164 | 83,901 |
| Households | 551,734 | 16,476 | 25,222 | 29,956 |
| Persons per Household | 2.77 | 2.78 | 2.89 | 2.79 |
| **Housing** | | | | |
| Housing Units | 587,071 | 17,248 | 26,079 | 31,281 |
| Home Ownership | 53% | 63% | 70% | 69% |
| Vacancy Rate | 6.0% | 4.5% | 3.3% | 4.2% |
| **Median Age and Income** | | | | |
| Household Income | $73,775 | $114,699 | $123,608 | $99,683 |
| Age | 36.9 | 36.3 | 40.6 | 39.3 |

Note: Existing demographics are shown for 2010 to 2014 and represent the entire 5-year period rather than a specific year.
Source: U.S. Census Bureau, 2014.

- **Population and Households.** Alameda County has 1,559,308 residents and 551,734 households. Dublin has 49,694 residents and 16,476 households, Pleasanton has 73,164 residents and 25,222 households, and Livermore has 83,901 residents and 29,956 households.

[9] Total percentage exceeds 100 percent due to rounding.

- **Household Size.** Compared to the countywide average household size (2.77 persons), the cities in the study area have slightly larger household sizes. Dublin and Livermore have average household sizes of 2.78 and 2.79 persons, respectively. The city of Pleasanton has the largest household size at 2.89 persons.
- **Housing Units.** Alameda County has 587,071 housing units. Dublin has the fewest housing units (17,248), while Pleasanton and Livermore have 26,079 and 31,281 housing units, respectively.
- **Homeownership.** Compared to the rate of homeownership in Alameda County (53 percent), the cities of Dublin, Pleasanton, and Livermore have higher rates of homeownership. Dublin, Pleasanton, and Livermore have homeownership rates of 63 percent, 70 percent, and 69 percent, respectively. Additionally, all three cities have vacancy rates of 3 to 4 percent, compared to Alameda County's vacancy rate of 6 percent, suggesting a higher demand for housing in the three cities.
- **Household Income.** The cities in the study area have higher household incomes than Alameda County as a whole. Specifically, Dublin, Pleasanton, and Livermore have median household incomes of approximately $114,699, $123,608, and $99,683, respectively, compared to the county median of $73,775.
- **Age.** The median age in Alameda County is 36.9 years. Dublin has a median age of 36.3 years, while Pleasanton and Livermore have a slightly higher median age, at 40.6 years and 39.3 years, respectively.

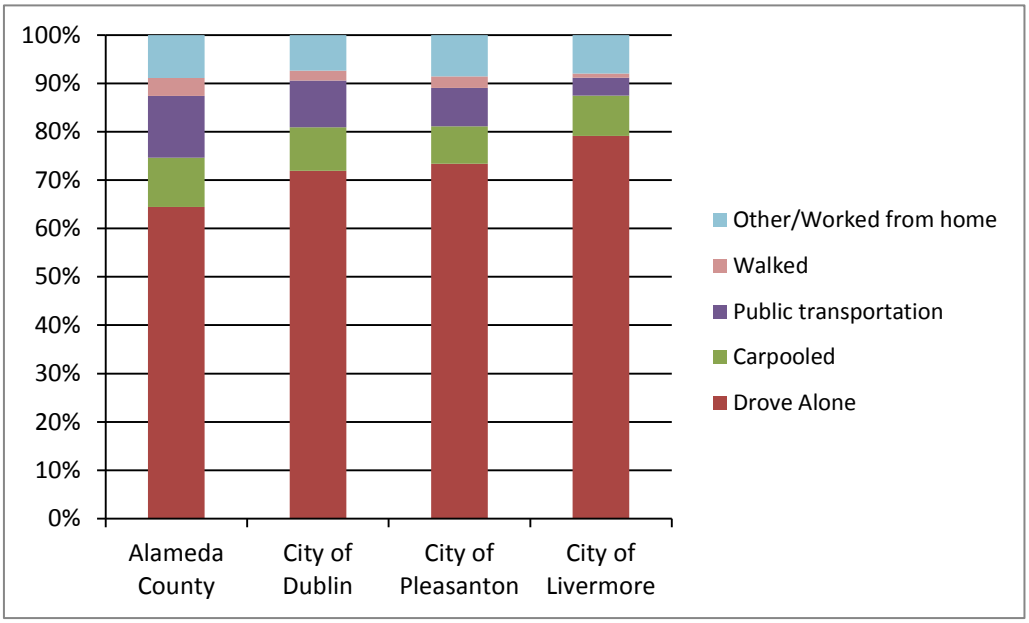
Chart 3.D-1 shows information about how people within the study area commute to work. Within Alameda County, 64 percent of residents commute to work in a single-occupancy vehicle whereas 13 percent of residents use transit. Between 72 to 79 percent of residents in Dublin, Pleasanton, and Livermore commute to work by single-occupancy vehicle—higher than the rate in Alameda County. Livermore has the highest level of commuting in a single-occupancy vehicle at 79.1 percent. Dublin has the highest rate of commuting by transit, at approximately 10 percent, and Livermore has the lowest rate of commuting by transit at 4 percent.

### (3) Employment

As of 2012, there were approximately 746,688 jobs in Alameda County, 19,138 jobs in Dublin, 64,152 jobs in Pleasanton, and 44,953 jobs in Livermore.[10] The largest employers or industries in the study area are described below, first for the County, then for the cities.

[10] U.S. Census Bureau, 2012. Economic Census and 2012 Non-employer Statistics. Available at: https://www.census.gov/programs-surveys/economic-census.html.

CHART 3.D-1 JOURNEY TO WORK DATA FOR THE STUDY AREA




Note: This data was collected over a period between 2010 and 2014 and represents the entire 5-year period rather than a specific year.
Source: U.S. Census Bureau, 2014.

The largest employers in Alameda County (that are not within the cities of Dublin, Pleasanton, and Livermore) include:[11]

- Alameda County Law Enforcement
- Alameda County Sheriff's Office
- Alta Bates Summit Medical Center
- Bayer Health Care
- Children's Hospital and Research Center
- Coopervision Inc. Advanced
- East Bay Water
- EMC Corp
- Grifols Diagnostic Solutions
- Highland Hospital
- Kaiser Oakland
- Lawrence Berkeley National Lab
- Life Scan Inc.
- Merritt Pavilion Lab
- Residential Students Service Program
- Tesla Motors
- Transportation Department-California
- University of California-Berkeley
- Washington Hospital Healthcare System
- Western Digital Corporation

In the city of Dublin, the following industries provide the greatest number of jobs: retail trade, accommodation and food services, food services and drinking places,

[11] State of California Employment Development Department (EDD), 2017. Major Employers in Alameda County. Available at: http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000001, accessed March 1.

manufacturing, healthcare and social assistance, construction, ambulatory health care services, educational services, motor vehicle and parts dealers, and public administration.[12]

In the city of Pleasanton, the major employers include the following (listed by greatest number of employees to least):[13]

1. Kaiser Permanente
2. Safeway
3. Workday Incorporated
4. Oracle
5. Pleasanton Unified School District
6. Valley Care Medical Center
7. Clorox Service Company
8. Macy's
9. Ross
10. State Fund – Compensation Insurance
11. EMC Corporation
12. Hendrick Automotive
13. City of Pleasanton
14. Roche Molecular Systems Inc.
15. Thoratec Corporation

In the city of Livermore, major employers are as follows:[14]

- Alere Home Monitoring
- City of Livermore
- Costco Wholesale Corp
- JW Peterson Painting
- Kaiser Permanente
- Lam Research
- Las Positas College
- Lawrence Livermore National Laboratory
- Livermore Area Recreation and Parks District
- Livermore Valley Joint Unified School District
- Performant Financial Corporation
- RGW Construction
- Sandia National Laboratories
- Topcon Positioning Systems
- US Foods
- Valley Care Health System
- Wente

[12] City of Dublin, 2016. Business Facts: Three-Digit NAICS Summary 2016. Available at: www.dublin.ca.gov/DocumentCenter/View/1761, accessed November 21.

[13] City of Pleasanton, 2013. Pleasanton Economic Development Strategic Plan, Background Report. Prepared by Strategic Economics. August.

[14] City of Livermore, 2016a. Major Employers. Available at: www.cityoflivermore.net/citygov/ed/why/majorbiz.htm, accessed August 23, 2016.

### b. Projections

Projections for population, housing, and employment within the study area are discussed below.

#### (1) Population, Households, and Housing Units

Population and household projections are described below for both 2025 and 2040, and housing unit projections are described for 2040. This discussion focuses on the projected change between existing conditions and 2040.

As shown in Tables 3.D-2 and 3.D-3, by 2040, Alameda County as a whole is projected to add the following: approximately 428,592 residents, an increase of 27 percent; approximately 153,596 households, an increase of 28 percent; and approximately 143,469 housing units, an increase of 24 percent. Of the three cities, Dublin is projected to experience the greatest percentage growth as demonstrated below.[15, 16]

**TABLE 3.D-2 EXISTING AND PROJECTED POPULATION AND HOUSEHOLDS, BY JURISDICTION**

| | | | | Change (Existing to 2040) | |
|---|---|---|---|---|---|
| **Jurisdiction** | **Existing** | **2025** | **2040** | **Increase** | **Percent** |
| **Population** | | | | | |
| Alameda County (Total) | 1,559,308 | 1,730,100 | 1,987,900 | 428,592 | 27 |
| Dublin | 49,694 | 58,700 | 73,800 | 24,106 | 49 |
| Pleasanton | 73,164 | 80,200 | 91,800 | 18,636 | 25 |
| Livermore | 83,901 | 91,700 | 104,300 | 20,399 | 24 |
| **Households** | | | | | |
| Alameda County (Total) | 551,734 | 624,300 | 705,330 | 153,596 | 28 |
| Dublin | 16,476 | 19,200 | 23,610 | 7,134 | 43 |
| Pleasanton | 25,222 | 28,730 | 32,300 | 7,078 | 28 |
| Livermore | 29,956 | 33,970 | 38,940 | 8,984 | 30 |

Note: Existing population and households are shown for 2010 to 2014 and represent the entire 5-year period rather than a specific year.
Sources: For existing data - U.S. Census Bureau, 2014.
For 2025 and 2040 data - ABAG, 2013.

[15] U.S. Census Bureau, 2014. 2010-2014 American Community Survey 5-Year Estimates. Available at: https://factfinder.census.gov/.
[16] Association of Bay Area Governments (ABAG), 2013. Plan Bay Area Projections 2013.

**TABLE 3.D-3 EXISTING AND PROJECTED HOUSING UNITS, BY JURISDICTION**

| | | | Change (Existing to 2040) | |
|---|---|---|---|---|
| **Jurisdiction** | **Existing** | **2040** | **Increase** | **Percent** |
| Alameda County (Total) | 587,071 | 730,540 | 143,469 | 24 |
| Dublin | 17,248 | 24,320 | 7,072 | 41 |
| Pleasanton | 26,079 | 33,160 | 7,081 | 27 |
| Livermore | 31,281 | 40,040 | 8,759 | 28 |

Note: Existing housing units are shown for 2010 to 2014 and represent the entire 5-year period rather than a specific year.
Sources: For existing data: U.S. Census Bureau, 2014.
For 2040 data: ABAG and MTC, 2013.

The cities in the study area are projected to grow as follows:

- Dublin is projected to add 24,106 residents, an increase of 49 percent from 2014; approximately 7,134 households, an increase of 43 percent; and approximately 7,072 housing units, an increase of 41 percent.
- Pleasanton is projected to add 18,636 residents, an increase of 25 percent from 2014; approximately 7,078 households, an increase of 28 percent; and approximately 7,081 housing units, an increase of 27 percent.
- Livermore is projected to add 20,399 residents, an increase of 24 percent from 2014; approximately 8,984 households, an increase of 30 percent; and approximately 8,759 housing units, an increase of 28 percent.

Much of this projected growth is anticipated to occur in areas referred to as PDAs. PDAs are areas within existing communities that local city or county governments have identified and approved for future growth. Within the nine-county Bay Area, 78 percent of new housing and 62 percent of new jobs are anticipated to be developed in PDAs.[17] Within the study area, there are seven PDAs as follows: three in Dublin, one in Pleasanton, and three in Livermore. Due to the nature of the Proposed Project, which would extend the BART service 5.5 miles to the east of Dublin/Pleasanton Station to a new terminus station at Isabel Avenue (see Chapter 2, Project Description), this discussion focuses on the PDAs in the city of Livermore. These PDAs are: (1) Livermore Downtown PDA, (2) Livermore East Side PDA, and (3) Livermore Isabel Avenue BART Station PDA, the location of the proposed Isabel Station and proposed Isabel Neighborhood Plan (INP). The housing and population

[17] Ibid.

numbers presented below for the Livermore Isabel Avenue BART Station PDA do not include growth related to the Isabel Station or INP. See Section 3.C, Land Use and Agricultural Resources, for further discussion of these PDAs, which are shown in Figure 3.C-10.

Table 3.D-4 shows existing and projected housing units in the city of Livermore and its PDAs. Between 2010 and 2040, the city of Livermore PDAs are projected to experience the greatest growth in housing units, compared to the remainder of the city of Livermore. The Livermore East Side PDA is projected to have the greatest increase, with approximately 4,270 new housing units by 2040. The Livermore Isabel Avenue BART Station PDA is projected to add approximately 3,470 units and the Livermore Downtown PDA is anticipated to add 1,670 housing units. The remainder of the city is projected to grow by only 290 housing units. The proposed INP, described in Section 3.A, Introduction to Environmental Analysis, provides for additional growth in the Livermore Isabel Avenue BART Station PDA, as shown in Table 3.A-2. Therefore, projected housing units in 2040 for the Livermore Isabel Avenue BART Station PDA would be greater than shown below if the INP is adopted.

**TABLE 3.D-4 EXISTING AND PROJECTED HOUSING UNITS IN LIVERMORE AND ITS PRIORITY DEVELOPMENT AREAS**

| PDA / Location | Existing | 2040 | Change (Existing to 2040) |
|---|---|---|---|
| Livermore Isabel Avenue BART Station PDA | 530 | 4,000 | 3,470 |
| Livermore East Side PDA | 100 | 4,370 | 4,270 |
| Livermore Downtown PDA | 1,020 | 2,690 | 1,670 |
| Remainder of City of Livermore | 28,690 | 28,980 | 290 |
| **Total for City of Livermore** | **30,340** | **40,040** | **9,700** |

Notes: PDA = Priority Development Area.
Existing housing units are shown for 2010.
For projected growth in the Livermore Isabel Avenue BART Station PDA related to the proposed INP, see Table 3.A-2 in Section 3.A, Introduction to Environmental Analysis.
Source: ABAG and MTC, 2013.

### (2) Employment

Table 3.D-5 presents employment projections for Alameda County and the cities of Dublin, Pleasanton, and Livermore. Alameda County is expected to add 200,962 jobs by 2040, an increase of 27 percent.

**TABLE 3.D-5 EXISTING AND PROJECTED JOBS, BY JURISDICTION**

| | | | | Change (Existing to 2040) | |
|---|---|---|---|---|---|
| **Jurisdiction** | **Existing** | **2025** | **2040** | **Increase** | **Percent** |
| Alameda County (Total) | 746,688 | 850,610 | 947,650 | 200,962 | 27 |
| Dublin | 19,138 | 25,620 | 31,650 | 12,512 | 65 |
| Pleasanton | 64,152 | 64,320 | 69,640 | 5,488 | 9 |
| Livermore | 44,953 | 47,860 | 53,210 | 8,257 | 18 |

Sources: Existing jobs - U.S. Census Bureau, 2012.
2025 and 2040 jobs - ABAG, 2013.

The cities in the study area are projected to grow as follows:

- Dublin is anticipated to add 12,512 jobs, representing a 65 percent increase.
- Pleasanton is expected to add 5,488 jobs by 2040, an increase of 9 percent.
- Livermore is projected to add approximately 8,257 jobs by 2040, an increase of 18 percent.

## 3. Regulatory Framework

This subsection describes the state environmental laws and policies relevant to population and housing. Applicable land use policies and regulations that affect growth are discussed in Section 3.C, Land Use and Agricultural Resources.

### a. California Relocation Assistance and Real Property Acquisition Guidelines

As described in the Environmental Analysis subsection below, the Proposed Project and Build Alternatives would require acquisition of land. Title 25 of the California Code of Regulations, Chapter 6, Section 6000 et seq, referred to as California Relocation Assistance and Real Property Acquisition Guidelines requires that relocation assistance be provided to any person, business, or farm operation displaced due to the acquisition of real property by a public entity for public use.[18] In addition, comparable replacement properties must be available for each displaced person within a reasonable period of time prior to displacement. Title 25 mandates that certain relocation services and payments be made available to eligible residents, businesses, and nonprofit organizations displaced by

[18] California Code of Regulations, Title 25, Chapter 6, Section 6000 et seq.

construction and operation of transit-related projects. Title 25 also establishes 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.

### b. Senate Bill 375

On September 30, 2008, Governor Schwarzenegger signed California State Senate Bill (SB) 375. SB 375 aims 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, the Sustainable Communities Strategy, which promotes high-density, transit-oriented development (TOD) and creates incentives for specifically defined, high-density development projects. See Section 3.L, Greenhouse Gas Emissions, for additional information regarding SB 375.

### c. Plan Bay Area

On July 18, 2013, ABAG and MTC adopted Plan Bay Area 2013 (Plan Bay Area), an integrated transportation and land use strategy through 2040, which serves as the nine-county Bay Area's first Sustainable Communities Strategy in compliance with the requirements of SB 375. See Section 3.C, Land Use and Agricultural Resources, for additional information regarding Plan Bay Area.

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purposes of this EIR, impacts related to population and housing are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) not in accordance with existing community or city plans
- Displace substantial numbers of existing housing or people, necessitating the construction of replacement housing elsewhere
- Displace substantial numbers of existing businesses

### b. Impact Methodology

The methodology used to evaluate the significance of employment, population, and housing-related impacts is described below under each respective impact analysis. The Electrical Multiple Unit (EMU) Option would result in the same impacts as the Diesel Multiple Unit (DMU) Alternative, and therefore the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service under the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

### c. Summary of Impacts

Table 3.D-6 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.D-6 SUMMARY OF POPULATION AND HOUSING IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| | | | **Project Analysis** | | |
| Impact PH-1: Induce substantial population growth during construction | NI | LS | LS | LS | LS |
| Impact PH-2: Displace substantial numbers of existing housing or people necessitating the construction of replacement housing elsewhere | NI | LSM | LSM | LS | NI |
| Impact PH-3: Displace substantial numbers of existing businesses during construction | NI | LSM | LSM | LSM | NI |

**TABLE 3.D-6 SUMMARY OF POPULATION AND HOUSING IMPACTS**

| Impacts | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| | No Project Alternative | Conventional BART Project[b] | DMU Alternative (with EMU Option)[b] | Express Bus/BRT Alternative[b] | Enhanced Bus Alternative |
| **Cumulative Analysis** | | | | | |
| Impact PH-4(CU): Induce substantial population growth during construction under Cumulative Conditions | NI | LS | LS | LS | LS |
| Impact PH-5(CU): Displace substantial numbers of existing housing, people, or businesses during construction under Cumulative Conditions | NI | LS | LS | LS | NI |
| **Operational** | | | | | |
| **Project Analysis** | | | | | |
| Impact PH-6: Induce substantial population growth during operations | NI | LS | LS | LS | LS |
| **Cumulative Analysis** | | | | | |
| Impact PH-7(CU): Induce substantial population growth during operations under Cumulative Conditions | NI | LS | LS | LS | LS |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation.
DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts related to construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts related to project construction are described below, followed by cumulative construction impacts.

Impacts related to displacement of housing, people, or businesses would be the same during construction and operation of the Proposed Project or Build Alternatives. Any potential displacement would commence during construction and continue during operation. Therefore, the construction-related impacts described below are considered permanent (rather than temporary). However, impacts related to inducement of substantial population growth would differ during construction and operation and are therefore discussed under both the Construction Impacts and Operational Impacts subsections.

#### (a) Construction – Project Analysis

***Impact PH-1: Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) not in accordance with existing community or city plans, during construction.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented. However, planned and programmed transportation improvements for segments of Interstate (I-) 580, local roadways and intersections, and core transit service improvements for BART, Altamont Corridor Express, and the Livermore Amador Valley Transit Authority (LAVTA) would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including construction of both residential and commercial uses. While construction of these improvements and development projects could induce population growth, the effects of the projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented. Furthermore, the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to inducement of substantial population growth during construction. **(NI)**

**Conventional BART Project and Build Alternatives.** As described in Chapter 2, Project Description, construction of the Proposed Project and Build Alternatives is anticipated to occur over approximately 5 years. The construction workforce for the Proposed Project and DMU Alternative would be several hundred workers per day, with fewer workers for the Express Bus/BRT Alternative and Enhanced Bus Alternative. Most construction employees would be anticipated to live in the Bay Area or Central Valley region and permanent housing would typically not be needed. However, even if construction employees do obtain housing near the project site, the existing housing stock in the area would be adequate to accommodate the temporary relocation of workers, as housing vacancy rates range between 3 to 6 percent in the study area, as shown in Table 3.D-1. Construction of the Proposed Project and Build Alternatives would not result in housing and employment growth beyond that currently anticipated as part of ongoing planning efforts. Therefore, the Proposed Project and Build Alternatives would have a less-than-significant impact related to inducement of substantial population growth during construction. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to inducement of substantial population growth during construction, and no mitigation measures are required.

***Impact PH-2: Displace substantial numbers of existing housing or people necessitating the construction of replacement housing elsewhere.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

Construction of the Proposed Project, DMU Alternative, or Express Bus/BRT Alternative would require the acquisition of partial properties, or in some cases, full properties along the project corridor, as described below. The Enhanced Bus Alternative would not require any property acquisition as it would be constructed within the existing street rights-of-way (ROWs).[19]

If partial acquisition of a parcel would leave the owner with an uneconomic remnant, then BART would offer to acquire that remnant. An uneconomic remnant is a parcel of property in which the owner is left with an interest after the partial acquisition of the owner's

[19] This EIR describes and analyzes the bus routes and bus infrastructure improvements at a programmatic level. Candidate locations for bus infrastructure improvements, anticipated to be constructed within existing street ROWs, are described to document the availability of such locations. Following implementation of the adopted project, specific routes would be developed by the bus operators based on detailed service planning. At that time, the routes and bus infrastructure improvements would be subject to subsequent environmental review if required.

property, and BART has determined that the remnant has little or no value or utility to the owner.

California Relocation Assistance and Real Property Acquisition Guidelines require that relocation assistance be provided to any person, business, or farm operation displaced due to the acquisition of real property by a public entity for public use, as discussed in the Regulatory Framework subsection above.[20] The guidelines establish uniform and equitable procedures for land acquisition, and provide for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by state and state-assisted programs. Any acquisition by BART for the Proposed Project or Build Alternative would follow these guidelines.

A detailed representation of the footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative is shown in Appendix B of this EIR and a detailed list of potential land acquisition is presented in Appendix C.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented—the relocation of I-580 would not occur, the mainline track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses would occur. The effects of the projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to displacement of substantial numbers of existing housing or people during construction. **(NI)**

**Conventional BART Project.** Activities under the Proposed Project that would require land acquisition include the relocation of the Caltrans ROW to accommodate the new BART ROW within the I-580 median, construction of the proposed Isabel Station, tail tracks, and storage and maintenance facility. Construction staging areas would occur within the land acquired for the project or on already vacant land temporarily leased for staging.

As shown in Table 3.C-1 in Section 3.C, Land Use and Agricultural Resources, the Proposed Project would require acquisition of approximately 117 parcels (approximately 147 acres) in whole or in part. This does not include parcels which are already owned by BART, or parcels which are currently occupied by existing transportation uses (i.e., Caltrans ROW). The majority of the 147 acres that would be affected under the Proposed

[20] California Code of Regulations, Title 25, Chapter 6, Section 6000 et seq.

Project would consist of agricultural uses (approximately 69 percent); the remaining 31 percent of affected land uses would be government, residential, commercial, and other uses.

Approximately 8 percent (approximately 11 acres) of the parcels to be acquired are occupied by residential uses, comprised of 10 parcels as shown in Table 3.D-7. Two residential parcels—1790 Hartman Road (Assessor's Parcel Number [APN] 903-006-004-05) and 1820 Hartman Road (APN 903-006-004-01)—would be functionally affected by the proposed storage and maintenance facility. Each parcel has a residential unit, which would be permanently displaced. For the other eight residential parcels, the area impacted by the Proposed Project footprint would be approximately 5 percent or less of each parcel and the areas affected would consist of landscaping, undeveloped land, and circulation. While BART would maintain access to the residential parcels during construction and operation, construction of the Proposed Project could result in changes to access or loss of parking spaces.

Acquisition of privately owned land—including residences and parking at existing development—is considered a significant impact. Therefore, the Proposed Project would result in a potentially significant impact related to displacement of existing housing or people. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program. **(LSM)**

**DMU Alternative.** The DMU Alternative would require partial or full acquisition of approximately 137 parcels (approximately 102 acres), as shown in Table 3.C-1 in Section 3.C, Land Use and Agricultural Resources. This does not include parcels which are already owned by BART, or parcels which are currently occupied by existing transportation uses (i.e., Caltrans ROW). For the DMU Alternative, approximately 54 percent of the 102 acres that would be affected consist of agricultural uses, 10 percent consist of government/public property, and the remainder of the uses each account for approximately 1 to 18 percent.

Similar to the Proposed Project, the DMU Alternative would require land acquisition for the relocation of the Caltrans ROW to accommodate the new BART ROW within the I-580 median, the proposed DMU transfer platform and BART storage tracks at the Dublin/Pleasanton Station, the proposed Isabel Station, tail tracks, and storage and maintenance facility. In addition, the construction staging areas would occur within the land acquired for the project or on vacant land temporarily leased for staging.

Approximately 3 percent of the parcels to be acquired under the DMU Alternative (approximately 3 acres) is occupied by residential uses; comprised of 8 parcels as shown in Table 3.D-7. The area within the DMU Alternative footprint would be approximately

5 percent or less of each parcel and the areas affected would consist of landscaping, undeveloped land, and circulation. No residences would be displaced. While BART would maintain access to the residential parcels during construction and operation, construction of the DMU Alternative could result in some changes in access or loss of parking spaces.

**TABLE 3.D-7 RESIDENTIAL PARCELS AFFECTED BY THE CONVENTIONAL BART PROJECT AND DMU ALTERNATIVE**

| APN Number/ Jurisdiction | Location | Use within Footprint | Acreage within Footprint | Percent of Parcel Area Affected |
|---|---|---|---|---|
| **Parcels only within Conventional BART Project Footprint** | | | | |
| 903-006-004-05 Alameda County | 1790 Hartman Road | Residence | 4.62 | 94 |
| 903-006-004-01 Alameda County | 1820 Hartman Road | Residence | 3.72 | 62 |
| **Parcels within Both Conventional BART Project and DMU Alternative Footprints** | | | | |
| 905-001-006-03 Dublin | Croak Road | Grazing land | 1.88 | 4 |
| 905-001-004-04 Dublin | Western end of Collier Canyon Road | Rural undeveloped land | 0.27 | 1 |
| 946-4623-008-06 Pleasanton | Northwest of Stoneridge Drive | Landscaped area | 0.08 | <1 |
| 946-1120-173 Pleasanton | Brockton Drive and Pimlico Drive | Landscaped area in front of apartments | 0.06 | 3 |
| 099-130-002-02 Livermore | East Airway Boulevard | Parking spaces and circulation | 0.22 | 1 |
| 099-1344-092 Livermore | Between East Airway Boulevard and Saddleback Circle | Landscaped area | 0.13 | 5 |
| 903-010-024-01 Livermore | Campus Hill Drive | Landscaped area | 0.03 | 2 |
| 903-010-024-02 Livermore | Campus Hill Drive | Landscaped area | 0.02 | 1 |
| **Total Residential Acres** | | | | |
| **Conventional BART Project** | | | 11 | -- |
| **DMU Alternative** | | | 3 | -- |

Notes: -- = Not applicable.
No residential parcels are within the footprint of the Express Bus/BRT Alternative. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the Proposed Project and other Build Alternatives, are anticipated to extend within the existing street ROWs and would not include any residential parcels.
Source: Arup, 2017.

Acquisition of privately owned land—including residences and parking at existing development—is considered a significant impact. Therefore, the DMU Alternative would result in a potentially significant impact related to displacement of existing housing or people. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program. **(LSM)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would require partial or full acquisition of approximately 34 parcels (approximately 10 acres), as shown in Table 3.C-1 in Section 3.C, Land Use and Agricultural Resources. This does not include parcels which are already owned by BART, or parcels which are currently occupied by existing transportation uses (i.e., Caltrans ROW). In terms of total acreage, acquisition for the Express Bus/BRT Alternative would primarily affect parcels with government/public property uses (approximately 56 percent) and commercial and office (approximately 42 percent).

The new BART ROW for this alternative would mainly occur within the I-580 ROW, from just west of Dougherty Road to Tassajara Road/Santa Rita Road. Land acquisition would be required for the widening of the Caltrans ROW to accommodate the widened BART ROW within the I-580 median. Parcels would also be acquired for the BART storage tracks and the bus transfer platforms at the Dublin/Pleasanton Station. In addition, the construction staging areas would occur within the land acquired for the alternative or on vacant land temporarily leased for staging.

Under the Express Bus/BRT Alternative, no residential parcels would be affected and no residents would be displaced. Therefore, the Express Bus/BRT Alternative would result in less-than-significant impacts related to displacement of existing housing or people during construction, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative does not include any major capital improvements. It would entail construction of bus shelters, bus bulbs, and signage within the existing street ROWs and other improvements to existing bus services. No land acquisition would be required under this alternative. Therefore, the Express Bus/BRT Alternative would result in no impacts related to displacement of existing housing or people during construction, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have potentially significant impacts related to displacing substantial numbers of existing housing or people during construction. However, with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program, potential impacts would be reduced to a less-than-significant level.

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for these alternatives.

**Mitigation Measure PH-2: Acquisition of Property and Relocation Assistance. (Conventional BART Project and DMU Alternative/EMU Option)**

BART's Real Estate Department will implement an acquisition and relocation program that meets the requirements of applicable State acquisition and 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.

***Impact PH-3: Displace substantial numbers of existing businesses during construction.***

***(No Project Alternative: NI; Conventional BART: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: NI).***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented—the relocation of I-580 would not occur, the mainline track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses would occur. The effects of the projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to displacement of substantial numbers of businesses. **(NI)**

**Conventional BART Project.** As described in **Impact PH-2** above, the Proposed Project would require the partial or full acquisition of approximately 117 parcels. Approximately 5 percent of the land to be acquired (26 parcels) is occupied by commercial and office uses. Many of these parcels are located along the I-580 corridor and the Proposed Project would encroach into areas of the parcels typically used as surface parking lots. Furthermore, one commercial building, at 2600 Kitty Hawk Road (APN 904-004-010-02), would be functionally affected by the Proposed Project and the existing business would be displaced. In addition, approximately 69 percent of the land to be acquired (15 parcels) is occupied by agricultural uses, generally in the Cayetano Creek Area. The tail tracks and

storage and maintenance facility that extend through the area would require partial or full acquisition of several large agricultural parcels used as grazing land. See Section 3.C, Land Use and Agricultural Resources, for an assessment of impacts to agricultural resources.

Acquisition of privately owned land—including businesses, farm operations, and/or parking—is considered a significant impact. Therefore, the Proposed Project would result in a potentially significant impact related to displacement of businesses. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program. **(LSM)**

**DMU Alternative.** As described in **Impact PH-2** above, the DMU Alternative would require the partial or full acquisition of approximately 139 parcels. Approximately 10 percent of the land to be acquired (38 parcels) is occupied by commercial and office uses. Many of these parcels are located along the I-580 corridor and the DMU Alternative would encroach into areas of the parcels typically used as surface parking lots. Similar to the Proposed Project, the only commercial building that would be functionally affected is 2600 Kitty Hawk Road (APN 904-004-010-02) and the existing business would be displaced. In addition, approximately 54 percent of the land to be acquired (11 parcels) is occupied by agricultural uses, generally in the Cayetano Creek Area. Similar to the Proposed Project, the tail tracks and storage and maintenance facility that extend through the area would require partial or full acquisition of several large agricultural parcels used as grazing land. See Section 3.C, Land Use and Agricultural Resources, for an assessment of impacts to agricultural resources.

Acquisition of privately owned land—including business activities, farm operations, and/or parking—is considered a significant impact. Therefore, the DMU Alternative would result in a potentially significant impact related to displacement of businesses. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program. **(LSM)**

**Express Bus/BRT Alternative.** As described under **Impact PH-2** above, the Express Bus/BRT Alternative would require the partial or full acquisition of 34 parcels. Approximately 41 percent of the land to be acquired (13 parcels) is occupied by commercial and office uses. These parcels are located along the I-580 corridor and the Express Bus/BRT Alternative would encroach into areas of the parcels typically used as surface parking lots. No commercial or office buildings would be affected by this alternative.

Acquisition of privately owned land, including available parking, is considered a significant impact. Therefore, the Express Bus/BRT Alternative would result in a potentially significant impact related to displacement of businesses. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure PH-2**, which would require BART to implement an acquisition and relocation program. **(LSM)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative does not include any major capital improvements. It would entail construction of bus shelters, bus bulbs, and signage within the existing street ROWs and other improvements to existing bus services. No land acquisition would be required under this alternative. Therefore, the Express Bus/BRT Alternative would result in no impacts related to displacement of substantial numbers of businesses during construction and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant impacts related to displacing existing businesses during construction. However, with implementation of **Mitigation Measure PH-2** (see **Impact PH-2** above)**,** which would require BART to implement an acquisition and relocation program, potential impacts would be reduced to a less-than-significant level.

As described above, the Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for this alternative.

### (b) Construction – Cumulative Analysis

The geographic study area for the cumulative analysis is the same as that described in the Introduction subsection above—it is the area that would be served by the Proposed Project and Build Alternatives, including the cities of Dublin, Pleasanton, and Livermore.

***Impact PH-4(CU): Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) not in accordance with existing community or city plans, during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact PH-1** above, the No Project Alternative would have no impacts related to inducement of substantial population growth during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Most of the cumulative projects listed in Section 3.A, Introduction to Environmental Analysis and Appendix E, would entail construction and therefore would create temporary construction jobs. Concurrent construction of the Proposed Project or a Build Alternative with the cumulative projects could temporarily increase demand for construction workers. These jobs would be spread throughout the Tri-Valley Area and would likely draw construction employees from around the region. Due to the temporary nature of these construction jobs, they would not result in substantial growth. Therefore, construction of the Proposed Project and Build Alternatives, in combination with other probable future projects, would result in less-than-significant cumulative impacts related to inducement of substantial population growth. **(LS)**

**Mitigation Measures.** As described above, Proposed Project and Alternatives in combination with past, present, and probable future projects would not result in significant cumulative impacts related to substantial population growth, and no mitigation measures are required.

***Impact PH-5(CU): Displace substantial numbers of existing housing or people, necessitating the construction of replacement housing elsewhere or displace substantial numbers of existing businesses, during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact PH-2** and **Impact PH-3** above, the No Project Alternative would have no impacts related to displacement of substantial numbers of existing housing, people, or businesses during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** As described in **Impact PH-2** and **Impact PH-3**, the Proposed Project and DMU Alternative would have significant impacts related to displacement of housing or people. Furthermore, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would each have significant impacts related to displacement of businesses. However, these impacts would be mitigated to a less-than-significant level with the implementation of **Mitigation Measure PH-2.**

While future cumulative projects within the study area could result in the need to redevelop land already occupied by other uses, the cumulative projects would generally be constructed on parcels that are currently undeveloped. As such, it is not anticipated that the cumulative projects listed in Section 3.A, Introduction to Environmental Analysis and

Appendix E, including the INP, would require substantial displacement of people, housing, or businesses.

Therefore, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, in combination with cumulative projects, would result in less-than-significant cumulative impacts related to displacement of housing, people, or businesses. **(LS)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would have no project impacts related to displacement of housing, people, or businesses, as described in **Impact PH-2** and **Impact PH-3** above, and therefore it would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts related to displacement of substantial numbers of existing housing, people, or businesses, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operational impacts.

#### (a) Operations – Project Analysis

***Impact PH-6: Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) not in accordance with existing community or city plans, during operations.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented. However, construction of the planned and programmed transportation improvements would occur, and population and employment growth throughout Alameda County would result in continued development. As the only anticipated transportation improvements under the No Build Alternative would be planned and programmed transit and roadway improvements and continued land use development, including construction of residential and commercial uses, there would be no indirect growth inducement impacts associated with transportation infrastructure not in accordance with plans.

The development pattern for growth in the project corridor would likely be less dense (i.e., more dispersed and automobile-oriented) than the pattern supported by the

Proposed Project and DMU Alternative, because there would not be a major transit hub (the proposed Isabel Station) to focus development around. Therefore, the No Project Alternative would not support local TOD policies within the city of Livermore and SB 375's goal of encouraging more compact and efficient communities to the same degree that the Proposed Project or DMU Alternative would. Nevertheless, while affecting the distribution of growth, the No Project Alternative would not be expected to induce population and employment growth beyond that planned by the County and cities. The long-term projections for growth in population, housing, and jobs within the project corridor would not change significantly under the No Project Alternative. Therefore, the No Project Alternative would not directly or indirectly result in significant impacts pertaining to inducement of substantial unplanned population growth. **(NI)**

**Conventional BART Project.** The Proposed Project is a transit project and would not include any residential uses. Therefore, it would not directly induce substantial population growth by proposing new housing.

The Proposed Project would increase the number of BART and LAVTA employees. Overall, approximately 119 full-time employees would be required for the Proposed Project as follows: approximately 101 BART employees, including station agents, train operators, maintenance personnel, and security; and approximately 18 LAVTA employees.[21] These jobs would likely be filled by persons within the study area or greater Bay Area, and would not represent substantial population growth. Furthermore, even if all new employees required new housing within the study area, this demand could be accommodated within the existing housing stock, as vacancy rates in the study area range from 3 to 6 percent (see Table 3.D-1). Therefore, the Proposed Project would not directly induce substantial population growth by proposing new businesses or jobs.

As described in Chapter 2, Project Description, one of the objectives of the BART to Livermore Extension Project is to provide an effective alternative to traffic congestion on I-580. While the study area is already largely developed and the Proposed Project would generally respond to the existing commuter demand, it would also indirectly support future growth in the study area. As described in the Projections subsection above, the population in the County and three cities in the study area is anticipated to increase by approximately 24 to 49 percent through 2040. Both BART ridership and passenger vehicle miles traveled (VMT) are forecast to increase in the future even without the Proposed Project, as described in Section 3.B, Transportation. Various planning documents anticipate this growth and it is planned for in Plan Bay Area, as well as the General Plans and Specific Plans of the cities in the study area.

[21] Dean, Donald, 2017. Email communication from Donald Dean, BART Environmental Coordinator, with Urban Planning Partners, Inc., February 28.

The Proposed Project could indirectly induce new growth, particularly near the proposed Isabel Station within the City of Livermore. One of the project objectives is to support TOD in PDAs, and development in the Livermore Isabel Avenue BART Station PDA would be consistent with this objective. The City of Livermore General Plan anticipates future BART service to Livermore and identifies buildout estimates for housing and employment that anticipate substantial new development in Livermore through 2040, with new residential and commercial uses near the Isabel Station. Furthermore, Plan Bay Area projects that approximately 3,470 additional housing units would be constructed by 2040 in the Livermore Isabel Avenue BART Station PDA (see Table 3.D-4). Redistributing planned development anticipated within the city of Livermore to the Livermore Isabel Avenue BART Station PDA is consistent with Plan Bay Area and other regional planning efforts, and with SB 375's mandate to reduce greenhouse gas emissions by increasing density, reducing passenger VMT and promoting TOD. As such, redistributing growth to areas well-served by transit is considered an environmental benefit rather than an adverse impact.

BART's System Expansion Policy requires communities that would be served by a new BART extension to prepare Ridership Development Plans (RDPs) for the area around proposed stations to support greater ridership. RDPs help to achieve greater ridership through measures such as transit-supportive land uses. Details regarding the RDP being prepared by the City of Livermore, referred to herein as the Isabel Neighborhood Plan, are presented in the Cumulative Analysis subsection below. In addition, details concerning projected population growth and its consistency with existing and proposed city plans are presented in Chapter 4, Other CEQA Considerations.

While the Proposed Project would have an indirect growth-inducing effect in the vicinity of the proposed Isabel Station, this growth has been accounted for in the various planning documents for the study area and is currently being addressed in the INP being prepared by the City of Livermore. Moreover, by diverting growth to the Isabel/BART Station PDA, the Proposed Project will reduce urban sprawl and comply with SB 375's direction to encourage more compact and efficient communities, Therefore, the Proposed Project would not directly or indirectly cause substantial population growth not in accordance with community and city plans, and would result in less-than-significant impacts related to population growth. No mitigation measures are required. **(LS)**

**DMU Alternative.** Similar to the Proposed Project, the DMU Alternative would extend rail service to the city of Livermore and construct a new station at Isabel Avenue. The DMU Alternative is a transit project and would not include any residential uses. Therefore, it would not directly induce substantial population growth by proposing new housing.

Approximately 135 new full-time equivalent staff would be required as follows: 102 DMU employees; 15 additional BART employees; 18 additional LAVTA employees. This number

of new employees would not directly induce substantial population growth by proposing new businesses or jobs, for the same reasons described for the Proposed Project above.

Also, similar to the Proposed Project, the DMU Alternative could indirectly induce new growth, particularly near the proposed Isabel Station within the City of Livermore. However, as described above for the Proposed Project, this growth has been accounted for in the various planning documents for the study area and is currently being addressed in the INP being prepared by the City of Livermore. Moreover, by diverting growth to the Isabel/BART Station PDA, the DMU Alternative would reduce urban sprawl and comply with SB 375's direction to encourage more compact and efficient communities, Therefore, the DMU Alternative would not directly or indirectly cause substantial population growth not in accordance with community and city plans. For these reasons, the DMU Alternative would result in less-than-significant impacts related to population growth and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative, rail service would not be extended to Livermore and a new station would not be constructed at Isabel Avenue. Instead, this alternative is intended to achieve the project objectives using Express Bus and BRT technology only. Under this alternative, approximately 23 additional employees would be required as follows: approximately six employees to serve the BART facilities at the Dublin/Pleasanton Station and 17 additional LAVTA employees. This number of employees would not result in substantial population growth.

The Express Bus/BRT Alternative could indirectly induce new growth by providing improved transit access. However, bus routes without major fixed improvements are easily changed in the future, which discourages major developer investment. It is unlikely that growth associated with the Express Bus/BRT Alternative would be substantial because the combination of BART ridership increases at Dublin/Pleasanton Station and bus ridership increases would be considerably lower than for the Proposed Project or DMU Alternative (see Section 3.B, Transportation). To the extent that the Express Bus/BRT Alternative would indirectly cause growth in the vicinity of new or modified bus routes, such growth would be redistributed from nearby areas which have less transit access, and has been accounted for in the various planning documents for the study area. Such growth would be consistent with SB 375's direction to encourage more compact and efficient communities. Therefore, the Express Bus/BRT Alternative would result in less-than-significant impacts related to population growth, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, rail service would not be extended to Livermore and a new station would not be constructed at Isabel Avenue, similar to the Express Bus/BRT Alternative. This Alternative only entails lower-cost bus service improvements. Under this Alternative, approximately 20 additional LAVTA

employees would be required to provide the increased bus services. This number of employees would not result in substantial population growth.

Similar to the Express Bus/BRT Alternative described above, the Enhanced Bus Alternative could indirectly induce new growth by providing improved transit access. However, bus routes without major fixed improvements are easily changed in the future, which discourages major developer investment. It is unlikely that growth associated with the Enhanced Bus Alternative would be substantial because the combination of BART ridership increases at Dublin/Pleasanton Station and bus ridership increases would be considerably lower than for the Proposed Project or DMU Alternative (see Section 3.B, Transportation). Due to the minor nature of the bus improvements and the low projected increase in ridership, this alternative is unlikely to result in substantial population growth. Therefore, the Enhanced Bus Alternative would result in less-than-significant impacts related to population growth, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to inducement of substantial population growth, and therefore, no mitigation measures are required.

**Operations – Cumulative Analysis**

The geographic study area for the cumulative analysis is the same as that described in the Introduction subsection above—it is the area that would be served by the Proposed Project and Build Alternatives, including the cities of Dublin, Pleasanton, and Livermore.

***Impact PH-7(CU): Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure) not in accordance with existing community or city plans, during operations under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** For the purpose of this EIR, it is assumed the INP would be implemented by the City of Livermore if the Proposed Project or DMU Alternative is adopted by the BART Board of Directors. Therefore, under the No Project Alternative, the INP would not be implemented and the development pattern would likely continue be less dense (i.e., more sprawling) than supported by the Proposed Project and DMU Alternative (in combination with the INP). Under the No Project Alternative, combined with the probable future projects, population growth would likely not support SB 375's goal of encouraging more compact and efficient communities and local TOD policies to the same degree as under the Proposed Project or DMU Alternative (in combination with the INP). However, as described in **Impact PH-6** above, the No Project Alternative would affect the

distribution of growth but would not be expected to induce population and employment growth beyond that planned by the County and cities. Therefore, the No Project Alternative would not directly or indirectly result in significant impacts on population growth, and would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and DMU Alternative.** As described in **Impact PH-6**, above, the Proposed Project and DMU Alternative would respond to the existing need for transit services as well as future growth anticipated by ABAG and the City of Livermore.

One of BART's requirements for implementation of either the Proposed Project or DMU Alternative is for the City of Livermore to create a Ridership Development Plan. This requirement would be fulfilled by the INP, a specific plan under preparation by the City of Livermore that would provide for denser development around the proposed Isabel Station than is currently allowed by the City of Livermore General Plan or projected by Plan Bay Area. The City of Livermore anticipates that the Draft INP and its Draft EIR will be available for public review in fall 2017 and will be considered for approval by the City of Livermore in winter 2017/2018.

Approval of the INP would facilitate an increase in population with new residential and commercial development around the proposed Isabel Station. Under the INP, the Livermore Isabel Avenue BART Station PDA would have 15,294 residents, 6,068 households, and 19,632 jobs by 2040, as shown in Table 3.A-2 in Section 3.A, Introduction to Environmental Analysis.[22, 23] The specific impacts of such growth are being evaluated by the City of Livermore in a separate environmental review for the INP.

While the amount of new growth projected for the study area could be substantial, preparation of the INP would help to accommodate growth in a more compact, transit-oriented configuration than would otherwise occur without the INP. The purpose of the INP is to concentrate jobs and housing around a transit hub to support transit ridership and reduce automobile travel.

The Proposed Project and DMU Alternative 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, as well as the Isabel Neighborhood Plan. Under the INP, the projected growth would be reconfigured to concentrate development at the transit hub and to take advantage of the regional accessibility provided at the proposed Isabel Station. This intensification of land uses in the INP area would be consistent with Livermore land use policies that have anticipated a BART to Livermore Extension. It would also be consistent with Plan Bay Area and other

[22] Cambridge Systematics, 2017. BART to Livermore Ridership Projections (Draft). January.
[23] City of Livermore, 2016b. Staff Report, Preferred Plan for the INP. July 5.

regional planning efforts, and with SB 375's mandate to reduce greenhouse gas emissions by increasing density, reducing passenger VMT and promoting TOD. Therefore, the Proposed Project and DMU Alternative, in combination with the cumulative projects, would have a less-than-significant cumulative impact related to inducement of substantial population growth. **(LS)**

**Express Bus/BRT Alternative and Enhanced Bus Alternative.** Under the Express Bus/BRT Alternative and Enhanced Bus Alternative, no rail service would be extended to Livermore and no new station would be constructed. For the purpose of this EIR, it is assumed that the INP would not be implemented under these alternatives. As described under **Impact PH-6**, the long-term projections for growth in population, housing, and jobs within the project corridor would not change significantly under the bus alternatives. Furthermore, bus routes that do not have major fixed infrastructure improvements, can be modified in the future, which discourages major developer investment. Nevertheless, while it is unlikely that growth associated with the Express Bus/BRT Alternative and Enhanced Bus Alternative would be substantial, these alternatives may, to a limited extent, indirectly cause growth in the vicinity of new or modified bus routes. Growth next to transit—including bus routes—would support SB 375's goal of encouraging more compact and efficient communities and local TOD policies within the city of Livermore, although not to the same degree that the Proposed Project or DMU Alternative would with the INP. Therefore, under the Express Bus/BRT Alternative and Enhanced Bus Alternative, projected growth would be anticipated to remain consistent with Plan Bay Area as well as city planning documents. The probable future projects combined with the Express Bus/BRT Alternative or Enhanced Bus Alternative would not result in significant cumulative impacts related to inducement of substantial population growth, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with probable future projects, would not result in significant cumulative impacts related to inducement of substantial population growth, and no mitigation measures are required.

# E. VISUAL QUALITY

## 1. Introduction

This section describes the existing visual resources as they relate to the BART to Livermore Extension Project, discusses the applicable regulations, and assesses the potential impacts to visual resources from construction and operation of the Proposed Project and Build Alternatives.

Visual quality can be subjective and often depends on the viewer. This section discusses how views from various locations within and surrounding the project corridor would change as a result of the Proposed Project and Build Alternatives. The analysis focuses on views from publicly accessible places, including parks and open space as well as roadways with a scenic designation.

Although the actual distance for views along the project corridor varies depending on topography, vegetation, landscaping, and intervening structures, the study area generally encompasses the area within approximately 0.25-mile radius of the collective footprint—the combined footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative —and within an approximately 0.5-mile radius of the Dublin/Pleasanton Station and proposed Isabel Station. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder buses for the Proposed Project and other Build Alternatives, which are anticipated to extend along existing streets and within the street ROWs, are addressed programmatically in this analysis, as described in Chapter 2, Project Description.

Consistent with the BART policy of coordinating system expansion with local land use planning, this section includes a brief discussion of applicable local policies, plans, and regulations. Under California Government Code Sections 53090 and 53091, transit districts such as BART are exempt from complying with local land use plans, policies, and zoning ordinances. However, BART has elected to consider City of Livermore's scenic vistas and corridors as scenic resources for purposes of impact analysis in this EIR. Any other policies pertaining to visual quality are presented for informational purposes only and are not considered for the purpose of identifying significant impacts under CEQA.

Comments pertaining to visual resources were received in response to the Notice of Preparation for this EIR or during the public scoping meeting held for the EIR. These comments focused on cumulative impacts to scenic views along Interstate Highway (I-) 580 due to multiple development projects in Dublin and Pleasanton, and visual impacts to the Brushy Peak Regional Preserve.

## 2. Existing Conditions

This subsection describes the concepts and terminology used in the assessment of visual quality and describes the existing visual conditions within the region and study area, including the visual character and quality of the corridor. It also identifies views of the corridor from scenic publicly accessible places, including parks, trails, and open space. Views of drivers from roadways with a scenic designation are also described.

### a. Overview of Terminology

The analysis of visual quality in this section uses concepts and terminology drawn from the Federal Highway Administration's Guidelines for the Visual Impact Assessment of Highway Projects.[1] An overview of the terminology used is provided below.

- **Visual Character.** A description of the landscape elements and the relationships between the existing visible natural and built landscape features. Visual character-defining resources and features include landforms, vegetation, land uses, buildings, transportation facilities, overhead utility structures and lighting, and open space. The visual character of the study area is described below in the Visual Character and Visual Quality of the Study Area subsection.
- **Visual Quality.** Visual quality is a value placed on visual resources by viewers and is based on the three concepts of vividness, intactness, and unity, as described below:
    - Vividness is the degree of drama, memorability, or distinctiveness of the landscape components as seen in a particular view.
    - Intactness is a measure of the visual integrity of the natural and human-built landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes as well as in natural settings. High intactness means that the landscape is free of unattractive features, out-of-place features, and elements do not break up the landscape. Low intactness means that visual elements in a view are unattractive or detract from the quality of the view.
    - Unity is the landscape's degree of visual coherence and compositional harmony considered as a whole. High unity frequently attests to the careful design of individual components and their relationship in the landscape or an undisturbed natural landscape.

  The existing visual quality serves as the baseline for determining the degree of visual impacts. The following five categories are used to rate visual quality: (1) low; (2) moderately low; (3) moderate; (4) moderately high; (5) and high. The existing visual

[1] Federal Highway Administration, 2015. Guidelines for the Visual Impact Assessment of Highway Projects. Document No. FHWA-HEP-15-029. January.

quality of the study area is described below in the Visual Character and Visual Quality of the Study Area subsection.

- **Sensitive Viewers.** Sensitive viewers are defined as the population or viewers that are sensitive to changes in the visual setting. Viewers at locations such as parks, pedestrian and bicycle trails, and other publicly accessible open spaces are considered to be sensitive viewers. Drivers are also considered sensitive viewers, if the roadway they are traveling on is a designated scenic highway, scenic route, or has a designated public 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. Viewers within commercial and industrial areas are not typically considered sensitive viewers. See the Sensitive Viewers subsection below for a list of sensitive viewers in the study area.
- **Visual Compatibility.** For the purposes of this assessment, visual compatibility is defined as the degree to which the project introduces similar or dissimilar elements into the natural and building landscape as well as the degree to which the environment can accommodate the visual changes introduced by a project. These elements are perceived by sensitive viewers as either compatible or incompatible with the existing visual character of the area. The degree to which the project elements are consistent with the existing visual character determines the magnitude of the resulting change in visual quality. The visual compatibility of the Proposed Project and Build Alternatives with the existing visual character of the study area and the resulting effects on visual quality are described in the Environmental Analysis subsection below.

### b. Regional Overview

The study area is located in the Tri-Valley Area of the San Francisco Bay Area (Bay Area). The Bay Area as a whole is characterized by an exceedingly diverse topography ranging from the shores of the Pacific Ocean, the coastal mountain ranges of the San Francisco Peninsula, Bay inlets, and hilly wine-growing regions in the north to the low-lying San Joaquin Delta and flat, dry farmlands of the eastern counties.

The Tri-Valley Area is located east of the East Bay Hills within the I-580 and I-680 corridors and consists of the following three valleys: Amador, Livermore, and San Ramon. The city of Livermore is in the Livermore Valley, and the cities of Dublin and Pleasanton are in the Amador Valley; both the Livermore and Amador Valleys are in Alameda County, and the combination of the two is referred to as the Livermore-Amador Valley. The town of Danville and city of San Ramon are in the San Ramon Valley in Contra Costa County.

Dublin, Pleasanton, and Livermore 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. These cities are surrounded by rural residential areas, and vineyards.

Development in the Tri-Valley Area is less dense and of a more rural character than other Bay Area cities to the west. Large tracts of suburban homes are arranged primarily in cul-de-sacs and along curvilinear streets. Commercial and industrial development, including business parks, are spread out and oriented near I-580 and along the Union Pacific Railroad rights-of-way. Areas of open grassy hillsides and scattered trees are located toward the eastern edge of the study area. Views of the hillsides and the surrounding ridgelines can be seen from many locations along the project corridor.

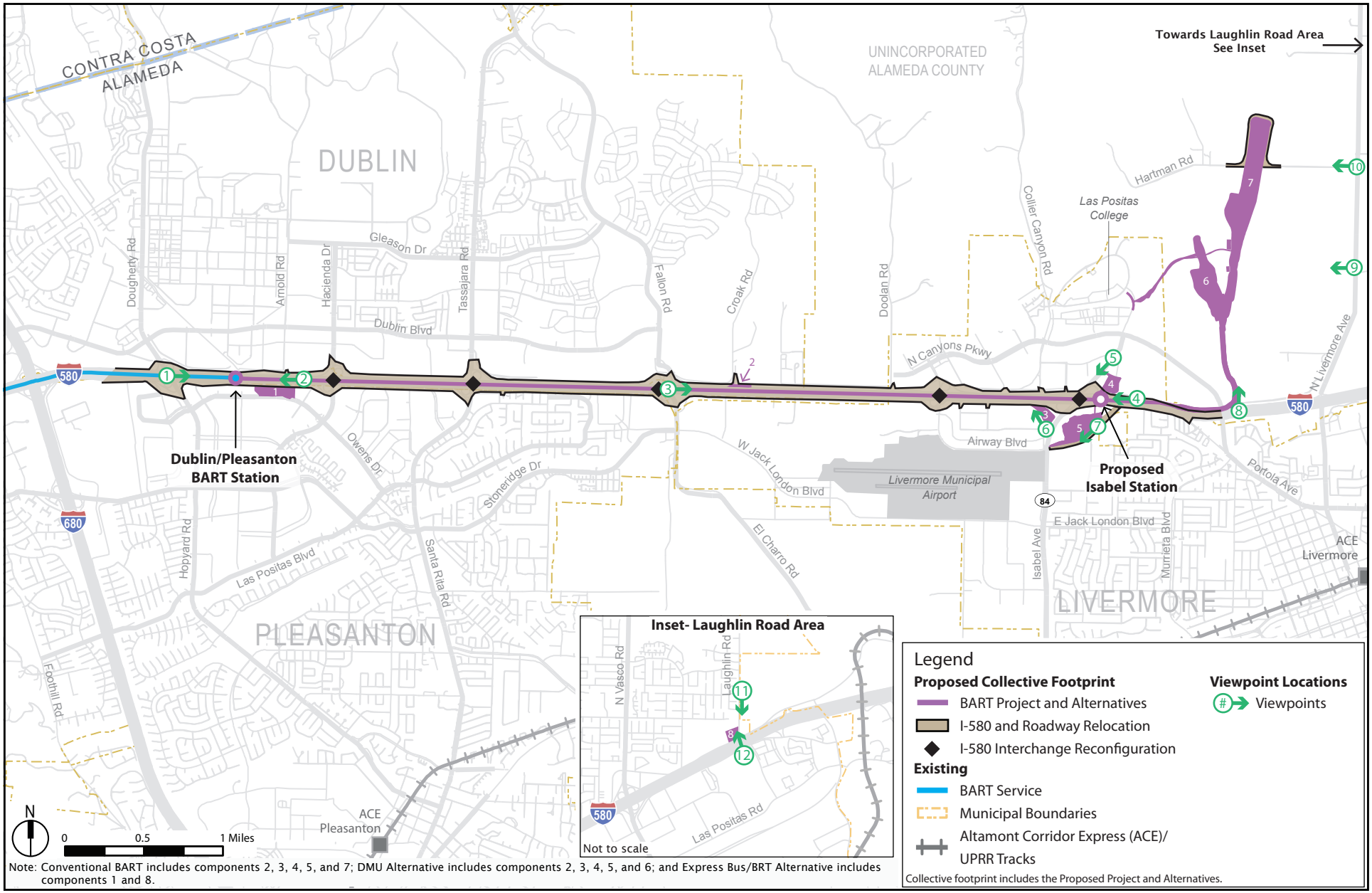
### c. Visual Character and Visual Quality of the Study Area

This subsection provides a summary of the existing visual character and visual quality along the project corridor as a whole, followed by a detailed description of the visual character and visual quality for each geographic subarea, from west to east along the project corridor. Elements of the landscape are described based on their proximity to the collective footprint, as follows: foreground (0.25 to 0.5 mile); middle-ground (0.5 to 5 miles away); and background (5 miles to the limit of visibility). Viewpoint locations are shown in Figure 3.E-1 and photos at representative vantage points are shown in Figures 3.E-2 through 3.E-5. See Section 3.C, Land Use and Agricultural Resources, for additional photos of the study area.

#### (1) Overview of Project Corridor

The I-580 corridor extends east to west within the study area. The project corridor along I-580 is predominantly characterized by elements of the built environment to the north and south of the freeway, and distant views of hills beyond to the east and west.

Near the existing Dublin/Pleasanton Station, the landscape is characterized by BART surface parking lots and a parking garage, multi-story residential buildings, commercial office buildings, and single-story automobile dealerships. Farther east of the Dublin/Pleasanton Station to Tassajara Road/Santa Rita Road, highway-oriented, mostly large, commercial structures are adjacent to I-580, including business parks and surface parking lots. Views beyond the immediate I-580 corridor include middle-ground views of rolling hills and background views of Mount Diablo to the northwest and Brushy Peak to the northeast.




Note: Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.E-1
Visual Quality
Viewpoint Locations

In Dublin between Tassajara Road/Santa Rita Road and Fallon Road/El Charro Road, the land north of I-580 is undeveloped and planned for commercial uses. Farther north are multi-story residential units in the middle-ground, with the foothills beyond. South of I-580 in this segment are residential subdivisions in Pleasanton and an automobile dealership center (part of Staples Ranch). See Section 3.C, Land Use and Agricultural Resources, for more information.

Between the El Charro Road interchange and just east of Airway Boulevard, to the north of I-580 is undeveloped land and to the south is the city-owned Las Positas Golf Course in Livermore, as well as the El Charro Specific Plan area (see Section 3.C, Land Use and Agricultural Resources), which is mostly undeveloped except for the San Francisco Premium Outlets. East of the golf course and Airway Boulevard, business parks are adjacent to the I-580 frontage.

Just east of Isabel Avenue, the area north of I-580 primarily consists of undeveloped grassland with middle-ground views of rolling hills, with the Shea Homes – Sage Project under construction. To the south of I-580 is the BART-owned park-and-ride lot on East Airway Boulevard, surrounded by agricultural uses and residential development, with undeveloped land farther to the east (north of East Airway Boulevard). In the Cayetano Creek area northeast of Portola Avenue, the location of the proposed tail tracks and storage and maintenance facility, is agricultural and undeveloped land. Farther to the east along I-580, the area around the proposed Laughlin Road parking lot is characterized by a mix of undeveloped land and detached single-family homes to the north of I-580, and office and industrial buildings to the south of I-580.

Views of the collective footprint and the project corridor can be seen from publicly accessible parks, trails, and open space areas located within and near the study area (including the cities of Dublin, Pleasanton, and Livermore). Areas that feature sensitive views of or through the project corridor are described in the Sensitive Viewers subsection below.

### (2) Dublin/Pleasanton Station Area

The Dublin/Pleasanton Station Area extends from west of the Dougherty Road interchange to the Hacienda Drive interchange along I-580 and includes the Dublin/Pleasanton BART Station, located in the I-580 median. Views of the area are shown in Figure 3.E-2. The visual character is defined primarily by the built environment with a range of building massing types and heights associated with the commercial, mixed-use residential, and light industrial uses in the area.

## Dublin/Pleasanton Station Area

**Viewpoint 1**: View from Dougherty Road/Hopyard Road interchange east towards the Dublin/Pleasanton Station.

**Viewpoint 2**: View from I-580 westbound towards the Dublin/Pleasanton Station.

## I-580 Corridor Area

**Viewpoint 3**: View from Fallon Road/El Charro Road interchange east along I-580.

**Viewpoint 4**: View from I-580 westbound towards Isabel Avenue.

Source: Urban Advantage, 2017.



Figure 3.E-2
Visual Quality
Dublin/Pleasanton Station Area and I-580 Corridor Area Photos

I-580 is 12 lanes wide; the eastbound and westbound lanes of the freeway are separated by a fenced median containing the existing BART tracks. The canopy of the elevated BART platform and the end-of-line facility extend up to approximately 27 feet above the freeway and are visually prominent to drivers on I-580.

North of I-580, the landscape is characterized by the multi-story BART parking garage and residential buildings beyond (ranging in height from four to seven stories), single-story automobile dealerships, and surface parking lots. South of I-580, the landscape is characterized by the BART surface parking lots, multi-story commercial offices that range in height up to five stories, residential apartments, and undeveloped parcels.

The visual quality of the Dublin/Pleasanton Station Area ranges from low to moderate. The area is predominantly typified by parking lots and office buildings with few distinguishing characteristics and has low vividness, resulting in low visual quality. Furthermore, there is little visual consistency in the landscape, with the exception of the area north of I-580 near the Dublin/Pleasanton Station, where the BART parking garage and residential buildings present a consistent visual theme. Given the consistent visual theme—the buildings are all approximately four to seven stories high, have similar massing and design elements, and are located near each another—this area has moderate intactness and unity and the visual quality in this area is moderate.

### (3) I-580 Corridor Area

The I-580 Corridor Area extends along I-580 from the Hacienda Drive overcrossing to the Portola Avenue overcrossing. Views of the area are shown in Figure 3.E-2. This area is characterized by the absence of natural landforms, as the existing grades have been modified to accommodate the highway and interchange overhead roadways. The visual character of this corridor and the surrounding areas is composed predominantly of highway infrastructure with a mix of highway commercial development and undeveloped land to either side. The shoulders immediately adjacent to the freeway pavement are mostly composed of compacted gravel. The area then transitions to sound walls or chain link fencing and concrete barriers along some portions, and roads or other forms of development. The corridor also includes five highway on- and off-ramps in association with the interchanges along I-580. These areas have been altered by grading and compaction and include limited grassland vegetation. Perennial landscaping with trees and/or shrubs are also present in the interchange areas.

Along the I-580 corridor, motorists have middle-ground views of rolling hills as well as intermittent background views of Mount Diablo to the northwest and Brushy Peak to the northeast.

The visual setting along the I-580 Corridor Area is described below as it varies along the I-580 overcrossings.

### (a) Hacienda Drive to Tassajara Road/Santa Rita Road

The portion of the corridor between the Hacienda Drive interchange and the Tassajara Road/Santa Rita Road interchange includes automobile dealerships, parking lots, and commercial areas, including a portion of the Hacienda Business Park. Development both north and south of the highway is typically single-story, and therefore at an elevation similar to the highway/corridor. The buildings along this segment are generally set back a distance from I-580 by large parking lots associated with the buildings. Automobile dealership and shopping center signs are the most prominent structures due to their location immediately adjacent to I-580 and their height compared to the mostly single-story commercial structures along this segment.

The visual quality along this segment is low; the automobile dealerships and commercial areas have limited characteristics of visual interest and are similar to other strip malls in the study area, as well as the broader region, therefore resulting in low vividness. While westbound commuters on I-580 have background views of the east side of the Berkeley Hills, the foreground commercial uses dominate the view.

### (b) Tassajara Road/Santa Rita Road to Fallon Road/El Charro Road

The area adjacent to the I-580 corridor between the Tassajara Road/Santa Rita Road and the Fallon Road/El Charro Road interchange exhibits a generally commercial and suburban appearance because of the commercial areas, business parks, and parking lots, as described below.

- **North**. The areas immediately north of the corridor and I-580 comprise a mix of undeveloped land and commercial and residential development from one story to four stories high. A chain-link fence separates I-580 from the frontage roadways that run parallel to it. Immediately north of I-580 in the foreground are two large single-story shopping centers with surface parking areas and undeveloped land. Farther north in the foreground are three- to four-story multi-family residential complexes with the foothills in the middle-ground. In addition, Mount Diablo is mostly visible in the background despite the varying height of the buildings along the northern part of this corridor.
- **South**. The areas immediately south of the corridor and I-580 comprise a mix of older, mostly automobile-oriented commercial development and single-family residential uses from one to two stories high, and some undeveloped land. Most of these homes are protected behind soundwalls and tall trees that obscure views of homes from the freeway. At the eastern end of the corridor are commercial areas with single-story buildings, open parking lots, and tall light poles. At the southeast corner, the Stoneridge Drive Specific Plan Area (see Section 3.C, Land Use and Agricultural

Resources) has been largely built out with the Stoneridge Creek senior living community and an automobile dealership center.

The visual quality along this segment is moderately low. A continuous soundwall precludes any views to the south of I-580 and obscures views for eastbound commuters. The soundwall ends briefly before the Fallon Road/El Charro Road interchange; the views to the south along the remainder of the segment have low vividness, featuring a residential community and an automobile dealership center that have no distinguishing visual characteristics. North of I-580, the lack of development immediately adjacent to the highway allows for background views of rolling hills, which have moderate vividness. However, residential and commercial developments are visible in front of and also directly on the hills, partially obstructing these views. The angular forms of the developments also present a discordant contrast to the smooth, undulating curves of the rolling hills, therefore resulting in low intactness and unity.

### (c) Fallon Road/El Charro Road to Airway Boulevard

The areas adjacent to the corridor between Fallon Road/El Charro Road and Airway Boulevard include roadways, undeveloped land, a shopping center, and portions of a golf course and a driving range. Additionally, on the south side of I-580, the corridor includes a portion of Arroyo las Positas creek, which is visible from the highway. Development along most of the highway corridor is at-grade with the highway.

- **North**. The areas immediately north of the corridor and I-580 are composed primarily of undeveloped and rural land, much of which is in unincorporated Alameda County. The undeveloped land consists of mostly flat grasslands in the foreground that transition into rolling hills farther in the background. Along the highway, overhead utility lines and poles line the frontage road. The only developed area is a casino whose green landscape contrasts with the surrounding undeveloped and rural land during the dry summer and fall seasons when the natural vegetation turns brown. Other than utility poles and highway signage, there is little to impede existing views of rolling hills to the north.
- **South**. The areas immediately south of the corridor and I-580 are composed of undeveloped land, a golf course and a driving range, and the San Francisco Premium Outlets shopping center and its associated large surface parking lots. The buildings range in height from one story to three stories and obscure views of nearly everything farther south. Farther east, the corridor transitions into undeveloped land and the Tri-Valley Golf Center, a golf driving range, which has a large safety net surrounding the premises. The Las Positas Golf Course is also south of the corridor. The golf course is lined with tall trees near the highway that restrict nearly all views to the south.

The visual quality along this segment is moderate. While views south of I-580 are low in visual quality and are dominated by commercial areas with no distinguishing characteristics, there are almost uninterrupted views of rolling hills to the north, which have moderate vividness. Similar to the Tassajara Road/Santa Rita Road to Fallon Road/El Charro Road segment, residential subdivisions present a discordant contrast with the rolling hills; however, these developments are fewer and less prominent, as they are located in a small valley between two rows of hills. Therefore, they are partially obscured from view by the hills in front of them and the setting has moderate intactness.

### (4) Isabel North Area

The Isabel North Area is north of I-580 in proximity to Isabel Avenue. Views of the area are shown in Figure 3.E-3. The visual character of this area and the surrounding vicinity presents a transition from semi-rural to largely developed, with middle-ground views of low, rolling hills to the north. The site is relatively flat, but slopes up from the highway and provides views of the surrounding hills. The surrounding area is a mix of undeveloped land and new development, including the Shea Homes – Sage Project that is under construction and will be approximately two to three stories high. While there are several residential developments and business parks in the distance, they are sufficiently far from viewers on I-580 to be visually inconspicuous compared to the rolling hills in the background. Therefore, the vividness and intactness of these views is low to moderate. Overall, the visual quality of this area is moderately low despite the views of rolling hills because the visual character is dominated by views of the Isabel Avenue interchange.

### (5) Isabel South Area

The Isabel South Area is south of I-580 at Isabel Avenue. Views of the area are shown in Figure 3.E-3. The Isabel South Area comprises highway infrastructure, commercial development, business parks, agriculture, or undeveloped land. Because there are multiple roads from which motorists can view the Isabel South Area, the area is described below in terms of views from each road.

- **I-580**. The view from the Isabel Avenue interchange on I-580 looking south is predominantly obscured by a row of eucalyptus trees and highway infrastructure such as on- and off-ramps. The Isabel Avenue overcrossing provides an entirely different view. While much of the southern view consists of commercial and varying urban development uses, many of the surrounding vistas are clearly visible because of the overcrossing's height above grade.

## Isabel North Area

**Viewpoint 5**: View south from Isabel Avenue toward I-580.

## Isabel South Area

**Viewpoint 6**: View from Isabel Avenue and Kitty Hawk Road northwest to rolling hills.

**Viewpoint 7**: View southwest along Airway Boulevard.

Source: Urban Advantage, 2017.



Figure 3.E-3
Visual Quality
Isabel North Area and Isabel South Area Photos

- **Kitty Hawk Road**. Visual quality as observed from Kitty Hawk Road is low. To the east, in the southwest corner of Isabel Avenue and I-580—where a construction staging area is proposed—lies undeveloped land with a mixture of grass field and gravel lot. To the south and southwest of Kitty Hawk Road are business parks, generally one story high, that block access to most scenic views.
- **North of East Airway Boulevard**. The area to the north of East Airway Boulevard and to the south of I-580 is proposed to host the Isabel Station parking garage. The western portion of this area (near Isabel Avenue) is currently a BART park-and-ride lot with adjacent BART-owned agricultural land. This portion of East Airway Boulevard provides few scenic views while looking north, as most of the views are blocked by large eucalyptus trees that line Arroyo las Positas Creek between the site and the southern lanes of I-580.
- **South of East Airway Boulevard**. The area to the south of East Airway Boulevard consists of a single-story business park with a modern architectural style and agricultural land (G&M Farms) to the east with paved areas near the street. G&M Farms is also known as the Gandolfo Ranch Historic District and is further described in Section 3.F, Cultural Resources. The business park obstructs scenic vistas to the south.

The area has moderate vividness due to the presence of a few features of visual interest, including an agricultural field on BART property just northeast of the park-and-ride lot, and a prominent cluster of trees that includes eucalyptus and oaks along Las Positas Creek. However, the overall visual quality is moderately low in the area because there is a mix of disparate visual elements and it lacks a consistent visual theme, therefore resulting in low unity.

### (6) Cayetano Creek Area

The Cayetano Creek Area is approximately bounded by I-580 on the south, Portola Avenue on the southwest, and North Livermore Avenue on the east. It extends north past Hartman Road. Views of the area can be seen from I-580, North Livermore Avenue, and Hartman Road, as shown in Figure 3.E-4. The area and vicinity primarily consists of open, undeveloped land. The terrain has varying degrees of height and topography that can provide either excellent or highly obstructed views of the surrounding landscapes. Scenic views of the surrounding rolling hills are to the north and Altamont Pass to the east.

## Cayetano Creek Area

**Viewpoint 8**: View north from westbound I-580.

**Viewpoint 9**: View west from North Livermore Avenue.

**Viewpoint 10**: View southwest along Hartman Road from North Livermore Avenue.

Source: Urban Advantage, 2017; Urban Planning Partners, 2016, 2017.



Figure 3.E-4
Visual Quality
Cayetano Creek Area Photos

Visual quality in this area is high due to the high intactness of the landscape. As viewed from I-580, the rolling hills are entirely undeveloped and feature no contrasting elements, providing a strong sense of an agricultural, grazing setting with high vividness. As viewed from North Livermore Avenue, the landscape is low-intensity agricultural/rural with a few isolated farm buildings punctuating an otherwise unbroken expanse of gently undulating grassland. Compared to the views from I-580, the terrain viewed from North Livermore Avenue has flatter, less prominent curves and a few man-made visual elements such as farm buildings.

#### (7) Laughlin Road Area

The Laughlin Road Area is north of I-580, bounded by Northfront Road to the south and Laughlin Road to the east. Views of the area are shown in Figure 3.E-5. Brushy Peak Regional Preserve, an East Bay Regional Park District property, is located just north; the nearest trailhead is approximately 0.65 mile north of the proposed Laughlin Road parking lot location.

The current site consists of a small midget car race track and undeveloped land surrounding it to the north and west, a storage yard directly to the east, and I-580 to the south. The streets near the site are lined with various trees, shrubbery, and electrical poles. Looking north provides views of single-family residential neighborhoods and rolling hills with wind turbines on the ridgeline. Looking south, the primary views are of I-580 and various highway infrastructure elements, with business parks just beyond the freeway; scenic views are largely obscured by these features. Views to the west are primarily of undeveloped land, surrounding vegetation, and rolling hills in the distance. Looking to the east from the corner of Laughlin Road and Northfront Road, there are views of the storage yard and associated building, with I-580 just beyond in the foreground, and the Altamont Pass in the middle-ground.

The visual quality in this area is moderate. While there are no elements of particular visual interest and vividness is therefore low to moderate, the landscape has a high degree of unity and maintains a strong agricultural character. In addition, there is a visually prominent view of Brushy Peak to the north.

### d. Sensitive Viewers

The project corridor extends primarily along I-580 through predominantly developed areas. Sensitive viewers that may be affected by the Proposed Project and Build Alternatives include people at the following public parks, trails, and open space areas within the study area and beyond from which views of or through the study area exist:

- Dublin Sports Grounds, which has multiple sports fields at 6700 Dublin Boulevard in Dublin

## Laughlin Road Area

**Viewpoint 11**: View south from Laughlin Road.

**Viewpoint 12**: View northwest from Northpoint Road.

Source: Urban Advantage, 2017; Urban Planning Partners, 2016, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-5
Visual Quality
Laughlin Road Area Photos

- Iron Horse Trail, a multi-use trail between the cities of Concord and Pleasanton that extends under the Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) in Dublin and Pleasanton
- Las Positas Municipal Golf Course, a public golf course immediately south of I-580 near Airway Boulevard in Livermore
- Las Positas College recreational facilities at 3000 Campus Hill Drive in Livermore
- Cayetano Park at 698 Portola Avenue in Livermore (Portola Avenue at Campus Hill Drive
- Vista Meadows Park, a hilly park at 2450 Westminster Way in Livermore
- Brushy Peak Regional Preserve, an East Bay Regional Park District property immediately east of Laughlin Road, whose southern boundary is approximately 0.5 mile north of I-580

Oher parks within the study area or in close proximity to the study area are listed below. There would be no views of the Proposed Project and Build Alternatives from any of the below parks due to the location of the parks as well as intervening land uses, roadways, and vegetation. For the purpose of this EIR, viewers at these parks are not considered sensitive viewers.

Dublin:

- Owens Plaza Park at 5700 Owens Drive
- Emerald Glen Park at 4201 Central Parkway

Pleasanton:

- Fairlands Park at 4100 Churchill Drive
- Meadows Park at 3301 West Las Positas Boulevard
- Stoneridge Creek Park at 3300 Stoneridge Creek Way

Livermore:

- Henry Park at 1525 Mendocino Road
- Livermore Downs Park at 2101 Paseo Laguna Seco
- Lester J Knott Park at 655 North Mines Road
- Ralph T. Wattenburger Park at 1515 Honeysuckle Road
- Springtown Open Space at 1020-1030 Bluebell Drive
- Summit Park at 6329 Tioga Pass Court
- Northfront Park at 6379 Almaden Way

## 3. Regulatory Framework

This subsection describes the State of California (State) and local environmental laws and policies relevant to visual quality. Additionally, scenic resources and vistas as well as roadways with a scenic designation resulting from State or local regulations are identified.

### a. State Regulations

#### (1) State Scenic Highways

The California Department of Transportation (Caltrans) designates State scenic highways. To be designated, highways must meet various criteria established in a visual assessment conducted and reviewed during the scenic highway's nomination process. Such a visual assessment includes an evaluation of the corridor's visual quality in terms of vividness, intactness, and unity. The four criteria used to determine whether a highway may be designated as scenic are as follows:

- The State or county highway consists of a scenic corridor composed of a memorable landscape that showcases the natural scenic beauty or agriculture of California.
- Its existing visual intrusions do not significantly impact the scenic corridor.
- It demonstrates strong local support for the proposed scenic highway designation.
- The length of the proposed scenic highway is not less than a mile and is not segmented.

Visual intrusions are evaluated in the following manner:

- The more pristine the natural landscape is and less affected by intrusions, the more likely the nominated highway will qualify as scenic.
- Where intrusions have occurred, the less impact they have on an area's natural beauty, the more likely the nominated highway will qualify as scenic.
- The extent to which intrusions dominate views from the highway will determine the significance of their impact on the scenic corridor.

Once the scenic highway designation is granted, a wide range of protections apply to the designated corridor, including a prohibition on off-premise advertising displays (colloquially known as billboards).[2]

[2] California Department of Transportation, 2008a. Landscape Architecture Program. Scenic Highway Guidelines. October. Available at: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/guidelines/scenic_hwy_guidelines_04-12-2012.pdf.

Within the study area, I-580 is eligible to be designated as a State scenic highway, although it is not officially designated.[3] However, according to California Streets and Highways Code Section 263, highways identified by the statute as eligible for scenic designation are considered to be part of the State Scenic Highway System together with the officially designated scenic highways. Therefore, this analysis conservatively assumes that I-580 is a scenic resource. No other roadways within the study area are considered scenic highways.

### (2) Landscaped Freeways

Caltrans also designates landscaped freeways. A classified landscaped freeway is a section of freeway with planted ornamental vegetation (i.e., lawns, trees, shrubs, flowers, or other plantings) designed primarily to improve the aesthetic appearance of the highway. To qualify for classification, a planting must be within Caltrans right-of-way, be continuous with no gaps greater than 200 feet, and at least 1,000 feet long. Landscaping may be planted immediately adjacent to the freeway or behind a sound wall.

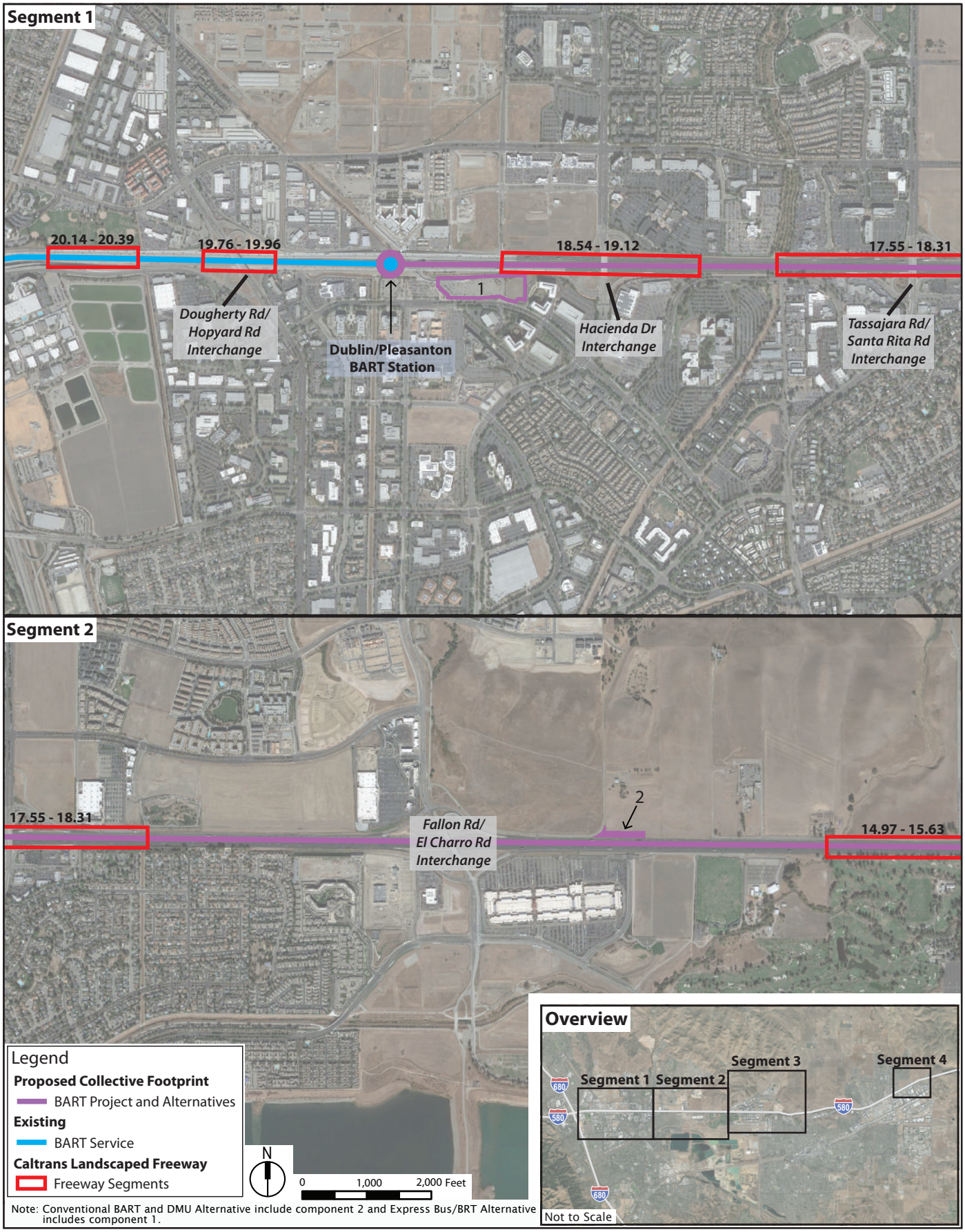
Off-site advertising within 660 feet of the Caltrans right-of-way that can be viewed primarily by persons traveling on the main-traveled way of the freeway is subject to Caltrans regulations through a permit process. Caltrans prohibits advertising displays adjacent to designated landscaped freeways. The removal of ornamental plantings, such as for freeway widening projects, can lead to the loss of a landscaped freeway designation along the portion of a freeway, and thereby allow for off-site advertising displays.[4]

The following portions of I-580 within the project corridor are designated as landscaped freeway segments, as shown in Figures 3.E-6a and 3.E-6b:

- Postmile 20.14 to 20.39 (partially within project corridor): adjacent to Dublin Sports Grounds
- Postmile 19.76 to 19.96: from just west of Dougherty Road/I-580 interchange to Dougherty Road
- Postmile 18.54 to 19.12: from Arnold Road to the eastern edge of the Regal Cinemas Complex (east of Hacienda Drive)
- Postmile 17.55 to 18.31: from the I-580 overcrossing of Tassajara Creek to the eastern edge of Grafton Plaza, east of Tassajara Road/Santa Rita Road

[3] California Department of Transportation, 2017. List of Eligible and Officially Designated State Scenic Highways. Excel Spreadsheet. Accessed February 10. Available at: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/.

[4] California Department of Transportation, 2008b. Landscape Architecture Program. Landscaped Freeways and Outdoor Advertising Displays. Available at: http://www.dot.ca.gov/design/lap/livability/docs/class-ls-fwy-and-outdoor-advertising-displays.pdf.

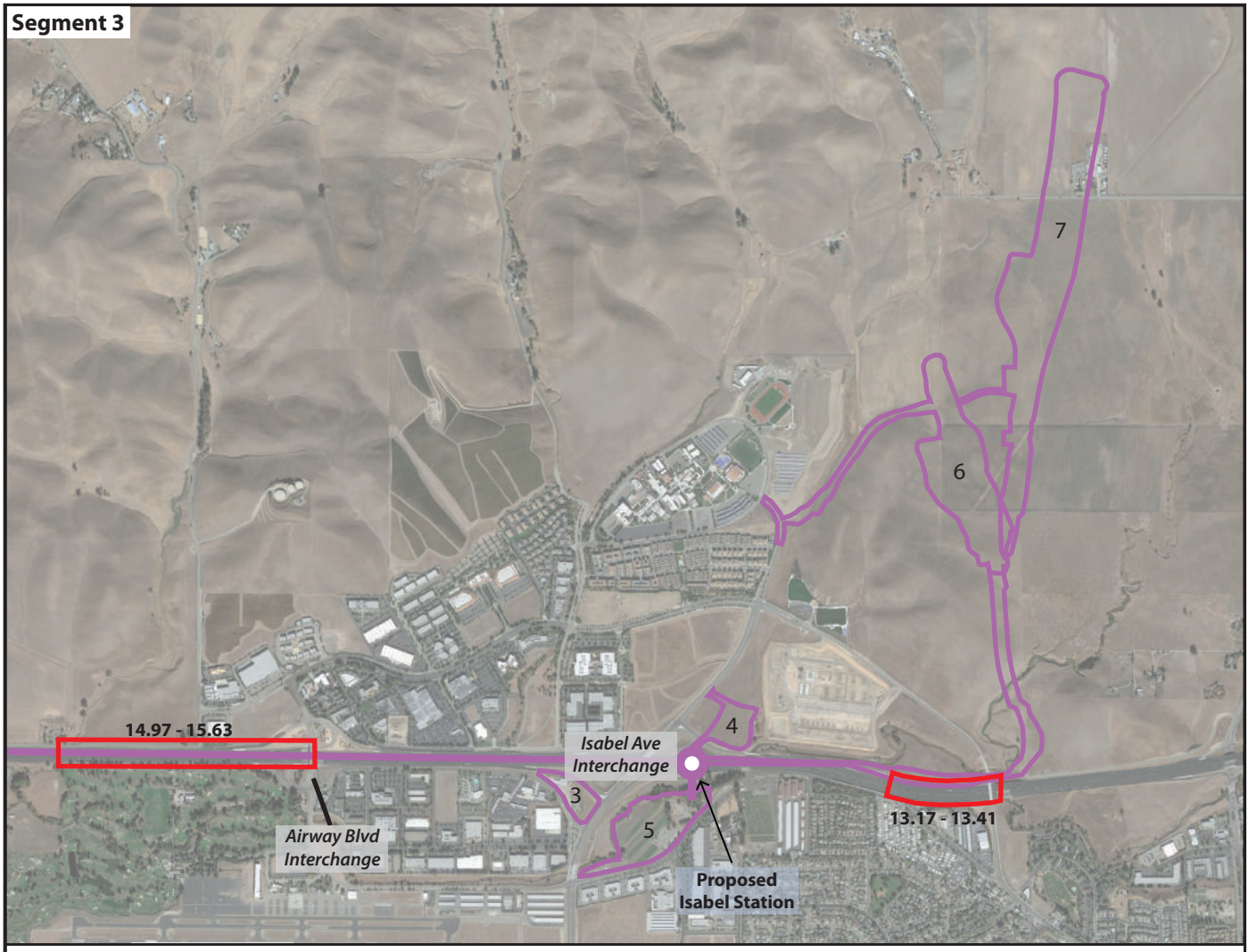



Note: Conventional BART and DMU Alternative include component 2 and Express Bus/BRT Alternative includes component 1.

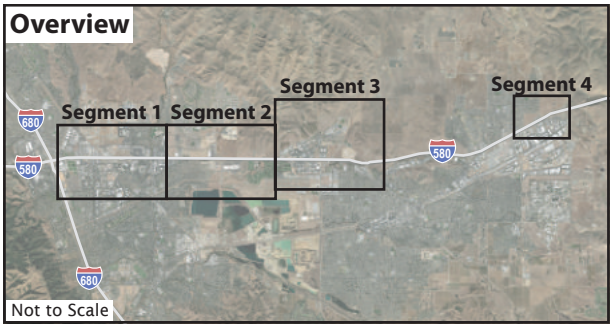
Source: Arup, 2017; Google Earth, 2016.

BART to Livermore Extension Project EIR

Figure 3.E-6a
Visual Quality
Caltrans Landscaped Freeway Segments








N

0 1,000 2,000 Feet

Note: Conventional BART includes components 3, 4, 5, and 7; DMU Alternative includes component 3, 4, 5, and 6; and Express Bus/BRT Alternative includes component 8.

Legend
**Proposed Collective Footprint**
BART Project and Alternatives
**Caltrans Landscaped Freeway**
Freeway Segments

Source: Arup, 2017; Google Earth, 2016.

BART to Livermore Extension Project EIR

Figure 3.E-6b
Visual Quality
Caltrans Landscaped Freeway Segments

- Postmile 14.97 to 15.63: from about the western edge of Las Positas Golf Course to Airway Boulevard
- Postmile 13.17 to 13.41: from west of Portola Avenue overcrossing to Portola Avenue overcrossing

### b. Local Regulations

Local policies are described below and identify the significant views and scenic resources in the study area.

#### (1) Alameda County

The Scenic Route Element of the Alameda County General Plan, adopted in 1966 (as amended in 1994), identifies the entirety of I-580 as a county Scenic Freeway.[5] The County's East County Area Plan includes a goal to preserve and enhance views within scenic corridors through managing development and conservation of the land within East County scenic highway corridors.[6]

#### (2) City of Dublin

Policies in the City of Dublin's General Plan Land Use and Circulation: Parks and Open Space Element are 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. Creeks, such as Tassajara Creek, are encouraged to be preserved for their natural resource value. The Land Use and Circulation: Circulation and Scenic Highways Element also includes policies for protecting I-580 and other scenic routes.[7]

#### (3) City of Pleasanton

Although the Pleasanton General Plan 2005–2025 does not identify any scenic views or routes in the study area, the Conservation and Open Space Element includes Policy 8, which aims to "preserve as permanent open space all areas of outstanding scenic qualities or areas which provide extraordinary views of natural and human-made objects" and Program 8.2, "Retain the scenic attributes of existing (I-680) and proposed scenic highways (I-580 and State Route 84), including views of woodlands, hills and ridges, valleys, and grazing lands."[8]

[5] County of Alameda, 1966. Scenic Route Element of the General Plan. Amended May 5, 1994.
[6] County of Alameda, 1994. East County Area Plan.
[7] City of Dublin, 1985. Dublin General Plan, Land Use and Circulation: Circulation and Scenic Highways Element. February 11. Amended October 6, 2015.
[8] City of Pleasanton, 2009a. Pleasanton General Plan 2005–2025, Open Space and Conservation Element. July.

The General Plan's Community Character Element also has the following policies relevant to aesthetics: "Policy 9: Enhance landscaping along city streets and the freeways," and "Policy 20: Preserve scenic hillside and ridge views, and other natural features in the hills."[9] Finally, the Land Use Element contains Policy 21, intended to preserve scenic hillsides at the edges of the city, as well as to preserve scenic hillside and ridge views, including the Pleasanton ridgeline and Southeast Hills.[10]

### (4) 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.[11] The Community Character Element sets goals, objectives, policies, and actions for the preservation of the city's scenic corridors, open spaces, and built environment. The policies are intended 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. In addition, relevant policies are also found in the Land Use Element of the City of Livermore General Plan.

#### (a) Community Character Element

#### Policies

These goals and policies include the following:

- Objective CC-1.3: Minimize obtrusive glare and wasted energy from excessive nighttime lighting and preserve views of the nighttime sky.
    - Policy 1: The importance of views of the nighttime sky unimpaired by inappropriate intensities of light and glare shall be acknowledged as a significant scenic resource in Livermore.
- 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.
        - Policy 1. Development shall not be allowed to obscure, detract from, or negatively affect the quality of the views from designated scenic routes.
        - Policy 2. 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

[9] City of Pleasanton, 2009b. Pleasanton General Plan 2005–2025, Community Character Element. July.
[10] City of Pleasanton, 2009c. Pleasanton General Plan 2005–2025, Land Use Element. July.
[11] City of Livermore, 2004. General Plan Community Character Element. February. Amended 2009.

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.

  - Policy 3. The City shall permit no development to wholly obstruct or significantly detract from views of any scenic area as viewed from a scenic route.

- Objective CC-4.6: Use landscaping to increase the scenic qualities of scenic routes.
- Policy 1. Landscaping should be designed and maintained in scenic route corridors to provide added visual interest, to frame scenic views, and to screen unsightly views.
- Objective CC-4.14: Control removal of vegetation in scenic routes.
- Policy 1. Except for agricultural crops, no vegetation should be removed without permission of the local jurisdiction, as a means of preserving scenic quality.

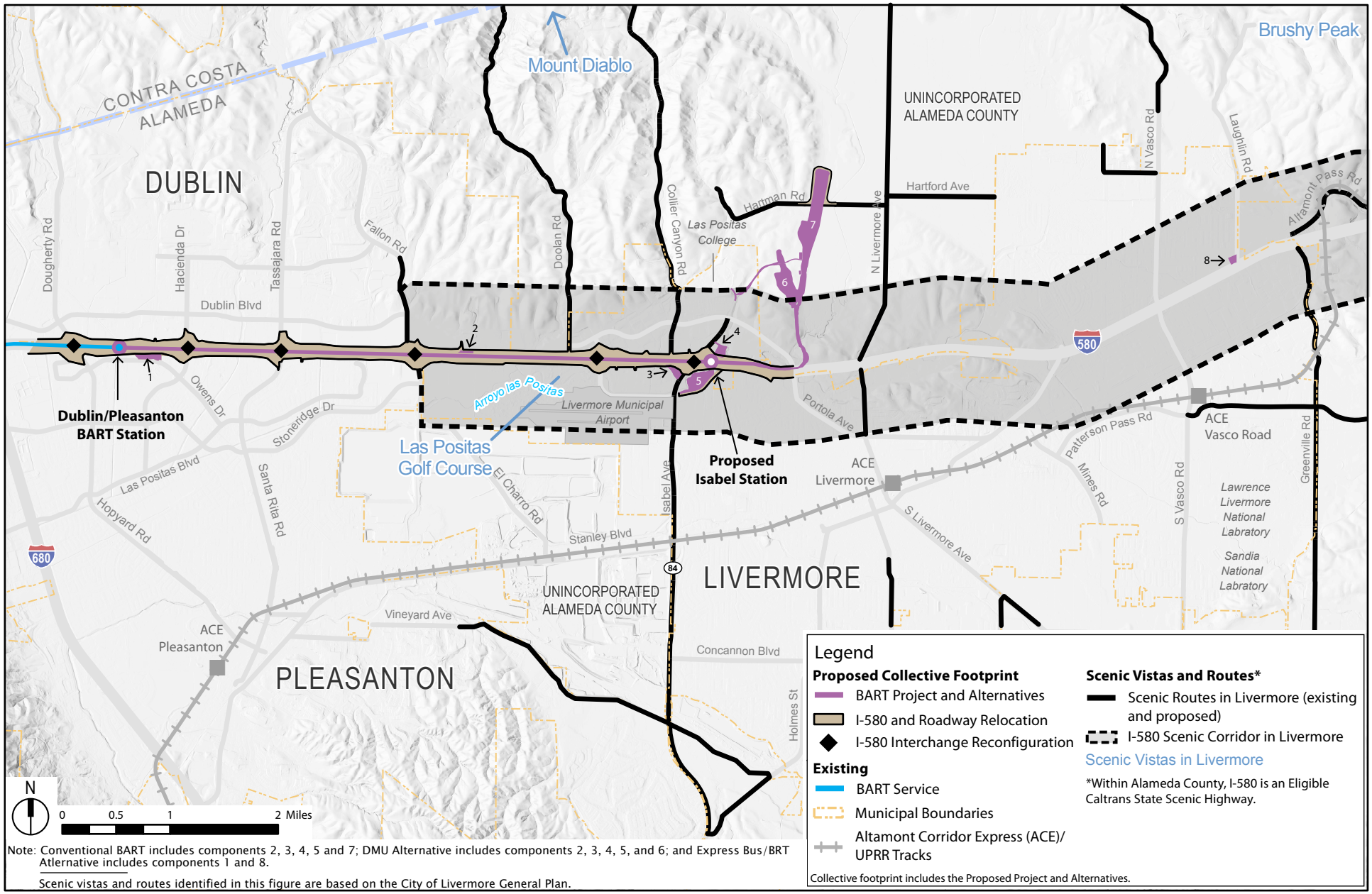
**Scenic Routes and Vistas**

The Community Character Element of the General Plan identifies several scenic routes and designated scenic vistas, as shown in Figure 3.E-7. It also identifies exemptions to the policies and regulations, noting that "public works projects and facilities of public necessity" may be exempt from regulations contained in the Scenic Route Goals, Objectives, Policies, and Actions of the General Plan.[12]

The following scenic vistas designated by the Livermore General Plan are in the study area:

- Mid-range views of rolling hills from I-580
- The view of Mount Diablo, a regional landmark and visual frame of reference for drivers along the highways in the county, to the northwest of the project corridor
- The view of Brushy Peak, a smaller mountain that can be seen to the northeast of the project corridor
- The view across I-580 facing south across and into Las Positas Golf Course, just west of Doolan Road

[12] Ibid.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Scenic vistas and routes identified in this figure are based on the City of Livermore General Plan.

Source: Arup, 2017; ESRI/USGS, 2016; City of Livermore, 2004.



Figure 3.E-7
Visual Quality
Scenic Vistas and Routes in Project Vicinity

Scenic routes are identified as important elements that contribute to the overall visual quality in Livermore. The Livermore General Plan identifies a number of roadways that are considered scenic routes, designated as such because they either pass through or provide access to important scenic, recreational, cultural, or historic points. The Livermore General Plan identifies the area within 3,500 feet on each side of the I-580 freeway centerline that is visible from the freeway as a scenic corridor, which features the low rounded knolls separating the city from the rest of the valley.[13] The Community Character Element sets goals, objectives, policies, and actions to protect the I-580 scenic corridor, as described below. Policies and actions in the Community Character Element specifically seek to preserve and protect scenic views within the I-580 scenic corridor through control of grading, landscaping, and building height.

The following scenic routes identified in the Livermore General Plan are within or immediately adjacent to the study area: Fallon Road, Doolan Road, Isabel Avenue, Collier Canyon Road, North Livermore Avenue, Hartman Road, Hartford Avenue, and Altamont Pass Road.

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. The General Plan encourages public views of arroyos to be protected and enhanced. Arroyo las Positas flows roughly parallel to I-580, primarily from east of Portola Avenue to Fallon Road. The General Plan recommends that future development maintain Arroyo las Positas in its natural form with minimum alterations.[14]

### View Angles

The Community Character Element divides the I-580 scenic corridor into six subareas and identifies policies and development standards for each subarea that reflect that subarea's unique visual resources. These policies and standards are intended to preserve views from I-580 toward ridgelines and hillsides. The primary standards used for this purpose are view angles, which are established as plane lines at elevations determined appropriate for maintaining views. Maximum building heights of development cannot exceed the boundaries of the view angle envelope created by using the specified view angles. Development is exempt from view angle restrictions on the north side of I-580 within a 1,000-foot radius of the Isabel Avenue/I-580 interchange.[15]

[13] Ibid.
[14] Ibid.
[15] Ibid.

### (b) Land Use Element Policies

The City of Livermore's General Plan Land Use Element also contains goals that seek to protect aesthetically sensitive areas, including its residential neighborhoods, vineyards, ranches, natural habitats, and open space. The Land Use Element also seeks to ensure that development in North Livermore will minimize potential visual impacts.[16]

- Goal LU-7: Ensure that alterations to existing topography are minimized.
  - Objective LU-7.1: To allow development that does not create impacts to the existing topography in North Livermore
  - Policy 1. Consistent with the other provisions of LU-6.1.P1 through P4; alteration of topography by grading, excavating, filling or any development activity shall be minimized. Where feasible, access roads shall be located, including by consolidation, where they are least visible from public places.

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purposes of this EIR, impacts related to visual quality are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- Substantially degrade the existing visual character or quality of the site and its surroundings
- Have a substantial adverse effect on a scenic vista
- Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway
- Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area

### b. Impact Methodology

The methodology used to evaluate the significance of visual resource impacts is described below, as well as under the respective impact analysis where applicable. The Electrical Multiple Unit (EMU) Option would result in the same impacts as the Diesel Multiple Unit

[16] City of Livermore, 2009. City of Livermore General Plan: 2003-2025, Land Use Element.

(DMU) Alternative; therefore, the analysis and conclusions for the DMU Alternative also apply to the EMU Option, except where specifically noted in the analysis below. In these cases, the impacts associated with the EMU Option are described immediately following the analysis of the DMU Alternative.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service under the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

A field investigation was conducted to inventory the existing visual setting within the project corridor. Specific attention was given to key visual resources, including hills, valleys, landmarks, and designated scenic travel routes. Key visual resources for each segment were identified and are described in the Existing Conditions subsection above.

Representative photos were taken at selected vantage points. The vantage points were chosen to show the visual impacts of major project components from the perspective of representative viewer groups. Due to the largely automobile-dominated nature of the project corridor, viewer groups generally consist of drivers along I-580 as well as adjacent roads, such as El Charro Road, Isabel Avenue, Kitty Hawk Road, East Airport Boulevard, and North Livermore Avenue.

Photo-simulations were generated by assembling the photographs in Adobe® Photoshop® software and incorporating 3D models or project designs from AutoCAD for the project elements, including Conventional BART, DMU, and EMU vehicles; wayside facilities; Isabel Station; tail tracks and storage and maintenance facility; and the transfer platforms for the DMU Alternative and Express Bus/Bus Rapid Transit (BRT) Alternative at the existing Dublin/Pleasanton Station.[17] To accurately scale the 3D models in the photographs of existing conditions, horizontal dimensions were obtained in Google Earth and vertical dimensions were obtained from engineering drawings as well as by using vertical measuring poles wherever possible. The photo-simulations were used as a means to compare and contrast visual quality under existing conditions and with the implementation of the Proposed Project or any of the Build Alternatives. The standards of significance listed above were then applied to assess potential impacts to visual quality.

[17] The designs shown in the photo-simulations are conceptual and preliminary. The final design of project components would be developed after the completion of the project approvals process.

### c. Summary of Impacts

Table 3.E-1 below summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.E-1 SUMMARY OF VISUAL QUALITY IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| **Project Analysis** | | | | | |
| Impact VQ-1: Substantially degrade the existing visual quality or create a new source of substantial light or glare during construction | NI | LSM | LSM | LSM | LS |
| **Cumulative Analysis** | | | | | |
| Impact VQ-2(CU): Substantially degrade the existing visual quality or create a new source of substantial light or glare during construction under Cumulative Conditions | NI | LS | LS | LS | LS |
| **Operational** | | | | | |
| **Project Analysis** | | | | | |
| Impact VQ-3: Substantially degrade the existing visual quality | NI | SU | SU | LS | NI |
| Impact VQ-4: Have a substantial adverse effect on a scenic vista | NI | SU | SU | LS | NI |
| Impact VQ-5: Substantially damage scenic resources within State scenic highway | NI | SU | SU | SU | NI |
| Impact VQ-6: Create a new source of substantial light or glare | NI | SU | SU | LSM | NI |

**TABLE 3.E-1 SUMMARY OF VISUAL QUALITY IMPACTS**

| Impacts | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| | No Project Alternative | Conventional BART Project[b] | DMU Alternative (with EMU Option)[b] | Express Bus/BRT Alternative[b] | Enhanced Bus Alternative |
| **Cumulative Analysis** | | | | | |
| Impact VQ-7(CU): Have a substantial visual impact under Cumulative Conditions | NI | SU | SU | SU | NI |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation; SU=Significant and unavoidable, even with mitigation or no feasible mitigation available.
DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts related to project construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts related to construction are described below, followed by cumulative construction impacts. Visual character, visual quality, and scenic vistas and highways are referred to collectively as visual resources below.

Construction impacts to visual resources and light or glare described below would be temporary and would cease to occur at the conclusion of construction.

#### (a) Construction – Project Analysis

***Impact VQ-1: Substantially degrade the existing visual resources or create a new source of substantial light or glare that would significantly impact daytime or nighttime views in the area during construction.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, Altamont Corridor Express, and the Livermore Amador Valley Transit Authority would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including construction of both residential and commercial uses along the project corridor. The construction effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact to light and glare during construction. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** Construction of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would introduce views of construction equipment and crews, unfinished structures, and construction-related and safety signs along the project corridor. Project construction equipment, activities, and staging areas are described in Chapter 2, Project Description. Staging areas would typically have security lighting and fencing enclosing temporary construction offices, stored materials, and equipment. In addition, some activities associated with relocation of I-580 would typically occur at night (10:00 p.m. to 7:00 a.m.) and would likely require illumination.

Because of the changes to current site conditions and new temporary sources of light during construction periods, and the presence of nearby commercial and residential uses, construction activities are considered a potentially significant visual impact. These activities would occur adjacent to I-580, which is an eligible State scenic highway, and could be seen by drivers and passengers along scenic routes designated by the City of Livermore. These scenic routes include Fallon Road, Doolan Road, Isabel Avenue, Collier Canyon Road, North Livermore Avenue, Hartman Road, Hartford Avenue, and Altamont Pass Road.

Construction impacts pertaining to visual resources and creating new sources of light and glare, 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. These impacts would be reduced to a less-than-significant level with implementation of **Mitigation Measure VQ-1.A**, which requires visual screening of staging areas, and **Mitigation Measure VQ-1.B**, which requires construction lighting to be directed downward. **(LSM)**

**Enhanced Bus Alternative.** Construction of the Enhanced Bus Alternative would occur over a short period (2 months) and would be limited to minor infrastructure improvements such as bus shelters and bulb-outs. Therefore, construction-related visual resources and lighting impacts under the Enhanced Bus Alternative would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** Potentially significant construction-related visual resources and lighting impacts under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would be reduced with implementation of the following mitigation measures. **Mitigation Measure VQ-1.A** requires staging areas to be visually screened and **Mitigation Measure VQ-1.B** requires construction lighting to be directed downward. With implementation of these mitigation measures, impacts would be reduced to a less-than-significant level.

As described above, the Enhanced Bus Alternative would not have significant impacts, and no mitigation measures are required for this alternative.

**Mitigation Measure VQ-1.A: Visually Screen Staging Areas (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)**

Views of stockpiled and stored construction materials and equipment shall be minimized to the extent practicable. Any staging areas located adjacent to residential, recreational, or other sensitive viewers shall be screened using appropriate solid screening materials such as temporary fencing or walls. Any graffiti or visual defacement of temporary fencing and walls shall be painted over or removed within 5 business days.

**Mitigation Measure VQ-1.B: Minimize Light Spillover During Construction (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)**

Where construction lighting will be required during nighttime construction, the contractor shall be required to shield such lighting and direct it downward in such a manner that the light source is not intrusive off site, and so that the light does not fall outside the boundaries of the project site to avoid light spillage off site.

### (b) Construction – Cumulative Analysis

***Impact VQ-2(CU): Substantially degrade the existing visual resources or create a new source of substantial light or glare during construction under Cumulative Conditions.***

The geographic study area for the cumulative visual quality construction analysis is the same as that identified in the Introduction subsection above.

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact VQ-1**, the No Project Alternative would have no impacts related to visual resources or creating a new source of substantial light or glare during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Cumulative construction impacts related to visual resources could result if construction of future projects located in close proximity to the project corridor occurs at the same time as construction of the Proposed Project and Build Alternatives. Many of the projects that could be under construction at the same time as the Proposed Project and Build Alternatives would not be close enough to have visual impacts that could combine, and intervening topography, trees, buildings and other structures could obscure the combined views.

However, construction or a portion of the construction associated with the following future projects and plans may occur at the same time as the Proposed Project and Build Alternatives and would be in close proximity to the Proposed Project and Build Alternatives. These future projects and plan areas are located in the study area from west to east, as follows: the IKEA Retail Center/Project Clover is located in the Dublin/Pleasanton Station Area; the Kaiser Dublin Medical Center is located along the I-580 Corridor Area between Tassajara Road/Santa Rita Road and Fallon Road/El Charro Road; the Crosswinds Site is located along the I-580 Corridor Area between Fallon Road/El Charro Road and Airway Boulevard; the Hyatt Hotel is located east of Airway Boulevard; the Isabel Neighborhood Plan is located at the Isabel North and South Areas; and the Las Positas College is located at the Cayetano Creek Area. The Isabel Neighborhood Plan is not expected to generate a substantial amount of construction activity until after the conclusion of construction associated with the Proposed Project and Build Alternatives.

Although the duration of the construction of these projects would overlap with construction of the Proposed Project and Build Alternatives, these projects would be at different locations from each other and would be unlikely to be visible concurrently from any single viewpoint. As described in Chapter 2, Project Description, construction of the Proposed Project and Build Alternatives would occur in phases at various locations along the project corridor, which would decrease the duration of construction at any particular segment of the project corridor. For example, relocation of I-580 is anticipated to occur over approximately 24 months and construction of the Isabel Station and associated facilities would occur over approximately 30 months. Within these areas, sensitive viewers would be people at the Iron Horse Trail, Las Positas College recreational facilities, and Cayetano Park. Due to the distance from the sensitive viewers and the limited duration of construction, the combined visual impacts of the probable future projects and the

Proposed Project and Build Alternatives at these locations would not significantly impact the existing visual resources or create a new source of substantial light or glare.

Therefore, the probable future projects combined with the Proposed Project or an Alternative would not result in significant cumulative construction-related visual resource or light and glare impacts and no additional mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Build Alternatives, in combination with probable future projects, would not result in significant cumulative construction-related visual impacts, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operations impacts.

#### (a) Operations – Project Analysis

***Impact VQ-3: Substantially degrade the existing visual character or quality of the site and its surroundings.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; EMU Option: SU; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

The existing character and quality of the landscape is described in the Local Setting subsection above. Generally, the visual character is defined by the built environment with mixed forms/types of urban development along the project corridor, with greater intensity and diversity of form at the western edge of the study area in the Dublin/Pleasanton Station Area. Along this area, distant views of undeveloped hills and ridgelines are visible. Toward the eastern edge of the study area, the Cayetano Creek Area and Laughlin Road Area, the visual character is defined predominantly by the natural environment, with open space and immediate views of undeveloped hills and ridgelines. Visual quality is generally low to moderate at the western end of the study area and moderate to high at the eastern end.

As described in the Sensitive Viewers subsection above, sensitive viewers are viewers from pedestrian and bicycle trails, parks and other publicly accessible open spaces, as well as drivers traveling on a roadway that is a designated scenic highway, scenic route, or has a designated public scenic viewpoint. Parks, trails, and public open space from which there are views of the project site include the Iron Horse Trail, Las Positas Municipal Golf Course, Las Positas College recreational facilities, Cayetano Park, Vista Meadows Park, and Brushy Peak Regional Preserve. Scenic highways or routes include I-580, Fallon Road,

Doolan Road, Isabel Avenue, Collier Canyon Road, North Livermore Avenue, Hartman Road, Hartford Avenue, and Altamont Pass Road.

The Proposed Project and Build Alternatives would result in the construction of new transportation-related facilities and infrastructure. Depending on whether the Proposed Project or one of the Build Alternatives is ultimately selected to be constructed, components could include the following improvements: new station at Isabel Avenue/I-580, pedestrian overcrossings above I-580, and pedestrian touchdown structures; DMU/bus transfer platforms; rail tracks; surface parking lots and parking garage; storage tracks, wayside facilities, and storage and maintenance facility; bus shelters, bulb-outs, and signage; and relocated I-580 lanes and frontage roadways, including freeway overcrossings, retaining walls, bridges and on-/off-ramps.

The types of visual changes that would occur because of a proposed project are determined by factors such as the physical layout of constructed elements with respect to each other and existing structures, the density or intensity of development, scale of 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. This determines the amount of visual change, either positively or adversely affecting the perceived visual quality of the landscape.

To analyze visual impacts, the impacts within each geographic subarea 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 elements of the Proposed Project or Alternative are noticeable and prominent, inconsistent with the existing visual character of the area, and can be viewed by sensitive viewers. Generally, a high impact is equivalent to a significant impact.

2. A moderate visual impact occurs if elements of the Proposed Project or Alternative are noticeable to sensitive viewers and less than consistent with the existing visual character of the area. Generally, a moderate impact is potentially significant; therefore, it is conservatively identified as a significant impact in the below analysis.

3. A low visual impact occurs if elements of the Proposed Project or Alternative are relatively consistent with the line, form, texture, and color of the existing visual character in a subarea 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 thus would have no effect on the existing visual quality.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. The relocation of I-580 would not occur, the rail track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses along the project corridor would occur. While these projects could result in impacts to visual quality, these effects have been or will be addressed in environmental documents prepared for these projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to substantially degrading the existing visual character or quality of the site and its surroundings. **(NI)**

**Conventional BART Project.** The visual changes that would result from implementation of the Proposed Project and the potential impacts to the visual quality of the area are described below. Representative photos and corresponding photosimulations of key points along the Proposed Project alignment are shown in Figures 3.E-8 through 3.E-14.

**Existing Conditions**


**Conventional BART Project**


**Viewpoint 3:** East along I-580 corridor at proposed BART mainline track

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-8
Visual Quality
Conventional BART Project
El Charro Road Overpass

**Existing Conditions**

**Conventional BART Project**

**Viewpoint 4:** West at proposed Isabel Station from westbound I-580

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-9
Visual Quality
Conventional BART Project
I-580 Between Isabel Avenue and Portola Avenue

**Existing Conditions**

**Conventional BART Project**

**Viewpoint 5:** South at proposed Isabel Station pedestrian touchdown structure and plaza

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-10
Visual Quality
Conventional BART Project
Isabel Avenue North of I-580

**Existing Conditions**

**Conventional BART Project**

**Viewpoint 7:** Southwest at proposed Isabel Station parking facility and pedestrian touchdown structure

Source: Urban Advantage, 2017.



Figure 3.E-11
Visual Quality
Conventional BART Project
East Airway Boulevard

**Existing Conditions**


**Conventional BART Project**


**Viewpoint 6:** Northwest at proposed wayside facility

Source: Urban Advantage, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.E-12
Visual Quality
Conventional BART Project
Isabel Avenue and Kitty Hawk Road

**Existing Conditions**

**Conventional BART Project**


**Viewpoint 8:** North from westbound I-580 at proposed tail tracks heading toward storage and maintenance facility

Source: Urban Advantage, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.E-13
Visual Quality
Conventional BART Project
I-580 East of Portola Avenue

**Existing Conditions**

**Conventional BART Project**


**Viewpoint 10:** West along Hartman Road at proposed storage and maintenance facility

Source: Urban Advantage, 2017.



Figure 3.E-14
Visual Quality
Conventional BART Project
North Livermore Avenue and Hartman Road

- **Dublin/Pleasanton Station Area.** Within the Dublin/Pleasanton Station Area, the visual character is primarily characterized by the forms of the built environment. In this area, the Proposed Project would include conversion of the existing tail tracks to mainline tracks east of the station, within the existing I-580 median and at the same grade as I-580. This project element would result in minor visual changes, would not introduce new elements beyond the I-580 corridor, and would not substantially change the heights or grades of existing facilities. While sensitive viewers would be located along the Iron Horse Trail, which extends through the station area, the proposed changes in the area would not be substantially visible to the sensitive viewers or degrade the perceived visual quality along the trail. In addition, sensitive viewers located at the Dublin Sports Grounds would be 0.6 mile west of the Proposed Project footprint. The perimeter of this park is lined with tall trees that obstruct views out of the park toward the I-580 corridor, and no proposed changes would be substantially visible to viewers. Overall, the impact in the Dublin/Pleasanton Station Area, from Dougherty Road to Hacienda Drive, would be low, and the Proposed Project would not result in substantial visual changes.
- **I-580 Corridor Area.** Project components in this area would include the new mainline and tail tracks, a wayside facility, Isabel Station, and portions of the pedestrian overcrossings (see Isabel North Area and Isabel Station for a discussion of Isabel Station and pedestrian overcrossings). As shown in Figure 3.E-8, the new mainline and tail tracks would be constructed within a new I-580 median and have an approximately 3-foot-high concrete safety barrier topped by fencing along the edges of the median. In addition, a wayside facility would be constructed north of I-580 near Croak Road. This structure would be adjacent to the transportation corridor and relatively low in height—ranging from 12 to 17 feet.

  Sensitive viewers in this area are located at the Las Positas Municipal Golf Course. These viewers would experience limited changes to views as a result of the Proposed Project. The new tracks, barrier, and fencing would be similar to the existing tracks and barrier along the BART facilities west of Dublin/Pleasanton Station. These components would be within the transportation corridor, at a similar grade to the existing I-580, and would therefore be visually compatible with existing visual character along the corridor. The wayside facility would be similar to other commercial structures along I-580, and would be visually compatible with the existing visual character along the corridor.

  As described further in Section 3.J, Noise and Vibration, the Proposed Project would result in significant ambient noise level increases along East Airway Boulevard, necessitating the construction of a sound wall along the south side of an approximately 0.3-mile segment of East Airway Boulevard—from 200 feet west of Montecito Circle to 300 feet east of Via Montalvo—as part of **Mitigation Measure NOI-5**. The sound wall would be approximately 6 to 8 feet high and would obstruct

the southward and southwestward views of drivers along East Airway Boulevard, resulting in secondary visual impacts due to the implementation of this mitigation measure. This sound wall would not be inconsistent with the visual character along East Airway Boulevard, as there is already a sound wall on the north side of I-580 from Sutter Street east to the western border of the Sun Valley Mobile Estates. In addition, the sound wall would be almost entirely contiguous with an existing approximately 0.3-mile long wooden fence that is approximately 6 feet high, which already obscures drivers' and passengers' views to the south and southwest. The sound wall would not be significantly taller than the wooden fence and would cover a similar extent of East Airway Boulevard. Given the existing one-story buildings in the vicinity and the existing I-580 sound wall, there would not be a substantial change to the visual character of East Airway Boulevard. Furthermore, drivers and passengers traveling along East Airway Boulevard are not considered sensitive receptors as East Airway Boulevard is not a locally designated scenic route. Nevertheless, replacing the wooden fence with a solid sound wall would add a conspicuous new feature. Therefore, this impact is conservatively considered to be significant.

Therefore, as described above, relocation of the I-580 lanes and frontage roadways, including freeway overcrossings, retaining walls, bridges, and on-/off-ramps, as well as construction of the sound wall along East Airway Boulevard would not introduce new elements to the landscape, as each of these elements exists under current conditions. In addition, these elements, which would occur within and along the existing transportation corridor and would be generally consistent with existing roadway/facility grades, would not result in substantial changes to the visual quality of the area. Overall, the impact in most of the I-580 Corridor area, from Hacienda Drive to the Portola Avenue overcrossing, would be low. However, there would be a significant impact in a localized area of the I-580 Corridor Area along the 0.3-mile segment of East Airway Boulevard where the sound wall would be installed. This impact would be reduced with the implementation of **Mitigation Measure VQ-3.A**, which would require architectural treatment for the sound wall. Nevertheless, this impact is conservatively assumed to remain significant and unavoidable.

- **Isabel North Area and Isabel Station.** Within the Isabel North Area and adjacent to Isabel Station, the visual character is primarily characterized by forms of the natural environment in the foreground, including open grasslands, with residential and commercial development beyond and distant views of the hills.

  The Proposed Project's components in this area would be adjacent to or within the I-580 corridor and would be visually prominent. As shown in Figure 3.E-9 and Figure 3.E-10, the components in this area include the proposed Isabel Station in the I-580 median, pedestrian overcrossings, which would connect Isabel Station to pedestrian touchdown structures north and south of I-580, the north touchdown structure and loop access road connecting it to Isabel Avenue, and the bus transfer facility north of

I-580. The pedestrian overcrossings would be 20 feet wide and elevated to allow pedestrian access to the station over the freeway. One pedestrian overcrossing would extend approximately 382 feet from the station over I-580 to the north pedestrian touchdown structure and the other overcrossing would extend approximately 485 feet over I-580 to the south touchdown structure. The bus transfer facility and access loop road would include passenger drop-off and pick-up, taxi service, and bus connections.

The Isabel Station would have a similar design to the existing West Dublin/Pleasanton BART Station, with the BART train platform on the lower level at a similar grade as I-580, and an upper concourse level connecting to the pedestrian overcrossings of I-580. The Isabel Station platform would be approximately 700 feet long. The station canopy would be approximately 62 feet above grade and approximately 500 feet long. While the proposed station and pedestrian overcrossings would introduce new visually prominent structures, the structures would be located almost entirely within the transportation corridor and would be similar to existing elements along the corridor. Specifically, the Isabel Station canopy would be similar to that at the Dublin/Pleasanton Station and the station and pedestrian overcrossings would be similar to the West Dublin/Pleasanton BART Station along I-580. The pedestrian overcrossings would also be similar visually to the concrete freeway overpasses along I-580, including the adjacent Isabel Avenue overcrossing.

Sensitive views would exist from the Las Positas Municipal Golf Course between Fallon Road/El Charro Road and Airway Boulevard and at Las Positas College recreational facilities and Cayetano Park, north of I-580 near the proposed Isabel Station area. For viewers at Las Positas Golf Course and Las Positas College, the above project elements would be located in the distance, adjacent to the I-580 corridor, and would not be incompatible with the surrounding landscape, including the transportation corridor beyond.

For sensitive viewers at Cayetano Park, the visual character of the area consists of a mix of open space and new housing development under construction north of I-580 in the immediate project vicinity, with residential and commercial development beyond and distant views of hills. For viewers at these locations, the above project elements would be located in the distance, within the I-580 corridor, and would not be incompatible with the transportation corridor.

To drivers along I-580 and on Isabel Avenue, the forms and massing of the pedestrian overcrossings, north touchdown structure, and proposed Isabel Station would be visually prominent. However, these facilities would be consistent with driver expectations of the I-580 corridor, which features other roadway overcrossings and other station structures to the west of the proposed Isabel Station (Castro Valley BART Station, West Dublin/Pleasanton BART Station, Dublin/Pleasanton Station). Drivers would likely perceive these facilities by visual association as an extension to the east

of the existing BART services and facilities, rather than perceive them as an entirely new visual element within the I-580 right-of-way.

In addition, these structures could be visible from Vista Meadows Park, which has relatively open views to the northwest due to its elevated location south of I-580. Any structures associated with the Isabel Station would be approximately 1.5 mile away from Vista Meadows Park and would not be prominent from this open space. As with drivers along I-580, these structures would be seen by users of Vista Meadows Park as consistent with the transportation-oriented character of the I-580 corridor. Overall, the impact in the Isabel North Area would be low, and components of the Proposed Project would not substantially degrade the visual quality of the area.

- **Isabel South Area.** Within the Isabel South Area, the visual character is characterized by a mix of both natural and built environment forms. In the immediate foreground views include the existing BART park-and-ride lot, agricultural fields, and undeveloped lands. Farther north are views of the I-580 corridor and more distant views of the hills north of I-580. Commercial office, warehouse, and storage buildings are to the south, and are generally one to two stories high and rectangular in form, with few distinguishing architectural characteristics.

  The project components in this area would be visually prominent adjacent to the I-580 corridor. The components in this area along East Airway Boulevard include the following: the pedestrian overcrossing, described above; the south pedestrian touchdown structure; and parking garage and surface parking lots. Along Kitty Hawk Road just west of Isabel Avenue, the project components include the wayside facility.

  The south pedestrian touchdown structure would be approximately 47 feet above grade and located adjacent to the I-580 transportation corridor to provide pedestrian access to the station over I-580. Parking would be provided in a seven-level garage, approximately 87 feet high and 525 feet long, and in two surface parking lots. Figure 3.E-11 shows these structures along East Airway Boulevard.

  The structures within the wayside facility on Kitty Hawk Road at Isabel Avenue would be approximately 90 feet wide by 400 feet long and relatively low in height, ranging from 12 to 17 feet. The facility would be surrounded by an approximately 9-foot-high concrete wall where visible to the public, and chain link fencing along other areas. Furthermore, consistent with City of Livermore guidelines, the wayside facility would have green groundcover, low bushes along the walls, and would be screened by trees at 40-foot intervals, as shown in Figure 3.E-12.

  Similar to the Isabel North Area, sensitive viewers in this area would include viewers at Cayetano Park. In addition, see Section 3.F, Cultural Resources, **Impact CUL-5,** for a discussion of the impacts to the viewshed of the historic Gandolfo Ranch (otherwise known as G&M Farms).

For viewers at Cayetano Park, the proposed south pedestrian overcrossing, pedestrian touchdown structure, parking garage and surface parking lots, bus stops, and wayside facility would be located in the distance, at a lower elevation than the viewers. These components would be largely screened by the intervening topography, as well as the existing trees along Arroyo las Positas creek in Isabel South Area, many of which would remain even with the tree removal associated with the Proposed Project.

Drivers and passengers along I-580 would have intermittent views of the wayside facility, the south end of the pedestrian overcrossing, the south touchdown structure, and parking garage, which would be at a lower elevation than I-580 and would be partially screened by the existing trees and topography.

To drivers on the surface streets—along East Airway Boulevard and Isabel Avenue—the proposed parking facility and touchdown structure would appear visually prominent along the roadway. Only drivers along Isabel Avenue would be considered sensitive viewers as this roadway is designated as a scenic route in Livermore's General Plan. The parking garage would replace an agricultural field, one of the few visual characteristics of interest in this area. However, this area already has moderately low visual quality due to a lack of coherence and unity in its visual character. The proposed parking garage and touchdown structure could be visually incompatible with the adjacent commercial buildings across East Airway Boulevard. While the rectangular form and rectangular architectural elements of the parking garage, as seen in Figure 3.E-11, would be visually consistent with existing office buildings in the business park to the south, the proposed massing and height would be much greater than these one- to two-story buildings. These proposed structures would also be much greater in scale than the agricultural uses (G&M Farms) also located south of East Airway Boulevard and the storage facilities farther to the east.

To drivers on the surface streets—Kitty Hawk Road and Isabel Avenue (a designated scenic route)—the proposed wayside facility would be visually prominent at certain locations. The facility would be visually prominent along Kitty Hawk Road; however, from much of Isabel Avenue, the facility would not be as visually prominent due to the topography. Overall, the form of the proposed facility would be somewhat similar to other commercial types of structures in the immediate vicinity, would be set back from the existing buildings, and would be visually compatible with existing visual character along the transportation corridor. Landscaping measures required by the City of Livermore and described above would further screen the wayside facility from the view of drivers and make it more aesthetically pleasing.

Overall, due to the height and massing of the parking garage, which would be significantly taller than the surrounding commercial buildings, the impact in the Isabel South Area would be moderate, even though the area already has moderately low visual quality. A moderate impact is conservatively identified as significant; therefore, the components of the Proposed Project could substantially degrade the visual quality

of the area. This impact would be reduced to less-than-significant levels with the implementation of **Mitigation Measure VQ-3.B**, which would require design measures to reduce the visual incompatibility and prominence of the parking garage.

- **Cayetano Creek Area.** The project components in this area would be located beyond the I-580 corridor and would include the access roadway from Campus Hill Drive, tail tracks, and storage and maintenance facility.

  The proposed tail tracks would extend approximately 1.9 miles from the Isabel Station to the storage and maintenance facility. The tail tracks would extend from the Isabel Station in the I-580 median, through an underpass to the north side of I-580, cross Arroyo las Positas and Cayetano creeks on bridges, and extend through an approximately 450-foot-long, 20-foot-high hillside tunnel to the storage and maintenance facility. Figure 3.E-13 shows a view from I-580 of the tail tracks extending north toward the storage and maintenance facility. The tail tracks would be generally at-grade and have security fencing along the edges, similar to the existing BART tracks along I-580. In addition, some grading of the existing hill slopes would be required.

  The storage and maintenance facility would be approximately 68 acres and would include nine tracks for the storage of approximately 172 BART cars. The main building would be approximately 44 feet tall; other facility buildings include a 50-foot-high train control tower and buildings similar to the wayside facilities described above. The storage and maintenance facility would be enclosed with security fencing. In addition, a two-lane access road would be constructed from Campus Hill Drive to the storage and maintenance facility. Figure 3.E-14 shows the tail tracks and storage and maintenance facility as seen from the intersection of North Livermore Avenue and Hartman Road.

  Sensitive viewers in this area would include viewers at Las Positas College recreational facilities and Vista Meadows Park, described above. In addition, as described below, project components in the Cayetano Creek Area would also be visible from I-580, North Livermore Avenue, Hartman Road, and Hartford Avenue, all of which are designated as scenic by the City of Livermore. For viewers at Las Positas College, the proposed tail tracks and storage and maintenance facility would be screened by the intervening topography that would preclude views of these facilities.

  The tail tracks and tunnel would be visible to drivers and passengers traveling along I-580. The hillside tunnel would not be visually prominent due to its distance from I-580 (approximately 0.3-mile away), as seen in Figure 3.E-13. The alignment of the tail tracks would have flowing, curving lines that would be compatible with the undulating curves of the rolling hills. The tail tracks would largely not be visible west of the Portola Avenue overcrossing; they would also be blocked from view just east of the Portola Avenue overcrossing due to a highway barrier on the east side of I-580. Therefore, the tail tracks would only be visible to passing drivers and passengers for a

brief period of time just east of the Portola Avenue overcrossing as they travel north into the rolling hills. Furthermore, due to the topography, the tail tracks disappear from view quickly as they go behind a small crest in the hills. Nevertheless, even though these project elements would only be visible to passing drivers and passengers along I-580 for a brief period time, BART trains traversing the tail tracks would be conspicuous as seen from automobiles passing by at the same time. For these reasons, the tail tracks and tunnel are considered to represent a significant man-made intrusion into an otherwise natural landscape. Furthermore, the tail tracks and tunnel could also be visible to users at Vista Meadows Park, which is located on a hill south of I-580. Therefore, this impact is conservatively identified as high.

The storage and maintenance facility would be visible from North Livermore Avenue, Hartman Road, and Hartford Avenue. The Proposed Project would introduce angular forms associated with the storage and maintenance facility, including the linear forms of the access roadway to the facility; the storage tracks; and stored BART cars, as well as rectangular forms of the buildings at the storage and maintenance facility. While this area contains existing built forms, such as the linear forms of the roadway and fences, and rectangular forms of the agricultural and rural residential buildings scattered throughout the natural landscape, these elements are consistent with the rural character of the area. The storage and maintenance facility would introduce transportation-related elements that would contrast with this rural character. Furthermore, although these elements would be viewed at a substantial distance from along North Livermore Avenue, a route designated as scenic by the City of Livermore (approximately 0.5 mile to 0.75 mile, depending on the location of the viewer along North Livermore Avenue), they would also be viewed for an extended duration due to the length of the facility (approximately 1.2 mile long) parallel to North Livermore Avenue.

The storage and maintenance facility would also be visible from Hartman Road and Hartford Avenue, both of which are proposed scenic routes designated by the City of Livermore. The footprint of the storage and maintenance facility would intersect Hartman Road, necessitating the relocation of the road around the facility as shown in Figure 2-2. Therefore, this facility would abut Hartman Road, resulting in a significant alteration to the rural character of the area, which is currently undeveloped except for two rural residences that would be removed due to construction of the Proposed Project. The facility would be approximately 0.6 mile from Hartford Avenue at its nearest point, and the impact to visual quality as seen from this road would be similar to the impact to visual quality as seen from North Livermore Avenue.

Therefore, in the Cayetano Creek Area, the overall impact would be high and the Proposed Project could substantially degrade the visual quality of the area. The impact pertaining to the tail tracks and storage and maintenance facility as seen from North Livermore Avenue, Hartman Road, and Hartford Avenue would be reduced with the

implementation of **Mitigation Measure VQ-3.C**, which would require design measures to screen the storage and maintenance facility. Nevertheless, this impact is conservatively assumed to remain significant and unavoidable because of the large size of the storage and maintenance facility and the extended duration of time it would be visible to drivers along North Livermore Avenue. Furthermore, no mitigation measures are available to reduce the visual impact of the tail tracks and tunnel as seen from I-580.

- **Conclusion.** As described above, the Proposed Project would result in a significant secondary visual impact in the I-580 Corridor Area due to the sound wall on East Airway Boulevard, which would be incorporated as part of **Mitigation Measure NOI-5**. This impact would remain conservatively significant and unavoidable, even with the implementation of **Mitigation Measure VQ-3.A**. Furthermore, there would be a moderate and thus potentially significant visual impact in the Isabel South Area due to the impact of the proposed parking garage; however, this impact would be reduced to a less-than-significant level with the implementation of **Mitigation Measure VQ-3.B**. The Proposed Project would also result in a high, and thus significant, impact in the Cayetano Creek Area due to the visibility of the tunnel and tail tracks to drivers and passengers along I-580, and the visibility of the storage and maintenance facility to drivers and passengers along North Livermore Avenue, Hartman Road, and Hartford Avenue. This impact would remain significant even with the implementation of **Mitigation Measure VQ-3.C**. Overall, the Proposed Project would conservatively have a significant and unavoidable impact to visual character and quality, even with the implementation of the above mitigation measures. **(SU)**

**DMU Alternative.** The visual changes under the DMU Alternative would generally be similar to those described above for the Proposed Project along much of the project corridor; however, this alternative would result in some additional visual changes. The analysis for the Proposed Project would apply to this alternative, except where visual changes would differ, as described below for each study subarea. Representative photos and corresponding photosimulations of key points along the DMU Alternative alignment are shown in Figures 3.E-15 through 3.E-18.

**Existing Conditions**

**DMU Alternative**

**Viewpoint 1:** East at Dublin/Pleasanton Station and proposed DMU transfer platform (left of existing BART platform)

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-15
Visual Quality
DMU Alternative
Dougherty Road Overpass

**Existing Conditions**

**DMU Alternative**

**Viewpoint 2:** West at proposed Dublin/Pleasanton Station DMU transfer platform from westbound I-580

Source: Urban Advantage, 2017.



Figure 3.E-16
Visual Quality
DMU Alternative
I-580 East of Dublin/Pleasanton Station

**Existing Conditions**


**DMU Alternative**


**Viewpoint 3:** East along I-580 corridor at proposed DMU mainline track

Source: Urban Advantage, 2017.

**BART to Livermore Extension Project EIR**

Figure 3.E-17
Visual Quality
DMU Alternative
El Charro Road Overpass

**Existing Conditions**

**DMU Alternative**


**Viewpoint 9:** West at proposed storage and maintenance facility

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-18
Visual Quality
DMU Alternative
North Livermore Avenue

- **Dublin/Pleasanton Station Area.** As described above, the visual character of the area is primarily characterized by the forms of the built environment. The DMU Alternative would result in greater visual changes at the Dublin/Pleasanton Station Area than the Proposed Project due to the construction of the DMU transfer platform, extended tail tracks, and new DMU tracks. However, the components would be constructed within the I-580 corridor and would be consistent with the existing heights at the Dublin/Pleasanton Station.

  As shown in Figures 3.E-15 and 3.E-16, the proposed DMU transfer platform and canopy would be constructed north of the existing station, within the I-580 median.

  The concourse level (lower level) of the station would be widened by approximately 29 feet for a length of approximately 300 feet. The new DMU platform would range from 16 to 30 feet wide and would extend for the length of the existing platform (700 feet). The proposed DMU transfer platform and canopy above would be at a similar height (approximately 27 feet) and have a similar appearance to the existing BART platform and canopy.

  A new BART tail track would be provided within the I-580 median west of Dublin/Pleasanton Station to accommodate the increased BART car storage required at the station, and new DMU tracks would be extended to the east of Dublin/Pleasanton Station. The construction of the additional BART tail track and new DMU tracks would occur within the I-580 median at a similar grade to the existing I-580 grade.

  While sensitive viewers would be located along the Iron Horse Trail, which extends through the station area, the proposed changes in the area would not be substantially visible to the viewers or degrade the perceived visual quality along the trail. In addition, sensitive viewers located at the Dublin Sports Grounds would be 0.6 mile west of the Proposed Project footprint. The perimeter of this park is lined with tall trees that obstruct views out of the park toward the I-580 corridor, and no proposed changes would be substantially visible to viewers. To drivers and passengers along I-580, the forms and massing of the new DMU platform and canopy would be visually prominent; however, they would appear consistent with the existing BART station and canopy. Therefore, the visual impact of the DMU Alternative would be low in the Dublin/Pleasanton Station Area from Dougherty Road to Hacienda Drive, and no substantial visual changes would result.

- **I-580 Corridor Area.** The DMU Alternative would result in similar visual changes along the I-580 Corridor Area as the Proposed Project, as it would include similar components and would also be located within the I-580 corridor, as shown in Figure 3.E-17. Similar to the Proposed Project, a sound wall would be installed along a 0.3-mile segment of East Airway Boulevard as part of **Mitigation Measure NOI-5**.

  Therefore, as described above for the Proposed Project, in most of the I-580 Corridor Area from the Hacienda Drive overcrossing to the Portola Avenue overcrossing, the

DMU Alternative would have a low visual impact. However, there would be a significant visual impact in a localized area of the I-580 Corridor Area along the 0.3-mile segment of East Airway Boulevard where the sound wall would be installed. This impact would be reduced with the implementation of **Mitigation Measure VQ-3.A**, which would require architectural treatment for the sound wall. Nevertheless, this impact is conservatively assumed to remain significant and unavoidable.

- **Isabel North Area and Isabel Station.** The DMU Alternative would result in similar visual changes in the Isabel North Area as the Proposed Project as it would include similar components, including the Isabel Station, and would be similarly located adjacent to the I-580 corridor. Therefore, as described above for the Proposed Project, in the Isabel North Area, the DMU Alternative would have a low impact and would not substantially degrade the visual quality or character of the area
- **Isabel South Area.** The DMU Alternative would result in similar visual changes in the Isabel South Area as the Proposed Project because it would include similar components and would be similarly located adjacent to the I-580 corridor. However, the parking garage would be six levels rather than seven as under the Proposed Project, and no surface parking would be provided. Similar to the Proposed Project, due to the height of the parking garage, which would be significantly taller than the surrounding commercial buildings, the impact in the Isabel South Area would be moderate, even though the area already has moderately low visual quality. A moderate impact is conservatively identified as significant; therefore, the components of the DMU Alternative could substantially degrade the visual quality of the area. This visual impact would be reduced to less-than-significant levels with the implementation of **Mitigation Measure VQ-3.B**, which would require design measures to reduce the visual incompatibility and prominence of the parking garage.
- **Cayetano Creek Area.** As described above, the visual character in the Cayetano Creek Area is characterized by the forms of the natural environment, including immediate views of open grasslands and rolling hills and distant views of hills and ridgelines, with several unobtrusive rural elements such as fences and scattered farm buildings.

  Similar to the Proposed Project, the components of the DMU Alternative within the Cayetano Creek Area would include the tail tracks and tunnel, as visible by drivers and passengers along I-580 as well as users at Vista Meadows Park; an access roadway from Campus Hill Drive, as visible by viewers at Las Positas College; and the storage and maintenance facility, as visible by drivers and passengers along North Livermore Avenue, Hartman Road, and Hartford Avenue, which are proposed or designated as scenic routes by the City of Livermore. However, the storage and maintenance facility would be substantially smaller than under the Proposed Project (36 acres instead of 81 acres).

  The tail tracks heading north toward the storage and maintenance facility would be similar to the Proposed Project, as depicted in Figure 3.E-13. Therefore, similar to the

Proposed Project, the tail tracks and tunnel represent a significant man-made intrusion into an otherwise natural landscape. Even though these project elements would only be visible for a brief period of time, DMU trains traversing the tail tracks would be conspicuous as seen from automobiles passing by at the same time. For these reasons, this impact is conservatively identified as high.

Figure 3.E-18 shows the tail tracks and storage and maintenance facility as seen from North Livermore Avenue. The proposed approximately 36-acre storage and maintenance facility would include eight tracks for storage of approximately 12 DMU vehicles. An approximately 51,255-square-foot maintenance building, approximately 44 feet high, would be constructed, as well as a surface parking lot. Other support buildings would include a 44-foot-high train control tower, a vehicle cleaning platform, and a blowdown building. The storage and maintenance facility and connecting tail tracks would be enclosed with security fencing and security lighting would be installed.

For sensitive viewers at Las Positas College recreational facilities and Cayetano Park, the proposed tail tracks and storage and maintenance facility would be located where intervening topography would preclude views of these facilities.

Similar to the Proposed Project, components of the storage and maintenance facility could be seen from North Livermore Avenue, Hartman Road, and Hartford Avenue. These include the linear forms of the access road to the storage and maintenance facility, storage tracks, and stored DMU cars, as well as rectangular forms of the maintenance facility building. Drivers along North Livermore Avenue would view the storage and maintenance facility for a shorter period of time than under the Proposed Project; the storage and maintenance facility under the DMU Alternative is approximately 0.5 mile long and parallel to North Livermore Avenue, while approximately 1.2 mile long under the Proposed Project. Furthermore, under the DMU Alternative, it would be slightly farther to the west from North Livermore Avenue (approximately 0.8 mile or more) than under the Proposed Project. The storage and maintenance facility would also be visible from Hartman Road, where it would be approximately 0.4 mile away at its nearest point.

The storage and maintenance facility would be over a mile from Hartford Avenue and would largely be indistinguishable from the surrounding landscape at that distance. This impact is conservatively identified as moderate, and thus potentially significant, because the storage and maintenance facility would represent a man-made intrusion into a landscape otherwise devoid of prominent man-made visual elements as viewed from North Livermore Avenue and Hartman Road.

Therefore, in the Cayetano Creek Area, the overall impact would be high and the DMU Alternative could substantially degrade the visual quality of the area. The impact pertaining to the tail tracks and storage and maintenance facility as seen from North Livermore Avenue and Hartman Road would be reduced with the implementation of

**Mitigation Measure VQ-3.C**, which would require design measures to screen the storage and maintenance facility. Nevertheless, this impact is conservatively assumed to remain significant and unavoidable because the storage and maintenance facility would remain visible from those scenic routes. Furthermore, no mitigation measures are available to reduce the impact of the tail tracks and tunnel as seen from I-580.

- **Conclusion.** As described above, the DMU Alternative would result in a significant secondary visual impact in the I-580 Corridor Area due to the sound wall on East Airway Boulevard, which would be incorporated as part of **Mitigation Measure NOI-5**. This impact would remain conservatively significant and unavoidable, even with the implementation of **Mitigation Measure VQ-3.A**. Furthermore, there would be a moderate and thus potentially significant impact in the Isabel South Area due to the visual impact of the proposed parking garage; however, this impact would be reduced to less-than-significant levels with the implementation of **Mitigation Measure VQ-3.B**. The DMU Alternative would also result in a high, and thus significant, impact in the Cayetano Creek Area due to the visibility of the tunnel and tail tracks from I-580, and the visibility of the storage and maintenance facility from North Livermore Avenue and Hartman Road. This impact would remain significant even with the implementation of **Mitigation Measure VQ-3.C**. Overall, the DMU Alternative would conservatively have a significant and unavoidable impact to visual quality, even with the implementation of the above mitigation measures. **(SU)**

**EMU Option.** As shown in Figure 3.E-19, the EMU Option would generally be similar to the DMU Alternative, but would include an overhead catenary system to provide power. The catenary system would be installed between the tracks; it would include support masts, which are typically approximately 20 feet high, and the support system and electrical contact wires that would extend over the center of the train. The catenary system would appear similar to existing electrical or telephone lines and would not be prominent as it would be located in the center of the 46-foot-wide BART median. The catenary system would be consistent with the character of the I-580 corridor, which features elements of similar height and scale such as overhead electrical lines and utility poles.

Similar to the DMU Alternative, the EMU Option would result in a significant secondary visual impact in the I-580 Corridor Area due to the sound wall on East Airway Boulevard, which would be incorporated as part of **Mitigation Measure NOI-5**. This impact would remain conservatively significant and unavoidable, even with the implementation of **Mitigation Measure VQ-3.A**. Furthermore, there would be a moderate and thus potentially significant impact in the Isabel South Area due to the visual impact of the proposed parking garage; however, this impact would be reduced to less-than-significant levels with the implementation of **Mitigation Measure VQ-3.B**. The EMU Option would also result in a high, and thus significant, impact in the Cayetano Creek Area due to the visibility of the tunnel and tail tracks from I-580, and the visibility of the storage and

**Existing Conditions**


**EMU Option**


**Viewpoint 3:** East along I-580 corridor at proposed EMU mainline track

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-19
Visual Quality
EMU Option
El Charro Road Overpass

maintenance facility from North Livermore Avenue and Hartman Road. This impact would remain significant even with the implementation of **Mitigation Measure VQ-3.C**. Overall, the EMU Option would conservatively have a significant and unavoidable impact to visual quality, even with the implementation of the above mitigation measures. **(SU)**

**Express Bus/BRT Alternative.** The changes to visual character and quality under the Express Bus/BRT Alternative would generally be less than those described above for the Proposed Project. Visual changes would be limited to the Dublin/Pleasanton Station Area and the Laughlin Road Area, as well as minor, visually unobtrusive widening of I-580 in the I-580 Corridor Area between Hacienda Drive and Tassajara Road/Santa Rita Road.

- **Dublin/Pleasanton Station Area**. Within the Dublin/Pleasanton Station Area—from just west of Dougherty Road to Hacienda Drive—new bus transfer platforms would be constructed on either side of the existing BART platforms and a new parking lot or parking garage would be constructed south of I-580 in Pleasanton. As shown in Figures 3.E-20 and 3.E-21, the new bus transfer platforms would be integrated into the station along the north and south of I-580. New bus-only ramps would be constructed from I-580 to the bus platforms. The platforms would be protected from the freeway by safety barriers and a windscreen would be constructed over the platforms.

  Either a new surface parking lot or a three-level parking garage, up to approximately 41 feet high would be constructed to replace existing parking spaces removed by the Express Bus/BRT Alternative. The surface parking lot would be constructed on existing undeveloped land east of and adjacent to the existing BART parking lot in Pleasanton (south of I-580). The parking garage would be constructed on a portion of the existing BART parking lot.

  Furthermore, I-580 would be relocated within this subarea—including west of Dougherty Road—encroaching slightly into the footprint of the Dublin Sports Grounds, a public sports facility with sensitive viewers. However, the perimeter of this park is lined with tall trees that obstruct views out of the park toward the I-580 corridor, and no proposed changes would be substantially visible to viewers.

  In conclusion, while these components would result in visual changes in the area, they would be located within or adjacent to the I-580 corridor and would be visually compatible with the transportation corridor. Therefore, the Express Bus/BRT Alternative would result in a low impact in the Dublin/Pleasanton Station Area, and no substantial adverse visual changes would occur.

- **Laughlin Road Area.** Under the Express Bus/BRT Alternative, a new surface parking lot would be constructed in this area. The parking lot would include a bus stop shelter, landscaping, and lighting.

**Existing Conditions**

**Express Bus/BRT Alternative**


**Viewpoint 1:** East at Dublin/Pleasanton Station and proposed bus transfer platforms (left and right of station)

Source: Urban Advantage, 2017.

BART to Livermore Extension Project EIR

Figure 3.E-20
Visual Quality
Express Bus/BRT Alternative
Dougherty Road Overpass

**Existing Conditions**

**Express Bus/BRT Alternative**

**Viewpoint 2:** West at proposed Dublin/Pleasanton Station bus transfer platform from westbound I-580

Source: Urban Advantage, 2017.



Figure 3.E-21
Visual Quality
Express Bus/BRT Alternative
I-580 East of Dublin/Pleasanton Station

Within the Laughlin Road Area, the visual character is characterized by a mix of both natural and built environment forms. In the immediate foreground, views include the existing midget car race track, commercial storage yard and undeveloped lands, and the I-580 corridor to the south. Farther views include the residential developments to the north and west and distant views of the hills beyond.

Drivers and passengers along I-580 and on the surface streets would have views of the parking lot. Furthermore, hikers at the Brushy Peak Regional Preserve could have views of the Laughlin Road parking lot from the higher elevation vantage points along the trails. However, the parking lot would not substantially change the visual quality of the area, which includes a mix of built and natural forms, and would generally be visually compatible with the existing development. Overall, the impact in the I-580 Corridor area would be low.

- **Conclusion.** As described above, the Express Bus/BRT Alternative would not substantially degrade the existing visual quality of the site and its surroundings. Therefore, the Express Bus/BRT Alternative would have less-than-significant impacts to visual quality, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, constructed improvements would include bus shelters, bus bulbs, and signage. These elements would be constructed within existing street rights-of-way and would not be anticipated to introduce visually incompatible elements. Therefore, the Enhanced Bus Alternative would have no impacts to visual quality, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and EMU Option would result in significant impacts related to substantially degrading existing visual character and quality. These impacts would be reduced with the implementation of **Mitigation Measure VQ-3.A**, which would require architectural treatment for the sound wall that is proposed as part of **Mitigation Measure NOI-5**; **Mitigation Measure VQ-3.B**, which would require design measures to reduce the visual incompatibility and prominence of the parking garage; and **Mitigation Measure VQ-3.C**, which would require design measures to screen the storage and maintenance facility. However, this impact would remain conservatively significant and unavoidable because the sound wall along East Airway Boulevard would be a conspicuous new feature and the storage and maintenance facility would remain visible from scenic routes. Furthermore, no mitigation measures are available to reduce the impact of the tail tracks and tunnel as seen from I-580.

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for these Alternatives.

**Mitigation Measure VQ-3.A: Include Architectural Treatments on Sound Wall Required by Mitigation Measure NOI-5 (Conventional BART Project and DMU Alternative/EMU Option)**

BART shall include architectural treatments in the design of the sound wall that is required by Mitigation Measure NOI-5. Surface design enhancements appropriate to the visual context of the area shall be installed with the sound wall and may include, but are not limited to, stamped patterns, surface articulation, and decorative texture treatment. Non-reflective materials and neutral colors shall be used. BART will consult with the City of Livermore regarding the architectural treatments for the sound wall.

**Mitigation Measure VQ-3.B: Design Parking Garage with Architectural Treatments (Conventional BART Project and DMU Alternative/EMU Option)**

BART shall adhere to the following guidelines when designing the parking garage:

- Design the parking structure to have variation in the horizontal and vertical planes to create visual interest and reduce the perceived mass.
- Incorporate well-proportioned openings within the wall of the structure, rather than providing continuous openings.
- Design circulation towers as identity elements.
- Use architectural elements that reflect the light industrial character of the immediate vicinity, as well as the natural beauty of the surrounding area. Use natural tones as the primary color to promote compatibility with the scenic qualities of the station area. Use darker, bolder accent colors.
- Incorporate ornamental building detailing, such as decorative screens, trellises, arches or canopies, to create interest at the human scale.
- Screen rooftop parking from view from the public right-of-way with architectural elements, decorative screens, or trellises.
- Integrate public art into the parking garage.

**Mitigation Measure VQ-3.C: Screen Storage and Maintenance Facility (Conventional BART Project and DMU Alternative/ EMU Option)**

BART shall design the storage and maintenance facility to blend with the natural context of the surrounding area, to the extent feasible. Buildings shall be designed with natural toned colors. Furthermore, BART shall use fences and berms to provide visual screening of the facility from prominent views, where feasible.

***Impact VQ-4: Have a substantial adverse effect on a scenic vista.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

As described in the Introduction subsection above, it should be noted that California Government Code Sections 53090 and 53091 exempt rapid transit districts such as BART from the requirement to comply with local plans, policies, and zoning ordinances. However, BART acknowledges that the City of Livermore has identified scenic vistas and routes in its General Plan; therefore, BART has elected to treat scenic vistas, routes, and corridors as defined by the City of Livermore as scenic vistas for the purpose of impact analysis in this EIR. No applicable scenic vistas are identified in the City of Dublin or City of Pleasanton General Plans.

The City of Livermore General Plan identifies the following scenic vistas in the study area: mid-range views of rolling hills from I-580, long-range views of Mount Diablo and Brushy Peak, and the view of Las Positas Golf Course from north of I-580. Livermore-designated scenic corridors in the study area include Fallon Road, Doolan Road, Isabel Avenue, Collier Canyon Road, North Livermore Avenue, and Altamont Pass Road. Hartman Road and Hartford Avenue, which run west and east, respectively, from North Livermore Avenue approximately 1.5 miles north of I-580, are proposed scenic routes. Furthermore, the Livermore General Plan designates 3,500 feet on each side of the I-580 freeway centerline as a scenic corridor, and establishes view angle envelopes along the corridor, past which development is not permitted to extend. However, development may take place outside of the view angle envelope where it is located within a 1,000-foot radius of the Isabel Avenue/I-580 interchange, north of I-580. I-580 is also eligible for designation as a State scenic highway (see **Impact VQ-5** below).

Obstruction or partial obstruction of the above scenic views due to project components such as new tracks, stations, parking facilities, or storage and maintenance facilities would result in an adverse effect on scenic vistas.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented; i.e., the relocation of I-580 would not occur, the rail track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses, would occur. While these projects could obstruct views designated as scenic by the City of Livermore, and therefore have a substantial adverse effect on a scenic vista, these effects have been or will be addressed in environmental documents prepared for these projects before they are implemented. The No Project Alternative would not result in new impacts as a

consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to substantial adverse effects on scenic vistas. **(NI)**

**Conventional BART Project.** The potential for obstruction of scenic vistas is described below for project components with heights consistent with existing grades, followed by project components with heights that would exceed existing grades.

The project components that would be at-grade with the I-580 would not block long-range views to Mount Diablo or Brushy Peak from viewers along the I-580 corridor or south of the corridor. Within the I-580 median, the vertical profile of the Proposed Project would not be sufficiently high to interfere with these distant views.

Locally designated scenic routes in these areas (where the Proposed Project would be at-grade) include Fallon Road and Doolan Road, which provide intermittent views of the I-580 corridor. The construction of the Proposed Project within the I-580 median would not substantially change the scenic nature of these routes as the Proposed Project would be located within the transportation corridor and would not obstruct views along these routes.

Project components that are elevated above existing grades include the Isabel Station (up to 62 feet high), pedestrian overcrossings and touchdown structures, parking garage (seven levels, or approximately 87 feet high), and wayside facilities as well as facilities at the storage and maintenance facility (up to approximately 50 feet high).

Within the vicinity of the proposed Isabel Station, scenic routes include Isabel Avenue, Collier Canyon Road, and I-580. Due to the topography and location of the wayside facility on Kitty Hawk Road, it would not be anticipated to block views along Isabel Avenue and would largely not be visible from the other two roads.

Isabel Station and its associated components would not be visible from Collier Canyon Road due to their location to the east, as views to the east are blocked by sidewalk trees as well as office buildings along the east side of Collier Canyon Road. When viewed along Isabel Avenue north of I-580, the proposed Isabel Station, pedestrian overcrossings and touchdown structures would be seen in front of a row of tall eucalyptus trees. No views would be obstructed except for those of the eucalyptus trees. Along Isabel Avenue south of I-580, the parking garage could block intermittent views of the mid-range rolling hills to the east due to the heights of the structures and the topography. Furthermore, the parking garage would be located outside the 1,000-foot radius of the Isabel Avenue/I-580 interchange (north of I-580) that is exempt from view angle regulations. Thus, the 87-foot high parking garage would be significantly taller than permitted by the view angle regulations and could obstruct views.

Along I-580, views of rolling hills to the north would be partially blocked by the pedestrian overcrossing and touch down structures on the north side of I-580; however, the obstruction of views would be intermittent and minimal because of the speed of passing motorists along I-580.

The tail tracks extending north to the storage and maintenance facility would be generally at-grade and would not obstruct views along I-580. The storage and maintenance facility would not be visible from I-580 due to the intervening hills. North Livermore Avenue, Hartman Road, and Hartford Avenue are designated or proposed scenic routes in the vicinity of the storage and maintenance facility. Views of rolling hills from North Livermore Avenue would not be significantly obstructed due to the distance of the storage and maintenance facility from the road (approximately 0.5 mile to 0.75 mile, depending on the location of the viewer along North Livermore Avenue). Furthermore, while heights of several buildings at the storage and maintenance facility would be significant (approximately 44 feet for the main building and approximately 50 feet for the train control tower), most of the facility consists of elements that are at-grade or near-grade, such as a parking lot and train tracks. These elements would not obstruct views from North Livermore Avenue. Similarly, the storage and maintenance facility would be over 0.5 mile from Hartford Avenue and would not substantially obstruct views from this scenic route at that distance.

However, the footprint of the storage and maintenance facility would intersect Hartman Road, necessitating the relocation of the road around the facility as shown in Figure 2-2. Therefore, this facility would abut Hartman Road; views from this scenic route would be significantly obstructed due to the immediate proximity of buildings, BART trains, and other elements in the storage and maintenance facility.

In summary, the parking garage would likely be taller than permitted by the view angle envelope established for the area by the City of Livermore, thus potentially obstructing scenic vistas, and the storage and maintenance facility would relocate and directly abut Hartman Road, substantially obstructing views from Hartman Road (a scenic route). In order to reduce these impacts to less-than-significant levels, substantial changes that are infeasible, would be required for the project design, such as significantly reducing the parking garage height and selecting an alternative location for the storage and maintenance facility. Reducing the parking garage height would be infeasible due to adverse secondary impacts. As described in Section 3.B, Transportation, the garage is sized to provide sufficient parking to meet the projected parking demand. Reducing the amount of parking below demand would result in indirect impacts such as traffic congestion and vehicle emissions of air pollutants and greenhouse gases, as drivers, who are unable to park in the smaller garage, would search for street parking in the vicinity of the station. In addition, the storage and maintenance facility location was selected from among several potential locations. The other locations were rejected due to substantially

increased costs, conflicts with zoning, or operational inefficiencies, as described in the Alternatives Considered but Withdrawn subsection of Chapter 2, Project Description. For these reasons, the Proposed Project would have significant impacts pertaining to substantial adverse effects on a scenic vista, and no mitigation measures are available. **(SU)**

**DMU Alternative.** Under the DMU Alternative, the general mass, height, scale, and location of project components would be similar to the Proposed Project, except that a DMU transfer platform would be constructed at the Dublin/Pleasanton Station and the storage and maintenance facility would be considerably smaller (36 acres instead of 81 acres as under the Proposed Project) and would not be adjacent to Hartman Road. Therefore, the analysis above for the Proposed Project would apply to this alternative, except where noted below.

At the Dublin/Pleasanton Station, the DMU transfer platform would be adjacent to the existing BART platform and have a canopy of similar height, and thus would cause minimal obstruction of views for drivers along I-580. Similar to the Proposed Project, the proposed parking garage in the Isabel South Area would be beyond the 1,000-foot radius of the Isabel Avenue/I-580 interchange (north of I-580) that is exempt from view angle regulations. Thus, although the parking garage would be somewhat shorter than under the Proposed Project (six levels rather than seven), it would be taller than permitted by the view angle envelope, potentially obstructing scenic vistas.

The storage and maintenance facility would be approximately 0.5 mile north of I-580 and would not be visible from I-580 due to the intervening hills. However, it would be visible from North Livermore Avenue, Hartman Road, and Hartford Avenue, locally designated scenic routes. While heights of several buildings at the storage and maintenance facility would be significant (approximately 44 feet for the main building and approximately 44 feet for the train control tower), most of the facility consists of elements that are at-grade or near-grade, such as a parking lot and train tracks. Due to the distance of the facility from North Livermore Avenue, Hartman Road, and Hartford Avenue (approximately 0.7 mile, 0.4 mile, and 1 mile, respectively) and the expanse of intervening open grasslands in the foreground, the DMU Alternative would not obscure the views of the rolling hills along these scenic routes.

As described above, the parking garage would likely be taller than permitted by the view angle envelope established for the area by the City of Livermore, potentially obstructing views and resulting in a significant impact. Reducing this impact to less-than-significant levels would require reducing the parking garage height, which would be infeasible due to adverse secondary impacts. A smaller garage would not meet the projected parking demand, as discussed above for the Proposed Project; see Section 3.B, Transportation. For these reasons, the DMU Alternative would have significant impacts pertaining to

substantial adverse effects on a scenic vista, and no mitigation measures are available. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative, new structures that could affect scenic vistas consist of the bus transfer platforms at the Dublin/Pleasanton Station and a surface parking lot or garage at the Dublin/Pleasanton Station south of I-580. In addition, under this alternative, a remote parking lot would be constructed at Laughlin Road and Northfront Road. This surface parking lot would be consistent with the existing site grades and any structures, such as a bus stop, would be of limited height; therefore, views through the area would not be obstructed.

The bus transfer platforms at the Dublin/Pleasanton Station would be adjacent to the existing BART platform within the I-580 median and would be at-grade with the existing I-580 grade. From the perspective of drivers along I-580, the platforms would cause minimal view obstruction.

A new surface parking lot at Dublin/Pleasanton Station would not obstruct scenic vistas. While a three-level garage may be visible to drivers on I-580, it would be located at the site of an existing parking lot where no scenic views are available, and therefore would not block scenic vistas. Furthermore, there are no locally designated scenic routes in the immediate project vicinity.

For these reasons, the Express Bus/BRT Alternative would have less-than-significant impacts pertaining to substantial adverse effects on a scenic vista, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, no scenic vistas would be affected as improvements under this alternative would be constructed in existing street rights-of-way and would not have substantial height or massing. Therefore, there would be no impacts under the Enhanced Bus Alternative and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative would have significant impacts related to substantial adverse effects on a scenic vista. There are no mitigation measures available to reduce these impacts. Therefore, these impacts would remain significant and unavoidable.

As described above, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not have significant impacts related to substantial adverse effects on a scenic vista, and no mitigation measures are required for these alternatives.

***Impact VQ-5: Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: NI)***

As described in the Regulatory Framework subsection above, I-580 is not officially designated as a State scenic highway. However, I-580 is identified as eligible by the State Streets and Highways Code, which provides that highways identified by statute as eligible are considered to be part of the State Scenic Highway System. Therefore, this analysis conservatively assumes I-580 is a scenic highway and addresses potential changes to scenic resources and views along I-580 resulting from the Proposed Project. Scenic resources within a State Scenic Highway could be affected by visual intrusions that impact the vividness, intactness and/or unity of a scenic corridor, and the presence of outdoor advertising. Impacts to vividness, intactness, and/or unity along I-580 are analyzed under **Impact VQ-3** and **Impact VQ-4** above. This analysis conservatively assumes that any visual impacts identified as significant in the above analyses would represent visual intrusions that could potentially significantly impact the scenic highway.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented; i.e., the relocation of I-580 would not occur, the rail track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses, would occur. Land use development could also occur adjacent to or within close proximity of I-580. Any visual impacts related to development that could affect scenic resources as seen from I-580 have been or will be addressed in environmental documents prepared for these projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impact related to substantially damaging scenic resources within a State scenic highway. **(NI)**

**Conventional BART Project.** As described in further detail above under **Impact VQ-3**, the proposed tail tracks and tunnel in the Cayetano Creek Area—as seen from I-580 just east of the Portola Avenue overcrossing—would represent a man-made intrusion into an otherwise natural landscape. In addition, as described under **Impact VQ-4**, the proposed parking garage in the Isabel South Area would be taller than permitted by the view angle envelope established by the City of Livermore for the protection of scenic views from I-580. Both of these are conservatively considered to be significant visual intrusions.

Furthermore, as described in the Regulatory Framework subsection above, portions of I-580 are classified as landscaped freeway segments due to planted ornamental vegetation. The Proposed Project would entail the relocation of approximately 5.6 miles of I-580, and would therefore require removal of vegetation, including in segments where I-580 is classified as a landscaped freeway. Such removal could result in the loss of landscaped freeway classification, thus allowing for off-site advertising displays (also referred to as billboards). While the Cities of Dublin and Livermore prohibit off-site advertising displays, the City of Pleasanton does not.[18, 19, 20] Thus, Pleasanton could permit such displays along I-580 in the landscaped freeway segments from postmile 18.54 to 19.12 and postmile 17.55 to 18.31, if these segments were declassified due to loss of ornamental vegetation. The presence of off-site advertising displays would be considered a significant impact to scenic resources within I-580.

This impact would be reduced with the implementation of **Mitigation Measure VQ-5,** which would require BART to replace landscaping along I-580 in areas where would be removed for the Proposed Project. However, due to the limited amount of available right-of-way, some segments of I-580 may not be revegetated. Furthermore, as described in **Impact VQ-3** and **Impact VQ-4**, there are no feasible mitigation measures to reduce the impacts related to the tail tracks and tunnel and the height of the parking garage. Therefore, even with implementation of **Mitigation Measure VQ-5,** this impact is conservatively assumed to remain significant and unavoidable. (**SU)**

**DMU Alternative.** As described in further detail above under **Impact VQ-3**, the proposed tail tracks and tunnel in the Cayetano Creek Area—as seen from I-580 just east of the Portola Avenue overcrossing—would represent a man-made intrusion into an otherwise natural landscape. As described under **Impact VQ-4**, the proposed parking garage in the Isabel South Area would be taller than permitted by the view angle envelope established by the City of Livermore for the protection of scenic views from I-580.

Furthermore, as described in the Regulatory Framework subsection above, portions of I-580 are classified as Landscaped Freeway segments. The DMU Alternative would entail the relocation of approximately 7.1 miles of I-580, and would therefore require removal of vegetation. While the cities of Dublin and Livermore prohibit off-site advertising displays, the City of Pleasanton does not.[21, 22, 23] Thus, Pleasanton could permit such displays along I-580 in the landscaped freeway segments from postmile 20.14 to 20.39, postmile 19.76 to 19.96, postmile 18.54 to 19.12, and postmile 17.55 to 18.31, if these segments were

[18] City of Dublin Municipal Code, Section 8.84.150
[19] City of Livermore Development Code, Section 4.06.040
[20] City of Pleasanton Municipal Code, Chapter 18.96.
[21] City of Dublin Municipal Code, Section 8.84.150
[22] City of Livermore Development Code, Section 4.06.040
[23] City of Pleasanton Municipal Code, Chapter 18.96.

declassified due to loss of ornamental vegetation. Similar to the Proposed Project, this would be considered a significant impact to scenic resources within I-580. This impact would be reduced with the implementation of **Mitigation Measure VQ-5,** which would require BART to revegetate areas of removed landscaping. However, due to spatial constraints, it is possible some relocated portions of I-580 could not be revegetated. Furthermore, as described in **Impact VQ-3** and **Impact VQ-4**, there are no feasible mitigation measures to reduce the impacts related to the tail tracks and tunnel and the height of the parking garage. Therefore, even with implementation of **Mitigation Measure VQ-5,** this impact is conservatively assumed to remain significant and unavoidable. (**SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative, approximately 2.2 miles of I-580 would be relocated, substantially less relocation (3.4 miles less relocation) than under the Proposed Project). The following two landscaped freeway segments would be affected: from postmile 19.76 to 19.96 at the Dougherty Road/Hopyard Road interchange, and from postmile 18.54 to 19.12 at the Hacienda Drive interchange. The segment from postmile 17.55 to 18.31 would also be affected; however, along this segment, relocation would only take place on the Dublin (north) side of I-580. As described above, Dublin prohibits the installation of off-site advertising displays, while the City of Pleasanton does not.

Similar to the Proposed Project and DMU Alternative, removal of vegetation for I-580 relocation under the Express Bus/BRT Alternative would be considered a significant impact to scenic resources within I-580. This impact would be reduced with the implementation of **Mitigation Measure VQ-5,** which would require BART to revegetate areas where landscaping has been removed. However, due to spatial constraints, it is possible that some relocated portions of I-580 may not be revegetated. Therefore, even with implementation of **Mitigation Measure VQ-5,** this impact is conservatively assumed to remain significant and unavoidable. (**SU)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, no scenic resources would be damaged as infrastructure improvements would be constructed within the existing street right-of-way. Therefore, there would be no impacts under the Enhanced Bus Alternative, and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would result in significant impacts related to substantially damaging scenic resources within a State scenic highway. This impact would be reduced with the implementation of **Mitigation Measure VQ-5,** which would require BART to revegetate areas where landscaping is removed. However, due to spatial constraints, it is possible some segments of I-580 may not be revegetated. Furthermore, there are no feasible mitigation measures to reduce the impacts under the Proposed Project and DMU Alternative related to the tail tracks and tunnel and the height of the parking garage.

Therefore, even with implementation of **Mitigation Measure VQ-5,** this impact is conservatively assumed to remain significant and unavoidable.

As described above, the Enhanced Bus Alternative would not have impacts; therefore, no mitigation measures are required for this alternative.

**Mitigation Measure VQ-5: Revegetate Areas of Removed Landscaping (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)**

BART shall revegetate areas where landscaping has been removed in-kind to the greatest extent feasible. BART shall ensure that all landscaping plans are consistent with the existing vegetation of the area while serving sustainability goals. A qualified landscape architect retained by BART's contractors will approve all landscaping plans for the area.

***Impact VQ-6: Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: NI)***

The Proposed Project and Build Alternatives would introduce new sources of light and glare that could affect daytime or nighttime views. The magnitude of the impact of a new light source is partially based on the existing lighting environment in an area. Existing environments that are dimly lit would experience a comparatively greater impact from new lighting than would more brightly illuminated environments. Urban areas tend to have greater lighting than rural areas. Along the project corridor, the existing lighting is generally greater in the Dublin/Pleasanton area and decreases toward the eastern, less urbanized areas near Isabel Avenue. In addition, residential areas tend to be more sensitive to new sources of lighting.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented; i.e., the relocation of I-580 would not occur, the rail track would not be extended to a new station at Isabel Avenue, and the storage and maintenance facility would not be constructed. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses, would occur. Any lighting impacts associated with the above projects have been or will be addressed in environmental documents prepared for these projects before they are implemented. The No Project Alternative would not result in new impacts as a consequence of BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is

considered to have no impact related to creating a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. **(NI)**

**Conventional BART Project.** Under the Proposed Project, lighting would be added primarily at the Isabel Station, north station area, south station area, and storage and maintenance facility. Lighting along the BART mainline track and tail tracks would be minimal and would not contribute to a significant or potentially significant impact from new sources of light and glare.

Due to the types of facilities and need for safety lighting, there is potential for the Isabel Station, including its associated facilities, to create a substantial source of light or glare. Lighting at Isabel Station is conservatively assumed to operate 24 hours a day, 7 days a week. Lighting would also be installed at the storage and maintenance facility, which would be located in an open grassland area with few other proximate sources of light. While the existing BART stations and storage yards are examples of possible design and construction of lighting at the proposed Isabel Station and storage and maintenance facility, there is still a potential for creating a new source of substantial light or glare in the area.

This impact would be reduced with implementation of **Mitigation Measure VQ-6**, which requires the Isabel Station and its associated facilities and the storage and maintenance facility to have lighting fixtures designed to minimize spillover into adjacent areas. While **Mitigation Measure VQ-6** would reduce impacts related to the Isabel Station facilities to less than significant, this impact is conservatively assumed to remain significant and unavoidable for the storage and maintenance facility, as it would be located in a rural area with few existing sources of illumination where any new lighting would be substantially noticeable. **(SU)**

**DMU Alternative.** Similar to the Proposed Project, lighting would primarily be added at the Isabel Station area and storage and maintenance facility. Light and glare generated by these project components could be significant. This impact would be reduced with implementation of **Mitigation Measure VQ-6**, which requires Isabel Station and its associated facilities and the storage and maintenance facility to have lighting fixtures designed to minimize spillover into adjacent areas. While **Mitigation Measure VQ-6** would reduce impacts related to the Isabel Station facilities to less than significant, this impact is conservatively assumed to remain significant and unavoidable for the storage and maintenance facility, as it would be located in a rural area with few sources of illumination where any new lighting could be substantially noticeable. **(SU)**

**Express Bus/BRT Alternative.** Under the Express Bus/BRT Alternative, new facilities that could emit new light and glare are limited to the bus transfer platforms at Dublin/Pleasanton Station, replacement parking at Dublin/Pleasanton Station, and the

Laughlin Road parking lot. The replacement parking would consist of a new surface lot or garage south of I-580, adjacent to the existing BART parking lot.

While new lighting would be required for the bus transfer platforms, it generally would not be noticeable due to the existing lighting at the Dublin/Pleasanton Station. Similarly, the light cast by the replacement parking would generally not be noticeable due to the existing lighting at the Dublin/Pleasanton Station parking lot. Therefore, these new sources would not emit substantial light or glare.

The Laughlin Road parking lot would be a substantial new source of light, with light fixtures operating primarily during the nighttime hours. Existing sources of light in the area include streetlights and a large residential subdivision approximately 500 feet to the north. Potential affected viewers are limited to the residents of the subdivision and recreational users of the nearby Brushy Peak Regional Preserve. Brushy Peak Regional Preserve is closed to the public after dark (closing hours range from 5:00 p.m. to 8:00 p.m. depending on the time of year).[24] Therefore, any light emanating from the Laughlin Road parking lot would occur after closing hours of the Brushy Peak Regional Preserve and would not be substantially noticeable to recreational users of the preserve. However, the new lighting at the Laughlin Road parking lot could be noticeable to residents of the subdivision to the north. This would represent a potentially significant impact. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure VQ-6,** which would require the Laughlin Road parking lot to have lighting fixtures designed to minimize spillover into adjacent areas. **(LSM)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, improvements would be constructed within the existing street rights-of-way. Additional lighting associated with bus shelters and signage would be limited and would be similar to existing bus facilities. Therefore, no new lighting would be needed, and there would be no impact related to light and glare under the Enhanced Bus Alternative. **(NI)**

**Mitigation Measures.** Potentially significant impacts due to new sources of light and glare described above under the Proposed Project and the DMU Alternative would be reduced with implementation of **Mitigation Measure VQ-6,** which would require the Isabel Station facilities and the storage and maintenance facility to have lighting fixtures designed to minimize spillover into adjacent areas. However, the storage and maintenance facility would be located in a rural area with few existing sources of illumination and thus any new lighting could be substantially noticeable. Therefore, this impact would conservatively remain significant and unavoidable.

[24] East Bay Regional Park District, 2017. Brushy Peak Regional Preserve. Available at: http://www.ebparks.org/parks/brushy_peak, accessed June 14, 2017.

Potentially significant impacts due to new sources of light and glare described above under the Express Bus/BRT Alternative would be reduced with implementation of **Mitigation Measure VQ-6,** which would require the Laughlin Road parking lot to have lighting fixtures designed to minimize spillover into adjacent areas. With implementation of this mitigation measure, impacts would be reduced to a less-than-significant level. **(LSM)**

As described above, the Enhanced Bus Alternative would not have significant impacts; therefore, no mitigation measures are required for this alternative.

**Mitigation Measure VQ-6: Design and Install Lighting Fixtures to Reduce Spillover (Conventional BART Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative)**

BART shall develop design specifications and lighting plans for facilities that require new lighting. In particular, under the Proposed Project and DMU Alternative, lighting plans shall be developed for the following facilities: Isabel Station, Isabel Station bus transfer facility, Isabel Station parking facilities, and the storage and maintenance facility. Under the Express Bus/BRT Alternative, a lighting plan shall be developed for the Laughlin Road parking lot.

Light sources shall be screened and shielded to reduce spillover light outside of BART property. Any night lighting shall be focused downward, shielded, and recessed within fixtures so as not to introduce new light or glare. During development of the lighting plans, a lighting design specialist shall be consulted to determine the location, intensity, and type of light sources used. Lighting installed for the project shall comply with these specifications, which shall be included in the contract documents.

### (b) Operations – Cumulative Analysis

***Impact VQ-7(CU): Substantially degrade the existing visual character or quality of the site and its surroundings; have a substantial adverse effect on a scenic vista; substantially damage scenic resources within a State scenic highway; or create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: NI)***

The geographic context for the cumulative visual quality analysis is the same as that identified in the Introduction subsection above.

**No Project Alternative.** As described in **Impact VQ-3** through **Impact VQ-6**, the No Project Alternative would have no impacts related to degrading the existing visual

character or quality of the site and its surroundings; having a substantial adverse effect on a scenic vista; substantially damaging scenic resources within a State scenic highway; or creating a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** Cumulative projects include the Isabel Neighborhood Plan (INP), Dublin/Pleasanton BART Station Garage, Kaiser Dublin Medical Center, Grafton Plaza Mixed Use Development, IKEA Retail Center/Project Clover, Fallon Gateway, and Crosswinds Site, listed in Section 3.A, Introduction to Environmental Analysis, as well as in Appendix E. These projects would result in infill development on a large number of the currently undeveloped parcels along the project corridor, particularly around the existing Dublin/Pleasanton Station, between Tassajara Road and Las Positas Golf Course, and in the INP area. The character of the project corridor would become more urban and commercial. The greatest change is anticipated to occur in the INP area around the proposed Isabel Station; this area currently has a mix of low-density, single-story office and commercial buildings approximately 16 to 25 feet high, as well as undeveloped land along Isabel Avenue to the north of I-580. Under the INP, the area north of the proposed Isabel Station would be developed into a compact core with a mix of residential and commercial uses, with greater building heights adjacent to the proposed Isabel Station that would step down in height to the edges of the INP area.[25]

Each of these projects is subject to environmental review and permitting. During this process, each project would be evaluated for visual impacts and consistency with protected scenic vistas and view corridors. Cumulative development would be required to be consistent with applicable plans and zoning requirements, and would be expected to support plan policies to protect hillsides and scenic resources and to promote visually complementary development.

For example, a detailed analysis of existing views was performed under the INP to identify the best views and strategies for preserving them. It was determined that the Isabel Avenue interchange currently substantially blocks views along this stretch of I-580; therefore, the tallest and densest development is planned around the interchange. The views with the highest visual quality when travelling westbound were identified as the stretch west of the Shea Homes – Sage Project and west of Collier Canyon Road; therefore, the INP plans for land uses with lower building heights at those locations. At other locations, exemptions from the City of Livermore's Scenic Corridor policy are planned.

[25] City of Livermore, 2016. Staff Report, Preferred Plan for the INP. July 5.

The INP would also entail amending and expanding the current area around the Isabel Avenue/I-580 interchange that is exempt from view angle regulations.[26]

Development consistent with growth in planning documents would maintain protected view corridors, viewsheds, and sensitive viewer locations because planning documents inherently protect views through their scenic policies. Lastly, it is expected that either local jurisdictions would substantially reduce lighting spillage and glare through project permitting processes or local ordinances that would apply to cumulative development.

As described above, planning documents for the study area would ensure that all development would comply with the applicable visual quality policies and each proposed development would undergo its own environmental review. Nevertheless, the amount of visual change in the study area resulting from the probable future projects would be substantial. Furthermore, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would result in significant impacts to visual quality, as described under **Impact VQ-3** through **Impact VQ-6**. The probable future projects combined with the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would change the visual character of the study area, introducing more man-made elements and buildings into an area that is currently developed but also features pockets of undeveloped land and vistas of rolling hills. Therefore, it is conservatively assumed that the probable future projects combined with the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative could degrade the existing visual quality of the area, have substantial adverse effects on scenic vistas, substantially damage scenic resources or create new substantial light and glare. The Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have a considerable contribution to this impact, even after project-level mitigation. Therefore, impacts would remain significant and unavoidable. **(SU)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would have no project impacts related to visual quality, as described under **Impact VQ-3** through **Impact VQ-6**. Therefore, it would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, even after the implementation of project-level mitigation measures, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would contribute to a potentially significant cumulative impact to visual quality. No additional feasible mitigation measures are available, and the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have a cumulatively considerable contribution (significant and unavoidable).

As described above, the Enhanced Bus Alternative would not contribute to cumulative impacts, and no mitigation measures are required for this alternative.

[26] Ibid.

# F. CULTURAL RESOURCES

## 1. Introduction

This section describes the cultural resources setting and existing conditions as they relate to the San Francisco BART to Livermore Extension Project, discusses the applicable regulations, and assesses the potential impacts to cultural resources from construction and operation of the Proposed Project and Alternatives.

CEQA Guidelines Section 15064.5(a) defines historical resources as including but not limited to any object, building, structure, site, area, place, record, or manuscript that is historically or archaeologically significant or that is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Generally, a resource is considered to be "historically significant" if it meets the criteria for listing in the California Register of Historical Resources (California Register).[1]

Historical resources refer to significant historic-era architectural resources and both prehistoric and historic-era archaeological resources, as described below. Historic-era resources refer to resources that are 45 years old or older; prehistoric resources include areas and artifacts of use and occupation prior to the arrival of Euroamericans to California.

- **Historic-era architectural resources** – includes buildings, structures, objects, and historic districts. Specific examples of architectural resources are residences, cabins, barns, lighthouses, military-related features, industrial buildings, and bridges.
- **Archaeological resources** – are those dating to prehistoric and historic-era times. Prehistoric archaeological resources consist of village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, petroglyphs, rock features, and burials. Associated artifacts include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs). Historic-era archaeological resources consist of townsites, homesteads, agricultural or ranching features, mining-related features, refuse concentrations, and features or artifacts associated with early military and industrial land uses. Associated artifacts include stone, concrete, or adobe footings and walls; artifact-filled wells or privies; and

[1] California Code, Public Resources Code, Section 5024.1.

deposits of metal, glass, and/or ceramic refuse. Under CEQA, archaeological resources can be significant as either historical resources or as unique archaeological resources.

The study area for cultural resources includes the area within a 0.5-mile radius of the collective footprint—the area of ground disturbance for the combined footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder buses for the Proposed Project and other Build Alternatives, which are anticipated to extend along existing streets and within the street right-of-ways, are addressed programmatically in this analysis, as described in Chapter 2, Project Description. The area of ground disturbance includes the surface and subsurface areas that would be disturbed as a result of activities associated with the Proposed Project and Build Alternatives, including construction staging areas and construction work areas. In addition, parcels immediately adjacent to areas of ground disturbance are considered to assess potential visual and vibratory impacts to architectural resources. The study area is used to develop the cultural context and to assess the likelihood for unrecorded cultural resources in the vicinity of the Proposed Project and Build Alternatives based on the distribution of recorded resources.

The cultural resources within the study area are described from west to east along the project corridor and are generally discussed for the geographic subareas described in Section 3.A, Introduction to Environmental Analysis.

No scoping comments pertaining to cultural resources were received in response to the Notice of Preparation for this EIR or during the public scoping meeting held for the EIR.

## 2. Existing Conditions

This subsection describes the regional context for the study area, including the natural environment and resource setting, and the local setting, including records search and survey results.

### a. Regional Overview

#### (1) Natural Environment

The Proposed Project and Build Alternatives would be located in the Livermore-Amador Valley at the northern end of the Diablo Range, part of the northwest-trending Coast Ranges Geomorphic Province. The Coast Ranges Geomorphic Province contains mountain ranges and valleys that trend northwest, parallel to the San Andreas Fault Zone. The ranges have been intensely uplifted, folded, and faulted and contain profound structural discontinuities. The diverse geologic conditions underlying the Livermore-Amador Valley

and the greater San Francisco Bay Area (Bay Area) are largely defined by the network of major active faults that occur within the region.

The Bay Area and surrounding region contained an abundance of natural resources that would have been used by prehistoric and early historic-era populations. A wide variety of migratory and year-round resident birds used Bay Area creeks and marshes as habitat for nesting and feeding. Salmonid and other fish were historically present in these local creeks. Deer, elk, and waterfowl were plentiful, as were nearby marine resources such as seals, otters, abalone, mussels, oysters, and clams. Franciscan chert was an easily obtainable local raw material for the formation of stone tools. Obsidian was obtained from the Annadel and Napa Glass Mountain quarries to the north.[2]

### (2) Prehistoric Setting

Categorizing the prehistoric period into cultural stages allows researchers to describe a broad range of archaeological resources with similar cultural patterns and components during a given timeframe, thereby creating a regional chronology. For the purpose of understanding prehistoric cultural changes in the Bay Area (including the Livermore-Amador Valley), Milliken et al. divide human history into four periods: Paleoindian Period (11,500 to 8000 B.C.), Early Period (8000 to 500 B.C.), Middle Period (500 B.C. to A.D. 1050), and Late Period (A.D. 1050 to 1550).[3] Economic and technological types, socio-politics, trade networks, population density, and variations of artifact types are used to differentiate between cultural periods.

The Paleoindian Period (11,500 to 8000 B.C.) was characterized by big-game hunters occupying broad geographic areas. Evidence of human habitation during the Paleoindian Period has not yet been discovered in the Bay Area.

During the Early Period – Lower Archaic (8000 to 3500 B.C.), geographic mobility continued from the Paleoindian Period, and is characterized by the milling slab and handstone as well as large wide-stemmed and leaf-shaped projectile points. The first cut shell beads and the mortar and pestle are documented in burials during the Early Period – Middle Archaic (3500 to 500 B.C.), indicating the beginning of a shift to sedentism.

During the Middle Period (which includes the Lower Middle Period – Initial Upper Archaic [500 B.C. to A.D. 430] and Upper Middle Period – Late Upper Archaic [A.D. 430 to 1050]),

[2] Moratto, M.J., 1984. California Archaeology. Smithsonian Press, San Diego.

[3] Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottfield, Donna Gillette, Vaviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson, 2007. Punctuated Culture Change in the San Francisco Bay Area, In Prehistoric California: Colonization, Culture, and Complexity. Edited by T.L. Jones and K.A. Klar, pp. 99–124, AltaMira Press.

geographic mobility may have continued, although groups began to establish longer-term base camps from which a more diverse range of resources could be exploited. The first rich black middens are recorded from this period. The addition of milling tools, obsidian and chert concave-base projectile points, and sites in a wider range of environments suggest that the economic base was more diverse. By the Upper Middle Period, mobility was being replaced by the development of numerous small villages. Around A.D. 430, a dramatic cultural disruption occurred, evidenced by the sudden collapse of the Olivella saucer bead trade network.

During the Initial Late Period – Lower Emergent (A.D. 1050 to 1550), social complexity developed toward large central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched projectile points, and a diversity of beads and ornaments.

### (3) Ethnographic Setting

The Livermore-Amador Valley is within the northeastern portion of the territory occupied by the Ohlone-speaking people, but very close to the boundaries of three other ethnographic groups: the Bay Miwok, the Northern Valley Yokuts, and the Plains Miwok.

Based on a compilation of ethnographic, historical, and archaeological data, Milliken describes the group known as the Ohlone.[4] While traditional anthropological literature portrayed the Ohlone as having a static culture, today it is better understood that many variations of culture and ideology existed within and between villages. While these static descriptions of separations between native cultures of California make it an easier task for ethnographers to describe past behaviors, this masks Native American adaptability and self-identity. California's Native Americans never saw themselves as members of larger cultural groups (as described by anthropologists), but rather as members of specific villages. Although they may have been related to others by marriage or kinship ties, the village was the primary identifier of their origins.

Levy describes the language group spoken by the Ohlone, known as Costanoan.[5] The term Costanoan derived from a Spanish word designating the coastal peoples of Central California. Today, Costanoan is used linguistically to reference a larger language family (at least eight languages) of the same Penutian language group spoken by distinct sociopolitical groups. The Ohlone once occupied a large territory that ranged from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The Proposed

[4] Milliken, Randall T., 1995. A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area, 1769-1810. Ballena Press, Menlo Park.

[5] Levy, Richard, 1978. Costanoan In California, edited by Robert F. Heizer, pp. 485–495. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Project is in the greater Chochenyo tribal area.[6] Milliken et al. describes the Souyen, a Costanoan-speaking tribe that occupied the western Livermore Valley area.[7]

Economically, the Ohlone engaged in hunting and gathering. Their territory encompassed both coastal and open valley environments that contained a wide variety of resources, including grass seeds, acorns, bulbs and tubers, bear, deer, elk, antelope, fish, shellfish, a variety of bird species, and small mammals. The Ohlone acknowledged private ownership of goods and songs and village ownership of rights to land and/or natural resources; they appear to have aggressively protected their village territories, requiring monetary payment for access rights in the form of clamshell beads, and even shooting trespassers if caught.[8] After European contact, Ohlone society was severely disrupted by missionization, disease, and displacement. Today, the Ohlone still have a strong presence in the greater Bay Area, and have representatives engaged in project planning, including consultation regarding impacts to Native American cultural resources.

### (4) Historic Setting

Beginning with the Spanish exploration of California, the historic period includes the Spanish and Mexican Periods (1776–1840s) and the Early American Period to the Present Day (1840s–the Present).

### (a) Spanish and Mexican Periods

By the middle of the 16th century, Spain had emerged as a 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 priests established the religious component (missions) of the colonization strategy. The missions had the most profound influence on Native American culture. The priests intended to convert Indians to Catholicism, introduce them to Spanish culture, and discipline them into a productive labor force. Pedro Fages led the first Spanish foray into the Livermore area in 1772. Ohlone in the Livermore area were forced and lured into the mission system, and primarily came to live at Mission San Jose.

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[6] Ibid.

[7] Milliken, Randall, Laurence H. Shoup, and Beverley R. Ortiz, 2009. Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today. Prepared for National Park Service, Golden Gate National Recreation Area. June.

[8] Levy, Richard, 1978. Costanoan In California, edited by Robert F. Heizer, pp. 485–495. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

By the beginning of the 19th 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.

Under a program known as secularization adopted by the Mexican congress in 1833, the mission lands were to be subdivided into land grants (ranchos) to be offered to trustworthy citizens. About 500 ranchos were established in California during the Mexican period. The ranchos established in the project vicinity 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). The rancho economy was based primarily on stock raised for the hide and tallow trade, supplemented by the cultivation of additional food crops such as wheat and smaller numbers of domestic livestock such as sheep and swine. Cattle were driven to coastal locations where they were slaughtered and skinned; the hides and tallow were then processed for transport to trade ships. Former mission Indians performed most of the labor on the ranchos; they worked almost entirely for food and shelter.

As early as the 1820s, British and American mountain men, fur traders, and entrepreneurs ventured into California in search of fortune. The Mexican government was unable to halt this incursion and granted citizenship to foreigners who pledged adherence 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, the steady overland migration of American settlers into the region further threatened Mexico's hold on California. 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 several 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. 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. California was admitted to the United States as the 31st state in the Union on September 9, 1850.

### (b) United States Acquisition to Present Day

Alameda County 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 Livermore Valley, was named Murray Township after early settler Michael Murray.

William Mendenhall, who named the town after his friend Robert Livermore, established the city of Livermore in 1869. Livermore developed primarily as an agricultural community until the Central Pacific Railroad, the first transcontinental railroad, was completed through the city in 1869, also resulting in the establishment of what became the city of Pleasanton (originally called Alisal). By 1870, wheat cultivation had replaced cattle grazing as the dominant economic activity in the project vicinity.

In 1879, the main line of the railroad was moved to a new route across the Carquinez Strait. The railroad line through Livermore remained the principal connection of the area to market for its products. By 1908, the original route of the Central Pacific Railroad (by this time known as the Southern Pacific Railroad), was joined by the Western Pacific Railroad, which ran a parallel line through the Livermore Valley.

By the 1930s, the automobile allowed people to live farther from the city 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.

The Western Pacific Railroad was bought by the Union Pacific in 1982, and is used today for freight as well as the Altamont Commuter Express train. The Southern Pacific Railroad abandoned its tracks in 1984, running its trains on the Union Pacific rails. It then pulled up the rails and deeded most of the land to Alameda County.[9]

## b. Local Setting

To determine the cultural resources sensitivity of the study area, background research and a survey were completed to document previously recorded and new cultural resources.

### (1) Northwest Information Center Records

The California Office of Historic Preservation (OHP) is an information repository for historical resources in California. The OHP administers the California Historical Resources Information System (CHRIS). CHRIS information is disseminated primarily through records searches and reviews of historical resources data files for specific geographic areas.

[9] Nale, Bill, 2003. Livermore History – Railroads. Available At: www.elivermore.com/photos/Hist_lvr_railroad1.htm, accessed August 5, 2016.

ESA conducted a records search at the Northwest Information Center (NWIC) of the CHRIS on August 6, 2013 (File No. 13-0186) and January 5, 2016 (File No. 15-0943). The records search included reviews of previous surveys, studies, and site records for the study area (defined in the Introduction subsection, above, as the collective footprint and a surrounding 0.5-mile radius). The Historic Property Data File for Alameda County was also reviewed. This file contains information on sites of recognized historical significance—including those evaluated for listing in the National Register of Historic Places (National Register), the California Register, the California Inventory of Historical Resources, California Historical Landmarks, and California Points of Historical Interest. The purpose of these searches was to: (1) determine whether known historical or archaeological resources have been recorded within or near the study area; (2) assess the likelihood of unrecorded historical or archaeological resources based on historical references and the distribution of nearby sites; and (3) develop a context for the identification of historical themes.

Based on the NWIC records review, nearly 90 cultural resources investigations have been completed within the study area. These studies primarily consist of background research and surface surveys. Eight projects, listed below in Table 3.F-1, include large portions of the collective footprint and/or adjacent subsurface survey efforts.

**TABLE 3.F-1 PRIOR CULTURAL RESOURCE STUDIES WITHIN OR ADJACENT TO THE COLLECTIVE FOOTPRINT**

| Study # | Project | Author | Year |
|---|---|---|---|
| 6422 | Hopyard Road/Route 580 Interchange Project | Margaret Buss | 1984 |
| 8892 | Highway 580 Interchange Improvements Project | Holman and Associates | 1985 |
| 13870<br>13871 | I-580/First Street Interchange Modifications Project | Basin Research Associates | 1991 |
| 25781 | Vasco Road Interchange Project | William Self Associates | 2002 |
| 33432<br>33815 | Isabel State Route 84/Interstate 580 Interchange Project | PAR Environmental | 2000 |
| 31701<br>33555<br>37251 | I-580 Eastbound High Occupancy Vehicle Lane Project | Rosenthal and Byrd (Far Western) | 2006 |
| 35826 | I-580 Westbound High Occupancy Vehicle Lane Project | Byrd (Far Western) | 2008 |
| 36350 | I-580/Tassajara Road Interchange Project | Basin Research Associates | 2001 |

Source: NWIC, 2016.

Recorded prehistoric and historic-era (i.e., 45 years old or older) cultural resources in the study area include prehistoric sites and isolated prehistoric artifacts, railroad segments, flood and irrigation canals, barns and other structural remnants of ranching and agricultural operations, and historic-era residential and ranch properties. Table 3.F-2 summarizes previously recorded cultural resources within the study area. Pursuant to federal and state law, CHRIS information pertaining to historical resources of an archaeological nature is confidential; therefore, the locations of resources are not provided in this section.

**TABLE 3.F-2 CULTURAL RESOURCES PREVIOUSLY IDENTIFIED WITHIN THE STUDY AREA**

| NWIC Number | Trinomial | Resource Name | Resource Type | Status |
|---|---|---|---|---|
| **Archaeological Resources** | | | | |
| C-1396 | – | – | Midden (not relocated) | Not evaluated |
| P-01-000067 | CA-ALA-47 | – | Prehistoric isolate artifacts (not relocated) | Not evaluated |
| P-01-000124 | CA-ALA-394 | | Buried prehistoric midden | Not evaluated |
| P-01-002108 | CA-ALA-430H | Robert Livermore Adobe Site | Historic-era archaeological site | California Historical Landmark |
| P-01-002122 | CA-ALA-516H | | Historic-era ranch structures, remains of concrete wall, and associated debris | Not evaluated |
| P-01-002194 | – | – | Historic-era steel-lined feed trough and debris | Not eligible |
| P-01-002195 | CA-ALA-584H | | Historic-era building foundations | Not eligible |
| **P-01-002196*** | **–** | **Fence** | **Historic-era barbed-wire fence** | **Not eligible** |
| P-01-002197 | – | Well House | Collapsed historic-era well house and associated elements | Not eligible |
| P-01-002198 | – | | Prehistoric isolate artifact | Not eligible |
| **P-01-002199*** | **–** | | **Prehistoric isolate artifact** | **Not eligible** |
| P-01-002200 | – | – | Prehistoric isolate artifact | Not eligible |
| P-01-002201 | – | – | Prehistoric isolate artifact | Not eligible |
| P-01-002202 | – | – | Prehistoric isolate artifact | Not eligible |
| **P-01-002203*** | **–** | | **Prehistoric isolate artifact** | **Not eligible** |
| **Architectural Resources** | | | | |
| P-01-000262 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-000263 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-000264 | – | Unnamed residence | Historic-era residence and barn | Not listed |

**TABLE 3.F-2 CULTURAL RESOURCES PREVIOUSLY IDENTIFIED WITHIN THE STUDY AREA**

| NWIC Number | Trinomial | Resource Name | Resource Type | Status |
|---|---|---|---|---|
| P-01-000265 | – | Unnamed residence | House and outbuildings | Not listed |
| P-01-000266 | – | Jerome de Ferrari Farm | Historic-era residence and outbuildings | Not listed |
| P-01-000267 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-000268 | – | Unnamed residence | Two historic-era residences and outbuildings | Not listed |
| **P-01-002204/5*** | **–** | **Gandolfo Ranch Historic District** | **Historic-era ranch complex and associated features** | **National Register eligible** |
| P-01-010512 | – | Unnamed residence | Historic-era ranch property | Not listed |
| P-01-010513 | – | Unnamed residence | Historic-era ranch house | Not listed |
| P-01-010514 | – | Unnamed residence | Historic-era residence / office | Not listed |
| P-01-010515 | – | Unnamed residence | Historic-era residence / office buildings | Not listed |
| P-01-010516 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-010517 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-010518 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-010519 | – | Unnamed residence | Historic-era residence | Not listed |
| P-01-010629 | – | South Bay Aqueduct | Historic-era water-conveyance conduit | Not listed |
| P-01-010779 | – | Unnamed residence | Historic-era residence and outbuildings | Not listed |
| P-01-010780 | – | – | Historic-era Quonset warehouse | Not listed |
| P-01-010781 | – | Unnamed residence | Historic-era residence and outbuilding | Not listed |
| P-01-010927 | – | Contra Costa Las Positas Transmission Line | Transmission line, crossing above Interstate (I-) 580 | Not listed |
| **–*** | **–** | **Lincoln Highway** | **Roadway** | **Not listed** |
| **–*** | **–** | **Tassajara Creek Bridge** | **Bridge** | **Not listed** |

Notes: **Bold*** items are in or immediately adjacent to the collective footprint.
Not listed = Not listed in a historical register; Not evaluated = Not evaluated for significance/listing in a historical register.
Source: NWIC, 2016.

### (2) Native American Coordination

In October 2008—for the BART to Livermore Extension Program EIR—a request was submitted to the Native American Heritage Commission (NAHC) to search its sacred lands file to determine the presence of any Native American cultural resources in the study area. The NAHC indicated that there are no known sacred sites in the immediate area and the NAHC provided a list of Native American organizations and individuals with possible knowledge of cultural resources in the area. Letters were sent to each of the organizations/individuals, and no responses from tribal representatives were received.

On April 19, 2016, an updated search request was sent to the NAHC. Additionally, a description of the Proposed Project and Build Alternatives was sent to each of the organizations/individuals identified by the NAHC in 2008 as Native American organizations and individuals with possible knowledge of cultural resources in the study area. Letters were sent on May 25, 2016 and again on August 17, 2016. No responses were received.

### (3) Surveys for Cultural Resource Sensitivity

In July 2013, an architectural historian qualified by the U.S. Secretary of the Interior[10] conducted a reconnaissance-level survey of the collective footprint and parcels immediately adjacent for the accessible portions of all alternatives. The survey included notes and photographs of all buildings and structures potentially 45 years old or older within and adjacent to the collective footprint.

On February 9, 2016, a Registered Professional Archaeologist conducted a pedestrian survey of the accessible portions of the collective footprint, examining areas of open ground surface for indications of cultural occupation, including prehistoric and historic-era artifacts, faunal remains, and soil characteristics consistent with midden deposits. The survey was completed in narrow, zigzag transects (5 to 10 meters wide) to examine all areas of exposed ground surface. While the surface visibility varied, minor ground disturbances, such as rodent holes, were closely examined in areas where vegetation obscured visibility.

The area surveyed included the collective footprint within the Dublin/Pleasanton Station Area, I-580 Corridor Area, Isabel North Area, Isabel South Area, and the Laughlin Road Area. A survey of the Cayetano Creek Area, which has been identified as an area sensitive for archaeological resources due to previously recorded sites in the vicinity, including

[10] The Professional Qualifications Standards are those used by the National Park Service, and have been published in the Code of Federal Regulations, 36 CFR Part 61. The qualifications define minimum education and experience required to perform identification, evaluation, registration, and treatment activities for archaeology and historic preservation.

several prehistoric isolated artifacts (P-01-000067, -002200, -002201, and -002202) (see Table 3.F-2),[11] was not completed at this time due to access limitations in that area.

The 2016 survey effort did not identify archaeological resources or other evidence of past prehistoric use or occupation in the accessible portions of the collective footprint. Additionally, no historic-era archaeological resources were identified.

### (4) Background Research and Survey Results

The results of the background research and survey are described in detail below for each of the geographic subareas within and adjacent to the collective footprint, organized from west to east along the project corridor. Historic-era architectural resources are described first, followed by archaeological resources (both prehistoric and historic-era).

### (a) Historic-era Architectural Resources

Several prior surveys were completed in the study area, which are listed in Table 3.F-1 and summarized below. As shown in Table 3.F-2, this background research completed for previous projects and updated for the Proposed Project and Build Alternatives indicates that 23 historic-era architectural resources have been previously recorded within the study area. Resources within or partially within the collective footprint are described below. Only one of these resources—the Gandolfo Ranch Historic District (P-01-002204/5)—is considered a historical resource for the purposes of CEQA.

During the current survey effort for the BART to Livermore Extension Project, five previously unrecorded historic-era architectural resources were identified—the Collier Canyon Ranch and four residential complexes. As described below, these resources are not eligible for listing in the California Register and therefore are not considered historical resources for the purposes of CEQA.

Findings and resources are described below for the collective footprint and immediately adjacent parcels, from west to east.

**Dublin/Pleasanton Station Area.** Based on the survey and review of prior studies, there are no historic-era architectural resources in the Dublin/Pleasanton Station Area.

**I-580 Corridor Area.** Three historic-era architectural resources are located in the I-580 Corridor Area study area as follows: (1) the Lincoln Highway; (2) a bridge over Tassajara

[11] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October.

Creek; and (3) the previously unrecorded Collier Canyon Road Ranch complex. However, as described below, these resources are not considered historical resources for the purposes of CEQA based on the California Register criteria.

- **Lincoln Highway.** The Thompson and West Alameda County Map of 1878 shows an east-west county road through Livermore Valley, running roughly parallel to and north of Las Positas Creek, approximating portions of the alignment of today's I-580. This road connected Livermore with Dublin to the west, the Altamont Pass, and ultimately to Stockton to the east. In downtown Livermore, the county road followed the alignment of today's Portola Avenue, Junction Avenue, and First Street. From First Street, the road ran northeast, becoming Altamont Pass Road. By 1913, this road was designated as part of the Lincoln Highway, the country's first transcontinental automobile highway connecting San Francisco with New York. By the 1920s, the road was a paved, two-lane highway referred to as the Lincoln Highway and/or U.S. Highway 50. In 1938, the road through Altamont Pass, from Greenville Road to Grant Line Road near Tracy, was upgraded to a four-lane divided highway (at the location of the existing I-580), bypassing the narrow and winding road through the canyon.[12]

  By 1950, a new four-lane highway segment was constructed between Greenville Road and Portola Avenue through previously open land, bypassing downtown Livermore to the north. Portions of the original two-lane road from Portola Avenue westward toward Dublin were also upgraded to a four-lane highway by 1950. Beginning in 1969, the highway was upgraded again to an eight-lane, grade-separated interstate freeway, with the construction of I-580. In 1969, the earlier 1938–1950 highway became today's eastbound I-580, while westbound I-580 was constructed along a new alignment immediately north of and parallel to this earlier highway. New overpasses and interchanges were constructed from the late 1960s and into the mid-1970s. Additional high-occupancy vehicle lanes were added by 2005 and recently in 2015. The former segments of the old Lincoln Highway in the collective footprint do not qualify as a historical resource due to numerous widening efforts and realignments over the past 50 years that have eliminated the integrity of the older highway.[13]

- **Bridge over Tassajara Creek.** The Tassajara Creek bridge over I-580 is a cast-in-place bridge that was originally constructed in 1965 and reconstructed in 1995. The

[12] Bezis, Jason A., 2008. 70 Candles for Altamont Pass Highway, 50 for Vasco Road in Livermore Heritage Guild Volume XXXIX. No. 6. Available at: http://www.livermorehistory.com/Newsletters/2008_09_Sep-Oct%20Newsletter.pdf, accessed August 5, 2013.

[13] Anderson, Kathy, 2017a. Department of Parks and Recreation Form for the Lincoln Highway. On file, ESA.

Caltrans Historic Bridge Inventory indicates that the bridge is a Category 5 and not eligible for listing in the National Register. [14]

- **Collier Canyon Road Ranch.** North of I-580 on Collier Canyon Road is the previously undocumented Collier Canyon Road Ranch complex (Assessor Parcel Number [APN] 99-1331-28), which is partially within the collective footprint. The ranch includes two residences, a barn, several outbuildings, a water tank, and a windmill. The ranch is shown on aerial imagery from as early as 1949 and topographic maps as early as 1952. The two single-story residences are simple wood frame structures with rectangular plans and gable roofs clad in wood shiplap siding and wood frame windows. The barn is wood frame with a rectangular plan vertical wood shiplap siding and gable roof clad in corrugated metal. Two other agricultural outbuildings consist of simple wood frame structures with rectangular plans, vertical wood siding, and gable roofs clad in corrugated metal. A cylindrical wood framed water tank, a small windmill, and an abandoned cattle pen also occupy the property. All of the buildings and structures are in various stages of dilapidation, and the complex appears abandoned. Preliminary research does not associate the Collier Canyon Road Ranch complex with an important event (California Register Criterion 1) or an important person (California Register Criterion 2). The buildings do not represent an architectural style or the work of a master (California Register Criterion 3). In addition, the complex would not provide information important to history (California Register Criterion 4). Finally, the Collier Canyon Road Ranch complex does not retain integrity of materials and workmanship due to the dilapidated condition of the buildings. Although the ranch complex is more than 50 years old, based on a reconnaissance-level survey and background research, the Collier Canyon Road Ranch complex does not appear to qualify for listing in the California Register.[15]

**Isabel North Area.** This area has been used for agricultural and grazing purposes since at least 1906, and possibly earlier. One small structure is shown on the 1906 topographic map. By 1941, this structure is no longer evident, and no other structures were built in the area after this time. The Isabel Station North Area is currently undeveloped open space. Based on the survey and review of prior studies, no historic-era architectural resources are located in this area.

**Isabel South Area.** This area has been in agricultural use since at least 1906, and possibly earlier. Based on the survey and review of prior studies, there is one historic-era architectural resource approximately 300 feet to the southeast and across East Airway

[14] Caltrans lists five categories to describe the significance of a bridge. Category 5 is "ineligible for National Register listing." California Department of Transportation. Historical Significance – State Agency Bridges. Website: dot.ca.gov/hq/structur/strmaint/hs_state.pdf.

[15] Anderson, Kathy, 2017b. Department of Parks and Recreation Form for the Collier Canyon Ranch. On file, ESA.

Boulevard from the Isabel South Area—the Gandolfo Ranch Historic District. This resource is partially within the collective footprint. As described below, the Gandolfo Ranch Historic District is considered a historical resource for the purposes of CEQA.

The 1906 USGS 7.5-minute topographic map shows one small structure in the northeastern corner of the Isabel South Area. This structure is no longer evident on the 1941 USGS topographic map. Subsequent USGS maps indicate that, by 1949, a residential ranch complex had been constructed in the approximate center of the Isabel South Area, consisting of four buildings built slightly west of the earlier structure. Two outbuildings were added to the ranch complex by the mid-1970s. By 1987, East Airway Boulevard was constructed along the southern edge of the parcel, and by 1989, the earlier ranch buildings had been removed. By 1993, a BART parking lot was constructed, with access from East Airway Boulevard. The current western edge of the Isabel South Area was created by the realignment of Isabel Avenue in 2010. Currently, there are no buildings or structures in the Isabel South Area. A grove of mature willow trees exists near where the earlier ranch buildings had been, and a heavily vegetated creek runs through the northern portion of the parcel, parallel to Isabel Avenue and I-580.

- **Gandolfo Ranch Historic District.** The Gandolfo Ranch Historic District (P-01-002204/5; APN 905-001-003-02) includes a working ranch with a Victorian-style farmhouse, a Craftsman-style residence, and a collection of barns and other agricultural outbuildings that date from the late 19th and early 20th centuries (see Table 3.F-2). The Gandolfo Ranch Historic District also includes fencing, driveways, pathways, landscaping features, farm equipment, and agricultural fields.[16] The buildings and structures that contribute to the significance of the ranch are in the southern portion of the 25-acre parcel. The evaluation of the ranch complex notes that the 25 acres represent a fraction of the original 200-acre ranch and that "given the integral relationship between the fields and the ranch buildings, the boundaries of the district encompass the whole [...] 25 acres."[17] The Gandolfo Ranch Historic District has been determined eligible for listing in the National Register at the local level of significance under Criterion A, for its important association with agricultural development of Livermore during its period of significance (1885-1950), and Criterion C, as a 19th century ranch (period of significance between 1885 and 1930). In addition, the circa 1870s residence is also individually eligible at the local level under Criterion C, as a representative example of a Gothic Revival/Folk Victorian

[16] Bakic, Tracy, and Cindy Baker, 2000. Site Record for P-01-002204 – Gandolfo Ranch Historic District. On file, Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California.
[17] Ibid.

farmhouse. The State Historic Preservation Officer (SHPO) determined this property eligible for inclusion in the National Register as a historic district in 2001.[18]

The northern-most part of the historic district has been converted to a gravel parking area; the buildings and structures that contribute to the significance of the district are approximately 500 feet to the south of East Airway Boulevard.

In 2001, the SHPO determined the widening of East Airway Boulevard for the Isabel Interchange Project would have an adverse effect on the Gandolfo Ranch Historic District. It was noted that "the loss of land and trees will change a portion of the historic character of the district by reducing the amount of diversified farming open space and eliminating historic vegetation." Additionally, the elevated overpass would be visible from the ranch buildings, affecting the overall integrity of the setting, feeling, and association.[19] To mitigate this adverse effect, a Historic American Building Survey was proposed to document the existing viewshed from the ranch buildings across the fields and from the fields towards the ranch.

**Cayetano Creek Area.** This area has been used for agricultural and grazing purposes since at least 1906, and possibly earlier. Most of the area is currently undeveloped open space; however, there are two residences on Hartman Road within the collective footprint, and two residences on immediately adjacent parcels. As described below, these residences are not considered historical resources for the purposes of CEQA based on the California Register criteria.

- **1790 and 1820 Hartman Road.** The two residences at 1790 and 1820 Hartman Road are within the collective footprint.[20, 21] The residence at 1790 Hartman Road (APN 903-006-004-05) is a ranch-style single-family residence constructed in 1962. The 1,947-square-foot structure is a single-story house with cross-gable roof with composition shingles, an updated two car garage on the eastern façade, and a wide brick chimney on the western façade. The exterior is a combination of stucco and decorative brick along the ground level, with minimal decorative ornamentation under

[18] Office of Historic Preservation (OHP), 2008. Historic Properties Directory Listing by County, On file, Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, updated May 2008; Dr. Knox Mellon, California State Historic Preservation Officer, letter to Michael G. Ritchie, Division Administrator, Federal Highway Administration, California Division, November 15, 2001, regarding determinations of eligibility and effect for the proposed construction of an interchange on I-580 at Isabel Avenue in Livermore, CA, Reference No. FHWA011017A.

[19] Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.

[20] Anderson, Kathy, 2017c. Department of Parks and Recreation Form for 1790 Hartman Road. On file, ESA.

[21] Anderson, Kathy, 2017d. Department of Parks and Recreation Form for 1820 Harman Road. On file, ESA.

the eaves. The fenestration consists of modern horizontal sliding vinyl windows and flush wooden doors. The secondary entrance is recessed between the garage and main residence, and consists of three separate entrances into the garage and living space (one on each wall).

The residence at 1820 Hartman Road (APN 903-006-004-01) is a 1,000-square-foot small American house/transitional ranch style single-family residence built in 1958. The property has a rectangular footprint and gable roof, with a small overhang topping the primary entrance on the southern façade and a modern two car garage with cross gable. Review of building permit history indicates that the building's ship shingle roof was replaced with a composite roof in 2002. The exterior consists of horizontal siding along the ground level, stucco, and vertical under-gable siding. A secondary flush wooden door is located adjacent to the garage on the southern façade, and the remaining fenestration consists of modern vinyl horizontal sliding windows and a picture window on the southern elevation next to the primary entrance.

Initial archival review failed to indicate any association between the two houses and significant events or individuals in history (California Register Criteria 1 and 2) (see the Regulatory Framework subsection below for a description of the California Register). The houses represent typical mid-century rural residential development in Alameda County, and do not appear to reflect any significant associations with this trend. Archival review also did not indicate any significant associations with persons important to history. The buildings do not embody the distinctive characters of a type, period, or method of construction, nor do they reflect any high artistic value (California Register Criterion 3). The houses are well maintained, but typical, ranch-style houses that have been updated through new siding, roof materials, new windows, and doors (including installation of modern automatic garage doors). The mixed material of brick and stucco and siding and stucco is typical of mid-century modern development, as is the wide brick chimney on the 1790 Hartman Road residence; however none of these features are prime representatives of the either the ranch or small American house/transitional ranch styles. Additionally the buildings are not anticipated to contribute to greater understanding of prehistory or history (California Register Criterion 4).

Due to their lack of significant associations, as well as the lack of integrity to reflect any potential historical associations, neither residence is recommended eligible for listing in the California Register and are not considered historical resources for the purposes of CEQA.

- **1442 Hartman Road.** The buildings at 1442 Hartman Road (APN 903 -0006-004-04), which is adjacent to the collective footprint, consist of a collection of

ranching/farmstead ancillary buildings dating to 1938 per assessor records.[22] The complex appears on historic aerials as early as 1947, and shows the craftsman residence in its current location just south of a large barn structure (significantly different from the extant structure currently on-site). The current outbuilding configuration appears on aerials dating to 2002, and the existing ancillary buildings do not appear to date to the original 1938 construction. As such, the focus of the evaluation is on the 1938 craftsman residence.

Initial archival review failed to indicate any association between the residence and significant events or individuals in history (California Register Criteria 1 and 2). Review of historic county assessor and clerk information, as well review of historic census and city directory information, failed to identify significant individuals associated with the residence.

1442 Hartman Road was included in an East Alameda County Historic Building reconnaissance survey in 2004, and was noted as having good integrity, but likely not individually eligible under California Register Criterion 3 (architectural significance). The report notes the building as dating to 1915, but assessor records indicate the 1938 construction date used in this evaluation. The residence is a well maintained craftsman residence, but does not appear to significantly embody the distinctive characters of a type, period, or method of construction, nor does it reflect any high artistic value. Additionally the buildings are not anticipated to contribute to greater understanding of prehistory or history (California Register Criterion 4).

While the residence has maintained its physical integrity, the building and its associated outbuildings lack significant historical associations. It is not recommended eligible for listing in the California Register and is not considered a historical resource for the purposes of CEQA.

- **1248 Harman Road.** 1248 Hartman Road (APN 903 -0008-001-02), which is adjacent to the collective footprint, consists of a collection of ranching/farmstead ancillary buildings dating to the mid-twentieth century.[23] The complex appears on historic aerials as early as 1947. The single family residence originally associated with these buildings was demolished circa 2009, having last appeared on a 2005 aerial map.

  Initial archival review failed to indicate any association between the complex and significant events or individuals in history (California Register Criteria 1 and 2). The outbuildings represent typical early to mid-twentieth century rural development in Alameda County, and do not appear to reflect any significant associations with this trend. Archival review also did not indicate any significant associations with persons

[22] Anderson, Kathy, 2017.e Department of Parks and Recreation Form for 1442 Harman Road. On file, ESA.
[23] Anderson, Kathy, 2017f. Department of Parks and Recreation Form for 1248 Harman Road. On file, ESA.

important to history. The buildings do not embody the distinctive characters of a type, period, or method of construction, nor do they reflect any high artistic value (California Register Criterion 3). The barns and sheds are typical utilitarian, vernacular structures: wood frame construction with vertical wooden plank siding. The buildings are in a deteriorated state, with portions of the siding and roofs missing or boarded over. Additionally the buildings are not anticipated to contribute to greater understanding of prehistory or history (California Register Criterion 4).

The buildings lack significant historical associations, as well as lack the physical integrity necessary to reflect any significant historic associations. They are not recommended eligible for listing in the California Register and are not considered historical resources for the purposes of CEQA.

**Laughlin Road Area.** The Laughlin Road Area was historically used for agricultural and grazing purposes. Aerial imagery of the parcel from 1987–2002 shows a go-cart race track, viewing stands, and associated parking lot, all of which currently exist. Based on the survey and review of prior studies, there are no historic-era architectural resources in the Laughlin Road Area.

### (b) Archaeological Resources

Findings and resources are described below for the geographic subareas within the study area, from west to east. Previous surveys that were completed in the collective footprint are listed in Table 3.F-1 and described below. The current survey effort did not identify any new archaeological resources that were not previously described in these studies.

As shown in Table 3.F-2, this background research completed for previous projects and updated for the Proposed Project and Build Alternatives indicates that 16 archaeological resources are recorded within the study area. Within the collective footprint, three archaeological resources were previously recorded: two prehistoric isolated surface artifacts (P-01-002199 and P-01-002203) and a historic-era fence (P-01-002196). As described below, these resources are not eligible for listing in the California Register and are therefore not considered historical resources for the purposes of CEQA.

**Dublin/Pleasanton Station Area.** Based on the review of prior studies, there are no previously recorded archaeological resources in the Dublin/Pleasanton Station Area. In addition, within this area, the Arnold Road Staging Area is graded and disturbed.

**I-580 Corridor Area.** Based on the review of prior studies, there are no previously recorded archaeological resources in the I-580 Corridor Area. Information from studies completed in the 1-580 Corridor Area is summarized below.

The I-580 Express Lanes Project (Study Numbers 31701, 33555, 35826, and 37251) completed for the Caltrans-approved Archaeological Survey Reports synthesized and augmented several cultural resources studies to provide a comprehensive analysis for the I-580 corridor between approximately San Ramon/Foothills Road in Dublin and Greenville Road in Livermore (including the entire I-580 corridor portion of the collective footprint). The study included a records search, surface survey, and detailed geoarchaeological analysis (described in more detail in the Geologic Context and Analysis for Buried Sites subsection, below), and concluded that no historical or archaeological resources were within the Express Lanes Project area.

In addition, within this area, the North Canyons Parkway Staging Area has light-brown silty clay with artificial fill in disturbed areas. There is disturbed fill from road construction and very low visibility due to dense vegetation. Once vegetation was scraped back, the ground surface soil was revealed as dark-brown clayey silt.

**Isabel North Area.** Based on the review of prior studies, there are no previously recorded archaeological resources in the Isabel North Area. Information from studies in the Isabel North Area is summarized below.

For the Isabel Exchange Project (Study Numbers 33432 and 33815), two historic-era resources were identified in the vicinity of the Isabel Station Area (a wooden trough [P-01-002194] and a concrete foundation [P-01-002195]). These resources were determined not to be historically significant and the OHP concurred with this recommendation.[24, 25] For the Isabel Exchange Project Extended Phase I subsurface survey effort, one trench was excavated within the Isabel Station Area.[26] There was no indication of any additional archaeological materials that provided evidence of a formal archaeological site.

In addition, the Isabel Avenue North Staging Area consists of medium-brown silty clay with mixed gravel and artificial fill. There is low visibility, and vegetation was periodically scraped back to reveal the ground surface.

[24] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October.

[25] Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.

[26] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October.

**Isabel South Area.** Based on the review of prior studies, there are three prehistoric isolated surface artifacts and a fenceline previously recorded in the Isabel South Area; however, these are not considered historical resources for the purposes of CEQA because they do not meet the California Register criteria of significance. Information from studies in the Isabel South Area is summarized below.

The Isabel Interchange Project (Study Numbers 33432 and 33815) conducted prior to construction of the interchange, included all of the Isabel South and North areas on both sides of I-580. Archaeologists identified a historic-era fence line (P-01-002196) in the Isabel South Area and determined that the 1,700-foot-long wooden post and barbed wire fence associated with the former Ramke Ranch was not historically significant.[27] The OHP concurred with this recommendation.[28]

Also identified during the Isabel Interchange Project were three prehistoric isolated surface artifacts within and adjacent to the Isabel South Area (P-01-002198, P-01-002199, and P-01-002203). To explore the potential for encountering subsurface archaeological sites, 13 trenches were excavated as part of an Extended Phase I subsurface survey. Five of the trenches were within the Isabel South Area, and none indicated a buried surface that would have been suitable for human use or occupation (see Geologic Context and Analysis for Buried Sites, below). The survey also concluded that "the scarcity and spatial separation of the 13 isolated surface artifacts [consisting of groundstone tools and fragments or non-diagnostic lithic fragments] made it difficult to label them as a formal archaeological site" and it was determined that they were representative of the general use of the area during the prehistoric period.[29] The OHP concurred with the finding of effect for the Isabel Interchange Project and recommended a post-review discovery plan.[30]

The area of the collective footprint on Kitty Hawk Road is an existing storage yard that is partially paved and graded. Soil is all artificial fill. No archaeological resources were identified during the surface survey.

**Cayetano Creek Area.** Based on the review of prior studies, there are four prehistoric isolated surface artifacts, an assumed archaeological site, and a well house previously recorded in the Cayetano Creek Area; however, these are not considered historical resources for the purposes of CEQA because they do not meet the California Register

[27] Ibid.
[28] Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.
[29] Ibid.
[30] Ibid.

criteria of significance.[31] Information from studies in the Cayetano Creek Area is summarized below.

For the Isabel Interchange Project (Study Numbers 33432 and 33815), four prehistoric isolated surface artifacts were identified in the Cayetano Creek Area (P-01-002200, P-01-002201, P-01-002202, and P-01-002204).[32] For the Extended Phase I subsurface survey, three trenches were excavated within the vicinity of the Cayetano Creek Area. As with the trenches excavated in the Isabel South and North areas, there was no indication of a buried surface or any additional archaeological materials that provided evidence of a formal archaeological site. While the isolated archaeological artifacts identified in the Cayetano Creek Area do not constitute a significant archaeological resource or site, given the number of isolates identified the general North of Portola Area has a high sensitivity for prehistoric archaeological resources.

Also in the Cayetano Creek Area is a prehistoric archaeological site (P-01-000067) originally recorded in 1951.[33] Archaeologists were not able to relocate the site during a subsequent survey.[34] A collapsed well house with associated objects (P-01-002197) has also been previously recorded in the Cayetano Creek Area. The well house was recommended not eligible for the National Register due to a lack of historic association and integrity; the OHP concurred with this recommendation.[35, 36]

**Laughlin Road Area.** Based on the review of prior studies, there are no previously recorded archaeological resources in the Laughlin Road Area. The majority of this area is paved and disturbed from construction of the existing race track and associated structures. Visible

[31] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October; Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.

[32] Ibid.

[33] McGeein and Mueller, 1951. Site Record for P-01-000067. On file, Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California.

[34] Holman, Miley, 1991. Site revisit of the lands of Lin et al., Location of Archaeological Site ALA-47. On file, Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California.

[35] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October.

[36] Mellon, 2001. Letter from Knox Mellon, State Historic Preservation Officer, Office of Historic Preservation, with U.S. Department of Transportation. November 15.

soil is medium-brown silty clay. No archaeological resources or other evidence of past human use or occupation were identified in the Laughlin Road area.

### (5) Geologic Context and Analysis for Buried Sites

Northern California has undergone dramatic landscape changes since humans began to inhabit the region more than 10,000 years ago. Rising sea levels and increased sedimentation into streams and rivers are among some of those changes.[37] In many places, the interface between older land surfaces and Holocene-age landforms are marked by a well-developed buried soil surface, or paleosol. Paleosols preserve the composition and character of the earth's surface prior to subsequent sediment deposition; thus, paleosols have the potential to preserve archaeological resources if the area was occupied or settled by humans.[38] Because human populations have grown throughout the Holocene, archaeological sites are predicted to be more frequent in paleosols identified in Late Holocene contexts. Conversely, lower population levels during the early Holocene suggest significantly less likelihood of archaeological resources in older paleosols (early Holocene or Pleistocene). Other criteria used to measure the archaeological sensitivity of a given area include the following:

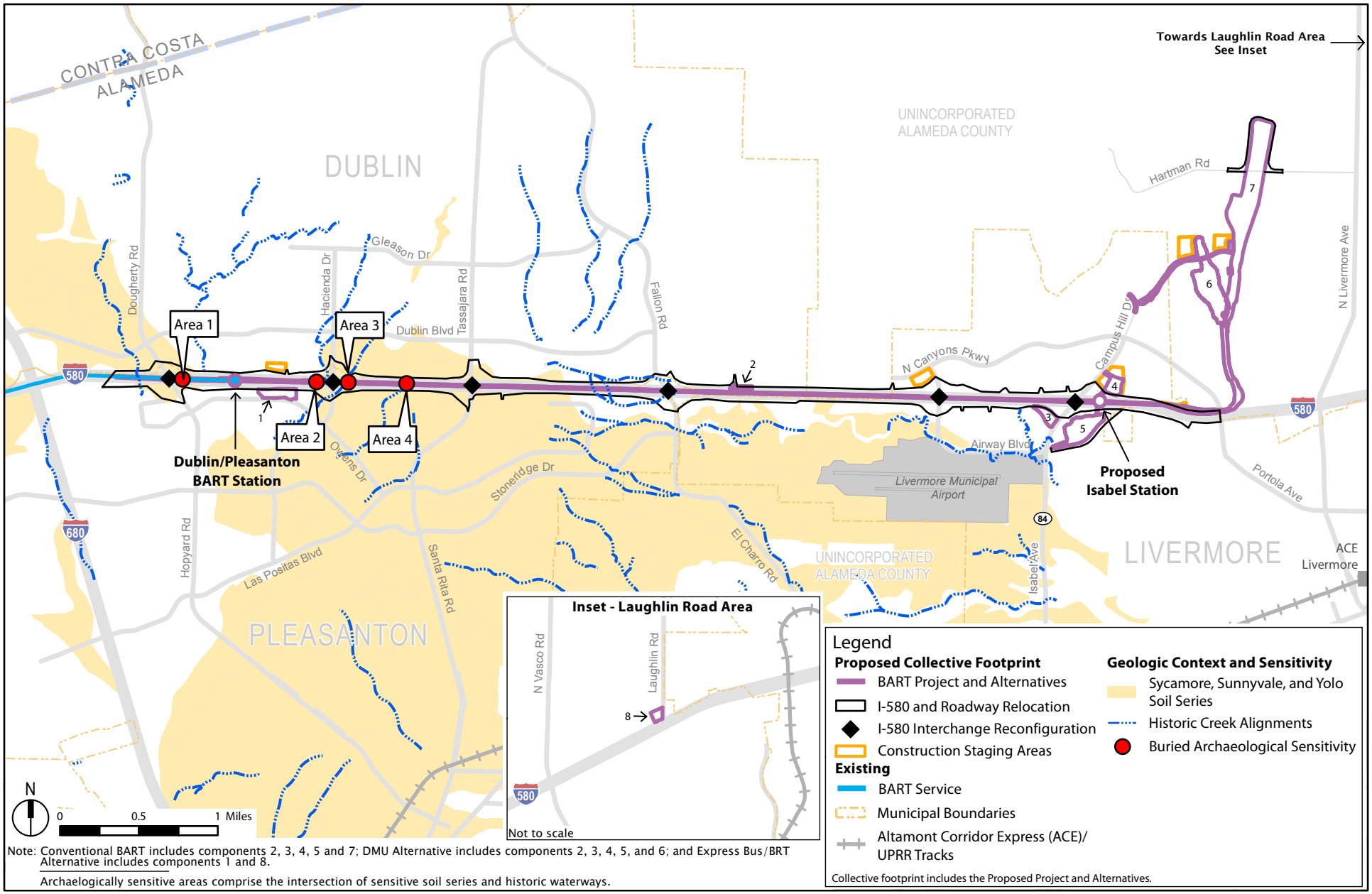
- Archaeological sites tend to be located near perennial water sources.
- Archaeological deposits from successive time periods are more common because the density of human populations increased over time.
- The longer a landform remained at the surface, the greater the likelihood that any one spot on that landform was occupied.[39]

The study area is primarily located within the extensive Holocene alluvial plain of the Livermore-Amador Valley basin (Figure 3.F-1). The surficial deposits in this area include gravels, sands, silts, and clays that are fluvial in origin and consist of material eroded from the surrounding Coast Ranges that filled the Livermore Valley between the Calaveras fault on the west and the Greenville fault on the east. These deposits are a heterogeneous mixture, the individual components of which vary proportionally to their mode of deposition; coarser materials are from higher energy environments (main channels) and finer materials are from lower energy environments (back waters).

[37] Helley, Edward J., K. R. Lajoie, W. E. Spangle, and M. L. Blair, 1979. Flatland Deposits of the San Francisco Bay Region, California - their geology and engineering properties, and their importance to comprehensive planning, Geological Survey Professional Paper 943.

[38] Meyer, Jack, and Jeffrey Rosenthal, 2007. Geoarchaeological Overview of the Nine Bay Area Counties in Caltrans District 4. Prepared for Caltrans District 4.

[39] Ruby, A., 2010. Draft Archaeological Survey Report for the Monterey Peninsula Light Rail Transit Project. Prepared by Far Western Anthropological Group, Inc. Prepared for Parsons Corporation, San Francisco. On file, ESA.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Archaeologically sensitive areas comprise the intersection of sensitive soil series and historic waterways.

Source: Arup, 2017; NRCS, 2016.

**BART to Livermore Extension Project EIR**

Figure 3.F-1
Cultural Resources
Archaeological Sensitivity

Numerous archaeological sites in the Livermore-Amador Valley have been discovered in a buried context, including CA-ALA-413 and -467 on the edge of the historic Willow Marsh and CA-ALA-483, -554, -555, and -574 at Arroyo de la Laguna.[40] Portions of the Arroyo de la Laguna sites have been uncovered underneath nearly 9 feet of alluvial sediment. Because buried sites often have no surface indicators, they are only discovered via geoarchaeological analysis or inadvertently during ground-disturbing activities.

For the I-580 Eastbound HOV Lane Project (Study Numbers 31701, 33555, 37251) (a component of the I-580 Express Lanes Project), a detailed geoarchaeological analysis of landscape evolution, buried sites, and the structure of the archaeological record in the Livermore-Amador Valley proposed a buried archaeological site sensitivity analysis that encompasses the study area, as follows:

> Because buried archaeological sites will only be discovered in landforms that developed during the Holocene, older alluvial fans on the eastern end of the valley have a very low likelihood of containing such sites. These include areas mapped in the Clear Lake, Diablo, Rincon, and San Ysidro soil series. Conversely, as most of the western portion of the study area is composed of late Holocene-age landforms, this area has the highest potential to contain subsurface archaeological sites. Likewise, all of the known buried sites are recorded in landforms on the western end of the valley. To date, buried archaeological sites have only been found in areas of Sycamore Silt Loam and Sunnyvale Clay Loam. As a result, these soils have the highest potential to contain additional buried sites. Due to the recent age of the Yolo Loam, this soil also has a high potential to contain buried sites, particularly those dating older than about 1,400 years.
>
> A review of the distribution of recorded archaeological sites in the valley reveals that all but one site is located within 125 meters of a waterway, and all recorded sites are located within 250 meters of a waterway. *Based on these patterns, the highest potential for buried archaeological sites in the study area occurs within the Sycamore, Sunnyvale, and Yolo soil series within 125 meters of a waterway* [emphasis added].[41]

Based on information provided in the previous studies, Figure 3.F-1 shows areas of high archaeological sensitivity for buried sites in the collective footprint. These areas are

[40] Meyer, Jack, and Jeffrey Rosenthal, 2007. Geoarchaeological Overview of the Nine Bay Area Counties in Caltrans District 4. Prepared for Caltrans District 4.

[41] Rosenthal and Byrd, 2006. Archaeological Survey Report for the I-580 Eastbound High Occupancy Vehicle Lane Project, East of Greenville Road to Hacienda Drive, Livermore Valley, Alameda County, California. On file (S-33555), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California. 2006.

limited to the following four locations, all within the Dublin/Pleasanton Station Area and the I-580 Corridor Area:

- Area 1 – north of I-580 near the intersection of Scarlett Court and Scarlett Drive
- Area 2 – both sides of I-580 at the Hacienda Drive on-ramp
- Area 3 – both sides of I-580 at the Tassajara Creek overcrossing
- Area 4 – both sides of I-580 at the Cottonwood Creek crossing

For the Eastbound and Westbound HOV projects the following was concluded regarding additional subsurface archaeological testing:

> Subsurface archaeological testing to locate buried archaeological sites is currently infeasible… due to the nature of the project area [for the HOV projects], which is narrow, often has steep slopes, and typically includes numerous buried utilities. Additionally [for the HOV projects] the anticipated construction work and associated vertical impacts correlated with the depth of prior construction disturbance and existing fill would not extend into undisturbed sediments.[42]

The collective footprint that extends along the I-580 corridor has similarly been previously disturbed for prior projects, and the potential for buried sites within this corridor is low.

## 3. Regulatory Framework

This subsection describes the federal and state environmental laws and policies relevant to cultural resources.

### a. Federal Regulations

#### (1) National Historic Preservation Act of 1966

Archaeological resources are considered through the National Historic Preservation Act (NHPA) of 1966, as amended (54 U.S.C. 307103), and its implementing regulations. Section 106 of the NHPA requires federal agencies to consider the effects of an "undertaking" (e.g., federal funding or issuance of a federal permit) on historic properties (those listed or eligible for listing in the National Register) and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register. Under the NHPA, a property is considered significant if it meets the National Register listing criteria at 36 Code of Federal Regulations (CFR) 60.4, as stated below:

[42] Ibid., pp. 60.

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

A. That are associated with events that have made a significant contribution to the broad patterns of our history, or

B. That are associated with the lives of persons significant in our past, or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or

D. That have yielded, or may be likely to yield, information important in prehistory or history

Federal review of projects is normally referred to as the Section 106 process. This process is the responsibility of the federal lead agency. A Section 106 review normally involves a four-step procedure, as summarized below:

- Identify historic properties in consultation with the SHPO and interested parties
- Assess the effects of the undertaking on historic properties
- Consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation
- Proceed with the project according to the conditions of the agreement

### b. State Regulations

The State of California implements the NHPA of 1966, as amended, through its statewide comprehensive cultural resource surveys and preservation programs. The OHP, as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The OHP also maintains the California Historical Resources Inventory. The SHPO is an appointed official who implements historic preservation programs within the state's jurisdictions.

#### (1) California Environmental Quality Act

CEQA, as codified in Public Resources Code (PRC) Sections 21000 et seq., is the principal statute governing the environmental review of projects in the state. CEQA requires lead agencies to determine if a project would have a significant effect on historical resources, including archaeological resources. The CEQA Guidelines define a historical resource as:

(1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.[43]

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique archaeological resource is "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" (PRC Section 21083.2 [g])

The CEQA Guidelines note that, if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

### (2) California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility to the California Register are based on National Register criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for or listed in the National Register.

[43] The cities of Dublin, Pleasanton and Livermore do not have local historic registers listed on their city websites or historic preservation planning cites.

To be eligible for the California Register, a historical resource must be significant at the local, state, and/or federal level under one or more 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
4. Has yielded, or may be likely to yield, information important in prehistory or history (PRC Section 5024.1[c])

For a resource to be eligible for the California Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the National Register criteria may still be eligible for listing in the California Register.

### (3) California Public Resources Code

Section 5097 of the PRC provides the procedures to be followed in the event of the unexpected discovery of human remains on nonfederal land. Section 5097.5 of the code states:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injury or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

Section 5097.98 further defines the standards for the handling of Native American human remains. Section 5097.993 sets requirements for the unlawful and malicious excavation, removal, destruction, injury, or defacing of a Native American historic, cultural, or sacred site, that is listed or may be eligible for listing in the California Register of Historic Resources.

### (4) California Health and Safety Code

Section 7052 of the California Health and Safety Code makes the willful mutilation, disinternment, or removal of human remains a felony. Section 7050.5 requires that the construction or excavation be stopped in the vicinity of discovered human remains until

the coroner can determine whether the remains are those of a Native American. If determined to be Native American, the coroner must contact the NAHC.

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purposes of this EIR, impacts on cultural resources are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- 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
- Disturb any human remains, including those interred outside of formal cemeteries

### b. Impact Methodology

The methodology used to evaluate the significance of cultural resource impacts is described below. The Electrical Multiple Unit (EMU) Option would result in the same impacts as the Diesel Multiple Unit (DMU) Alternative, and therefore the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service under the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

#### (1) Architectural Resources

Potential impacts on architectural resources are assessed by identifying the activities (e.g., construction, demolition, or substantial alteration) that could impact those resources identified as historical resources for the purposes of CEQA. As described in the Regulatory Framework subsection, above, individual properties and districts identified as historical resources under CEQA include those that are significant because of their association with important events, people, or architectural styles or master architects, or for their

informational value (California Register Criteria 1, 2, 3, and 4) and that retain sufficient historic integrity to convey their significance. Criterion 4, however, is typically applied to the evaluation of archaeological resources and not to architectural resources, as described below.

Once a resource has been identified as significant, it must be determined whether the impacts of the project would "cause a substantial adverse change in the significance" of the resource (CEQA Guidelines Section 15064.5[b]). A substantial adverse change in the significance of a historical resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of [the] historical resource would be materially impaired" (CEQA Guidelines Section 15064.5[b][1]). A historical resource is materially impaired through the demolition or alteration of the resource's physical characteristics that convey its historical significance and that justify its inclusion (or eligibility for inclusion) in the California Register or a qualified local register (CEQA Guidelines Section 15064.5[b][2]).

### (2) Archaeological Resources

The significance of most prehistoric and historic-era archaeological sites is often assessed under California Register Criterion 4. This criterion stresses the importance of the information potential contained within the site, rather than its significance as a surviving example of a type or its association with an important person or event. Archaeological resources may qualify as historical resources under the definition provided in CEQA Guidelines Section 15064.5[a], or they may also be assessed under CEQA as unique archaeological resources, defined as archaeological artifacts, objects, or sites that contain information needed to answer important scientific research questions (PRC Section 21083.2). A substantial adverse change in the significance of an archaeological resource is defined similarly to other historical resources—by destroying or materially altering in an adverse manner those physical characteristics of the resource that convey its significance under the appropriate criteria (CEQA Guidelines Section 15064.5[b][2]).

### (3) Human Remains

Human remains, including those buried outside of formal cemeteries, are protected under several state laws, including PRC Section 5097.98 and Health and Safety Code Section 7050.5. This analysis considers impacts that include intentional disturbance, mutilation, or removal of interred human remains.

### c. Summary of Impacts

Table 3.F-3 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.F-3 SUMMARY OF CULTURAL RESOURCES IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| **Project Analysis** | | | | | |
| Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource during construction | NI | LS | LS | NI | NI |
| Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource during construction | NI | LSM | LSM | LSM | LSM |
| Impact CUL-3: Disturb any human remains during construction | NI | LSM | LSM | LSM | LSM |
| **Cumulative Analysis** | | | | | |
| Impact CUL-4(CU): Cause a substantial adverse change in the significance of a historical resource, archaeological resources, or disturb human remains during construction under Cumulative Conditions | NI | SU | SU | SU | SU |
| **Operational** | | | | | |
| **Project Analysis** | | | | | |
| Impact CUL-5: Cause a substantial adverse change in the significance of a historical resource, archaeological resources, or disturb human remains during operations | NI | NI | NI | NI | NI |

**TABLE 3.F-3 SUMMARY OF CULTURAL RESOURCES IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| Impacts | No Project Alternative | Conventional BART Project[b] | DMU Alternative (with EMU Option)[b] | Express Bus/BRT Alternative[b] | Enhanced Bus Alternative |
| **Cumulative Analysis** | | | | | |
| No cumulative operational impacts. (NI) | | | | | |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation; SU=Significant and unavoidable, even with mitigation or no feasible mitigation available.
DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts related to project construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts pertaining to project construction are described below, followed by cumulative construction impacts.

Construction associated with the Proposed Project and Build Alternatives would permanently affect potential cultural resources through demolition of existing structures and ground disturbance. Therefore, the construction impacts described below are considered to be permanent (rather than temporary), with the exception of vibration impacts associated with construction equipment, as vibration impacts would be temporary and limited to the construction period.

#### (a) Construction – Project Analysis

***Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5 during construction.***

***(No Project Alternative: NI; Conventional BART: LS; DMU Alternative: LS; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

The Proposed Project or Alternatives could result in a significant direct impact if they cause a substantial adverse change to a historical resource. This impact analysis addresses historic architectural resources of the built environment, including buildings, structures, and objects that are eligible for listing in the California Register. This analysis describes potential impacts to resources within the footprints of the Proposed Project and Build Alternatives as well as within immediately adjacent parcels.

Archaeological resources that are also considered historical resources are analyzed below under **Impact CUL-2**.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, Altamont Corridor Express, and the Livermore Amador Valley Transit Authority would be constructed. In addition, population and employment increases throughout the Livermore-Amador Valley would result in continued land use development, including construction of both residential and commercial uses. Construction of these improvements and development projects could adversely impact historic architectural resources. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to historic architectural resources. **(NI)**

**Conventional BART Project.** As described in the Historic-era Architectural Resources subsection, above, the background research and reconnaissance-level survey completed for this analysis indicate that there is one historic architectural resource that qualifies as a historical resource for the purposes of CEQA, which is partially within the footprint of the Proposed Project—the Gandolfo Ranch Historic District. Potential direct and indirect impacts to the historic district are described below.

Construction-related vibration—such as that generated by jackhammers, drill rigs, and vibratory rollers—can cause structural damage to historic-era buildings and structures.[44] This analysis uses a vibration threshold for historic buildings of 0.12-inch per second

[44] Wilson, Ihrig & Associates, Inc., 2009. Crystal Springs Pipeline No. 2 Noise and Vibration Study, Impacts and Mitigation Technical Memo (Final). September 24.

(in/sec) peak particle velocity (PPV) at a distance of 25 feet.[45] Table 3.F-4 presents the distances at which vibratory construction equipment used during project construction would generate vibration levels at the 0.12-in/sec PPV damage threshold based on the Federal Transit Administration's equation for estimating vibration at different distances using a reference PPV of 25 feet for varying construction equipment.

**TABLE 3.F-4 DAMAGE THRESHOLD TO HISTORIC BUILDINGS FROM CONSTRUCTION EQUIPMENT**

| Equipment Type | Typical PPV at 25 Feet | Distance of Damage Threshold (0.12 PPV in/sec) |
|---|---|---|
| Vibratory pile driver | 0.730 in/sec | 80 feet |
| Vibratory roller | 0.210 in/sec | 45 feet |
| Drill rig | 0.120 in/sec | 25 feet |
| Bulldozer | 0.089 in/sec | 20 feet |
| Jackhammer | 0.035 in/sec | 15 feet |

Source: Wilson, Ihrig, & Associates et al., 2012.

The vibratory pile driver is piece of the construction equipment that would have the greatest PPV, typically a PPV of 0.73 in/sec at 25 feet.[46] Using Federal Transit Administration's equation, at distances greater than 80 feet, the vibration level generated by vibratory pile driving of sheet piles is lower than the 0.12-in/sec PPV damage threshold. For other pieces of equipment, the distance to the damage threshold (0.12-in/sec PPV) would be less: for vibratory rollers, a distance greater than 45 feet would be required; and for a typical drill rig, a distance greater than 25 feet would be required. Beyond the distance of the damage threshold—anticipated to be a distance of 80 feet—no damage to historic buildings or structures is expected.

The proposed parking garage and pedestrian touchdown structure at the Isabel South Area would be approximately 300 feet to the west the buildings and structures that contribute to the significance of the historic district. Thus, these buildings and structures are beyond the distance of the construction vibration damage threshold (beyond 80 feet). Therefore, there would be no impacts resulting from construction-related vibration to the Gandolfo Ranch Historic District.

The relocation of a portion of East Airway Boulevard under the Proposed Project would directly encroach approximately 50 feet onto the northern edge of the historic district, in

[45] Ibid.; Wilson, Ihrig, & Associates et al., 2012. Current Practices to Address Construction Vibration and Potential Effects to Historic Buildings Adjacent to Transportation Projects. September.

[46] New Hampshire Department of Transportation (New Hampshire), in cooperation with the U.S. Department of Transportation, Federal Highway Administration, 2012. Ground Vibrations Emanating from Construction Equipment – Final Report. September.

an area currently used as a parking lot. The parking lot does not contribute to the integrity of the historic district. Furthermore, the closest resources that contribute to the historic district are approximately 500 feet to the south of the portion of East Airway Boulevard that would be relocated. The encroachment of East Airway Boulevard into the parking lot (a non-contributing element of the historic district) would not result in adverse impacts to the buildings or structures that contribute to the historical significance of the Gandolfo Ranch Historic District.

Additionally, indirect impacts to the Gandolfo Ranch Historic District could result from the construction of the Proposed Project or DMU Alternative if physical changes are made to the setting or viewshed of the historic resource. While the seven-level parking garage and other facilities for the Proposed Project at the Isabel South Area would introduce new structures into the viewshed of the Gandolfo Ranch Historic District, these structures would not adversely affect the historic district. The existing setting does not offer a historic viewshed or contribute to the existing integrity of the historic district as the surrounding historic context and viewshed have been compromised by modern development, including the construction of the Isabel Avenue/I-580 overcrossing as documented by the State Historic Preservation Officer in 2001.[47] In addition, the proposed garage and facilities would be physically separated from the Gandolfo Ranch Historic District by East Airway Boulevard and located over 300 feet from the buildings and structures that contribute to the significance of the ranch in the southern portion of the district. Furthermore, the existing commercial buildings along East Airway Boulevard and Rutan Drive, constructed in the early 2000s, are intervening structures that visually separate the Isabel South Area from the historic ranch buildings and would reduce the view of the proposed parking garage from the historic district. Therefore, the Proposed Project would not result in indirect adverse impacts to the setting or viewshed of the Gandolfo Ranch Historic District.

For the reasons described above, the Proposed Project would have a less-than-significant impact on historic architectural resources and no mitigation measures are required. **(LS)**

**DMU Alternative.** Similar to the Proposed Project, there is one historic architectural resource partially within the DMU Alternative footprint—the Gandolfo Ranch Historic District. The potential impacts to the historic district would be the same as described above for the Proposed Project. Similar to the Proposed Project, the DMU Alternative would have a less-than-significant impact on historic architectural resources and no mitigation measures are required. **(LS)**

[47] Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.

**Express Bus/BRT Alternative.** Based on the results of the background research and reconnaissance-level survey, there are no historic architectural resources in the Express Bus/BRT Alternative footprint or immediately adjacent parcels. Therefore, the Express Bus/BRT Alternative would have a no impact on historic architectural resources and no mitigation measures are required. **(NI)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, the proposed bus improvements would be constructed within the existing street rights-of-way and would not be anticipated to directly adversely affect historical resources. Similarly, construction of bus shelters, bus bulbs, messaging boards, and other elements that are generally part of the urban landscape, would not be anticipated to indirectly adversely affect historical resources. Therefore, the Enhanced Bus Alternative would have no impact on historic architectural resources and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts related to historic architectural resources, and no mitigation measures are required.

***Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5 during construction.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LSM)***

This section discusses archaeological resources that qualify as historical resources according to CEQA Guidelines Section 15064.5 as well as unique archaeological resources as defined in CEQA Section 21083.2(g). This impact analysis describes potential impacts to resources within the footprints of the Proposed Project and Build Alternatives.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative could adversely impact known or unknown archaeological resources. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to known or unknown archaeological resources. **(NI)**

**Conventional BART Project.** Under the Proposed Project, ground disturbing activities would include the relocation of I-580 and associated surface frontage roadways to accommodate the proposed BART alignment within the I-580 median; construction of new BART tracks, the proposed Isabel Station, construction of a new parking facility at the Isabel Station area, and a new storage and maintenance facility.

As described in the Local Setting subsection above, based on the results of the background research and pedestrian survey, there are no known archaeological resources in the footprint of the Proposed Project, with the exception of prehistoric and historic-era archaeological resources that have been identified in the Cayetano Creek Area. Given the general high sensitivity based on previously identified isolated finds in the Cayetano Creek Area, there is the potential for known or unknown archaeological resources to be in the footprint. Due to access limitations, a surface investigation of the Cayetano Creek Area was not conducted during the survey.

The results of the analysis for deeply buried archaeological sites described in the Geologic Context and Analysis for Buried Sites subsection, above, indicate three locations within the footprint of the Proposed Project along I-580 that have a high potential for buried sites due to the geologic context and their proximity to historic waterways (Areas 2, 3, and 4). However, the footprint of the Proposed Project in these areas has been disturbed by prior activities. In addition, the shallow depth of anticipated disturbance for the Proposed Project in these locations (approximately 4 feet below ground surface [bgs]) would limit the possibility of uncovering unknown, deeply buried, prehistoric archaeological sites. Furthermore, while no known sites are present in other locations along the project corridor, the potential for discovery of a previously undiscovered archaeological site cannot be entirely discounted.

Given the potential for archaeological sites that could be considered unique or significant in the vicinity of the Cayetano Creek Area and the potential for discovery of a previously unknown archaeological site during ground-disturbing activity, the Proposed Project could have potentially significant impacts on archaeological resources, including deeply buried sites. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-2.A**, which includes provisions for archaeological survey in the Cayetano Creek Area and **Mitigation Measure CUL-2.B,** which provides protocols to follow in the event of a discovery of previously unknown archaeological resources. **(LSM)**

**DMU Alternative.** The areas of ground disturbance for construction of the DMU Alternative would be similar to the Proposed Project. In addition, ground disturbing activities would occur in the Dublin/Pleasanton Station Area.

Similar to the Proposed Project, the results of the background research and pedestrian survey indicate that there are no known archaeological resources in the DMU Alternative

footprint, with the exception of prehistoric and historic-era archaeological resources that have been identified in the Cayetano Creek Area.

In addition, the results of the analysis for deeply buried archaeological sites indicate four locations along I-580 that have a high potential to have buried sites (Areas 1, 2, 3, and 4). However, the footprint of the DMU Alternative in these areas has been disturbed by prior activities. In addition, the shallow depth of anticipated disturbance for the DMU Alternative in these areas of geoarchaeological sensitivity (approximately 4 feet bgs) would limit the potential to uncover unknown, deeply buried, prehistoric archaeological sites.

Given the potential for archaeological sites in the vicinity of the Cayetano Creek Area, and the potential for discovery of previously unknown archaeological sites during ground-disturbing activity, the DMU Alternative could have potentially significant impacts on archaeological resources. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-2.A**, which includes provisions for archaeological survey in the Cayetano Creek Area and **Mitigation Measure CUL-2.B**, which provides protocols to follow in the event that a previously undiscovered archaeological resource is encountered. **(LSM)**

**Express Bus/BRT Alternative.** Ground-disturbing activities under the Express Bus/BRT Alternative would occur primarily within the Dublin/Pleasanton Station Area for the construction of the bus transfer platforms, and associated relocation of I-580 and surface frontage roads, and construction of replacement parking lot/garage at the Dublin/Pleasanton Station, as well as at the Laughlin Road Area for the construction of the new surface parking lot.

As described in the Local Setting subsection above, based on the results of the background research and pedestrian survey, there are no known archaeological resources in the Express Bus/BRT Alternative footprint.

The results of the analysis for buried archaeological sites indicate four locations along I-580 within the footprint of the Express Bus/BRT Alternative with high potential for buried sites (Areas 1, 2, 3, and 4). However, the Express Bus/BRT Alternative footprint has been disturbed by prior activities in these areas. In addition, the shallow depth of anticipated disturbance for the Express Bus/BRT Alternative in areas of geoarchaeological sensitivity (approximately 4 feet bgs) would reduce the potential to uncover unknown, deeply buried, prehistoric archaeological sites.

However, the potential for encountering a previously undiscovered archaeological site cannot be entirely discounted. Therefore, impacts on archaeological resources could be potentially significant. These impacts would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-2.B**, which provides protocols to follow

in the event of that a previously undiscovered archaeological resource is encountered. **(LSM)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, limited ground-disturbing activities to approximately 2 feet below grade would occur within existing street rights-of-way for the installation of bus improvements, including bus shelters, bus bulbs, and signage. Ground disturbance would occur in areas that have been previously disturbed for construction of the roadways and associated street infrastructure.

Given the limited amount of ground disturbance associated with the Enhanced Bus Alternative in areas of geoarchaeological sensitivity there is a low potential to impact buried archaeological resources. Additionally, there is no potential to uncover deeply buried sites. For these reasons, impacts under this alternative would be less than those described above for the Express Bus/BRT Alternative. While unlikely, the potential for the discovery of a previously unknown buried archaeological site cannot be entirely discounted. Therefore, impacts on archaeological resources could be potentially significant. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-2.B**, which provides protocols to follow in the event of that a previously undiscovered archaeological resource is encountered. **(LSM)**

**Mitigation Measures.** As described above, the Proposed Project and DMU Alternative could have potentially significant impacts on archaeological sites in the vicinity of the Cayetano Creek Area. These impacts would be reduced with implementation of **Mitigation Measure CUL-2.A**, which would require a pedestrian surface survey of the Cayetano Creek Area with additional analysis. In addition, the Proposed Project, DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative could have potentially significant impacts on currently unknown archeological resources. These potential impacts would be reduced with implementation of **Mitigation Measure CUL-2.B**, which would require that discovery protocols be followed in the event that a previously undiscovered archaeological resource is encountered. With these mitigation measures, potential archaeological impacts would be reduced to a less-than-significant level.

**Mitigation Measure CUL-2.A: Archaeological Resources Investigation for the Cayetano Creek Area (Conventional BART Project and DMU Alternative/EMU Option).**

Prior to the final design of facilities and any ground disturbing activities in the Cayetano Creek Area, BART shall retain a professional who meets the Secretary of the Interior's Professional Qualification Standards for archaeology to conduct an archaeological resources investigation of the Cayetano Creek Area. The study shall include the following:

1. **Complete a Pedestrian Survey.** An intensive pedestrian survey of the footprint of the adopted project in the Cayetano Creek Area.
2. **Evaluate Archaeological Resources.** In the event of discovery of cultural resources during the pedestrian survey, a formal evaluation of any potentially affected archaeological resources shall be completed to determine if they qualify as historical resources or unique archaeological resources pursuant to Section 15064.5 of the CEQA Guidelines.
3. **Prepare and Implement Avoidance and Treatment Plan.** In the event a significant cultural resource is identified during the pedestrian survey, BART shall implement the following:

    a. Recommended measures consistent with PRC Section 21083.2(b) to avoid, where feasible, impacts on historical resources or 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.

    b. Where avoidance or preservation in place is not feasible, data recovery may be recommended as mitigation consistent with PRC Section 21083.2. A qualified archaeologist shall prepare and implement a detailed treatment plan to recover the scientifically consequential information from the resource prior to any excavation at the site. Treatment resources shall consist of (but not be limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the project. The treatment plan shall include provisions for analysis of data in a regional context; reporting of results within a timely manner; curation of artifacts and data at an approved facility; and dissemination of reports to local and state repositories, libraries, and interested professionals.

The results of the archaeological resources investigation shall be compiled into a technical report, which shall be submitted to BART and the Northwest Information Center of the California Historical Resources Information System. 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.

**Mitigation Measure CUL-2.B: Discovery of Previously Unknown Archaeological Resources (Conventional BART Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative, and Enhanced Bus Alternative).**

1. If prehistoric or historic-era archaeological resources are encountered by construction personnel during project implementation, all construction activities within 100 feet shall halt until a qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualification Standards for archaeology, can assess the significance of the find. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, hand stones, or milling slabs); and battered stone tools, such as hammer stones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.
2. If a find is evaluated and determined to be significant, a mitigation plan shall be developed that recommends preservation in place as a preference or, if preservation in place is not feasible, data recovery through excavation. If preservation in place is feasible, this may be accomplished through one of the following means: (1) modifying the construction plan to avoid the resource; (2) incorporating the resource within open space; (3) capping and covering the resource before building appropriate facilities on the resource site; or (4) deeding the resource site into a permanent conservation easement. If preservation in place is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan to recover the scientifically consequential information from the resource prior to any excavation at the site. Treatment for most resources would consist of (but would not necessarily be limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the project. The treatment plan shall include provisions for analysis of data in a regional context; reporting of results within a timely manner; curation of artifacts and data at an approved facility; and dissemination of reports to local and state repositories, libraries, and interested professionals.

***Impact CUL-3: Disturb any human remains, including those interred outside of formal cemeteries during construction.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LSM)***

This impact analysis describes potential impacts to resources within the footprints of the Proposed Project and Build Alternatives.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative could adversely impact unknown human remains. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to unknown human remains. **(NI)**

**Conventional BART Project and DMU Alternative.** Based on the results of the background research and pedestrian surface survey, there are no known archaeological resources, including those with human remains in the footprint of the Proposed Project or DMU Alternative. While no known sites are present, the potential for discovery of previously unknown human remains cannot be entirely discounted.

Several prehistoric isolated surface artifacts have been identified in the Cayetano Creek Area. These resources have been determined to not represent a formal archaeological site.[48] One additional archaeological site has been recorded in the vicinity; however, in subsequent visits, archaeologists were not able to relocate the site. While there is no indication that the Cayetano Creek Area contain human remains, the potential for discovery of previously unknown human remains cannot be entirely discounted. Therefore, impacts on human remains could be potentially significant. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-3**, which provides protocols to follow in the event of discovery of previously unknown human remains. **(LSM)**

**Express Bus/BRT Alternative.** There are no known archaeological resources with human remains or locations of isolated human remains that would be directly impacted by the

[48] PAR Environmental Services, Inc. (PAR), 2000. Historic Property Survey Report for the Isabel State Route 84/Interstate 580 Interchange Project, City of Livermore, Alameda County, California. Prepared for Caltrans District 4. On file (S-33815), Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park, California, October; Office of Historic Preservation (OHP), 2011. Determinations of Eligibility and Effect for the Proposed Construction of an Interchange on Interstate 580 at Isabel Avenue, Livermore, California. Letter to the U.S. Department of Transportation, Federal Highway Administration. November 15.

Express Bus/BRT Alternative. While unlikely, the potential for discovery of previously unknown human remains cannot be entirely discounted. Therefore, impacts on human remains could be potentially significant. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-3**, which provides protocols to follow in the event of discovery of previously unknown human remains. **(LSM)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, very limited ground-disturbing activities would occur and these activities would be located within existing street rights-of-way, which have been previously disturbed. While it is unlikely this Alternative could disturb human remains, the potential for discovery of previously unknown human remains cannot be entirely discounted. Therefore, impacts on human remains could be potentially significant. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure CUL-3**, which provides protocols to follow in the event of discovery of previously unknown human remains. **(LSM)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative could have potentially significant impacts on human remains. With implementation of **Mitigation Measure CUL-3**, which would require protocols be followed in the event of a discovery of human remains, potential impacts would be reduced to a less-than-significant level.

**Mitigation Measure CUL-3: Discovery of Previously Unknown Human Remains (Conventional BART Project, DMU Alternative/EMU Option, Express Bus/BRT Alternative, and Enhanced Bus Alternative).**

In the event that human remains are encountered during excavation, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains shall be conducted until the provisions of applicable state laws are followed:

1. The Alameda County coroner must be contacted.
2. 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 descendent of the deceased Native American (PRC Section 5097.98). The most likely descendent may make recommendations to the land owner (or the person responsible for the excavation work) for the means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC Section 5097.98.

### (b) Construction – Cumulative Analysis

The geographic study area for cumulative cultural resource impacts is the Livermore-Amador Valley, including the cities of Dublin, Pleasanton, and Livermore. Cumulative projects in this area include those that involve ground-disturbing activities or physical changes to the setting in the immediately surrounding environment, such as the introduction of a new building or structure.

***Impact CUL-4(CU): Cause a substantial adverse change in the significance of a historical resource, archaeological resources, or disturb human remains during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: SU; DMU Alternative: SU; Express Bus/BRT Alternative: SU; Enhanced Bus Alternative: SU)***

**No Project Alternative.** As described in **Impact CUL-1**, **Impact CUL-2**, and **Impact CUL-3** above, the No Project Alternative would have no impacts on prehistoric and historic-era archaeological resources, human remains, and historic-era buildings during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Based on previous cultural resource surveys and research, the Livermore-Amador Valley has been inhabited by prehistoric and historic-era peoples for thousands of years. Because all significant cultural resources and human remains are unique and non-renewable members of finite classes, all adverse impacts erode a decreasing resource base.

The Proposed Project and Build Alternatives, in combination with other development in the region, could result in the substantial loss of cultural resources (including prehistoric and historic-era archaeological resources, human remains, and historic-era buildings, structures, and districts). The Proposed Project and DMU Alternative would extend approximately 5.6 to 7.1 miles, respectively, along the I-580 corridor; some areas that would be disturbed have a high sensitivity for historical resources, prehistoric archaeological resources, historic-era archaeological resources, and human remains. The Express Bus/BRT Alternative and Enhanced Bus Alternative could also result in potential impacts on cultural resources, although each to a progressively lesser extent as each of these alternatives would result in less ground disturbance and construction than the prior alternative.

Other projects that could also result in impacts to cultural resources include those described in Section 3.A, Introduction to Environmental Analysis and Appendix E, particularly projects that occur along the I-580 corridor. Specifically, the Isabel Neighborhood Plan (INP), which would be implemented in conjunction with the Proposed Project and DMU Alternative, would involve ground disturbance near the proposed Isabel

Station, resulting in similar impacts to archaeological resources as the Proposed Project and Build Alternatives. Additionally, the INP would impact the Gandolfo Ranch Historic District as the area would be redeveloped with office and residential uses. Because the district is considered a historical resource for the purposes of CEQA, redevelopment of the ranch would be a significant impact. There are no feasible mitigation measures to reduce this impact.

The City of Livermore has advised that the INP is intended to guide development around a potential Isabel Station. The INP would be implemented with the Proposed Project and DMU Alternative. Therefore, the Proposed Project and DMU Alternative would provide a cumulatively considerable contribution to cultural resource impacts. The Express Bus/BRT Alternative and Enhanced Bus Alternative would not be associated with the INP. Even without the INP, however, a substantial amount of development is anticipated to occur in the city of Livermore. Thus, overall, limited ground disturbance for the Express Bus/BRT Alternative and Enhanced Bus Alternative could contribute to increased cumulative impacts to cultural resources associated with sprawl.

Planning and appropriate mitigation measures can help to capture and preserve knowledge of such resources and can provide opportunities for creating an understanding of past environmental conditions and cultures by recording data about sites discovered and preserving artifacts found. Federal and State laws are also in place, as discussed above, that help protect cultural resources. As described in **Impact CUL-2** and **Impact CUL-3**, above, the Proposed Project and DMU Alternative would implement **Mitigation Measure CUL-2.A**, and the Proposed Project and all Build Alternatives would be required to implement **Mitigation Measure CUL-2.B** and **Mitigation Measure CUL-3**. These measures would minimize potential impacts to resources through completion of a pedestrian surface survey of the Cayetano Creek Area (Proposed Project and DMU Alternative only) and implementation of protocols in the event of the discovery of previously unknown archaeological resources or human remains. It is likely that other projects developed under the Cumulative Conditions would also be required to undergo their own environmental review and mitigate potential impacts to cultural resources.

Even so, it is not always feasible to protect cultural resources, particularly when preservation in place or avoidance measures would limit implementation of projects. Furthermore, even though each project reduces its contribution to the cumulative impact, the overall cumulative impact on cultural resources of the Proposed Project and Build Alternatives, in combination with other past, present, and probable future projects, could be significant. While feasible mitigation measures would be applied to the Proposed Project and Build Alternatives, as well as other cumulative projects, it may not be possible to reduce all cumulative impacts to less-than-significant levels. Therefore, cumulative impacts to cultural resources are conservatively considered to remain significant and

unavoidable and the Proposed Project and Build Alternatives could have a cumulatively considerable contribution to significant cultural resources impacts. **(SU)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would implement project-specific mitigation measures (**Mitigation Measure CUL-2.A**, **Mitigation Measure CUL-2.B**, and **Mitigation Measure CUL-3)**. Additional mitigation measures are not feasible and would not further reduce the project's contribution. Therefore, the contribution of the Proposed Project and Build Alternatives to significant cultural cumulative impacts would remain significant and unavoidable.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operations impacts.

#### (a) Operations – Project Analysis

***Impact CUL-5: Cause a substantial adverse change in the significance of a historical resource, archaeological resources, or disturb human remains during operations.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative could adversely impact prehistoric and historic-era archaeological resources, human remains, and historic-era buildings during operations. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to prehistoric and historic-era archaeological resources, human remains, and historic-era buildings during operations. **(NI)**

**Conventional BART Project and DMU Alternative.** Direct impacts would be caused if the Proposed Project or DMU Alternative were to directly adversely affect a resource during operation. Under the Proposed Project or DMU Alternative, operation would not result in additional ground disturbing activities beyond the ground disturbance required during construction. Therefore, there would be no further impacts to archaeological resources or

human remains during operation beyond than those described for construction in **Impact CUL-2** and **Impact CUL-3** above. During operations, the Proposed Project and DMU Alternative would not result in impacts to cultural resource from vibration, such as from operation of the BART or DMU trains. See Section 3.J, Noise and Vibration, for further discussion of potential vibration impacts. Therefore, the Proposed Project and DMU Alternative would not result in impacts related to prehistoric and historic-era archaeological resources, human remains, and historic-era buildings during operations. **(NI)**

**Express Bus/BRT Alternative and Enhanced Bus Alternative.** Under the Express Bus/BRT Alternative and Enhanced Bus Alternative there would be no direct or indirect impacts during operation that would adversely affect cultural resources. Operation would not result in additional ground disturbing activities beyond the ground disturbance required during construction, which is analyzed in the Construction Impacts subsection above. Furthermore, these alternatives would not have indirect impacts to cultural resources, as they would not result in changes to the setting or viewshed of any resources. Therefore, the Express Bus/BRT Alternative and Enhanced Bus Alternative would result in no direct or indirect operational impacts to historical resources, archaeological resources, or human remains. **(NI)**

### (b) Operations – Cumulative Analysis

As described in **Impact CUL-5** above, the Proposed Project and Alternatives would have no impact during operations. Therefore, the Proposed Project and Alternatives would not contribute to cumulative cultural resources impacts during operations. **(NI)**

# G. GEOLOGY, SOILS, SEISMICITY, MINERAL AND PALEONTOLOGICAL RESOURCES

## 1. Introduction

This section describes the geologic, soils, and seismic conditions and mineral/ paleontological resources as they relate to the BART to Livermore Extension Project; discusses the applicable State of California (State) and local regulations; and assesses the potential impacts to geology, soils, seismicity, and mineral and paleontological resources from construction and operation of the Proposed Project and Alternatives.

For the purpose of analyzing potential impacts relative to geology and soils, the study area is defined as the collective footprint of the Proposed Project, the DMU Alternative, and the Express Bus/BRT Alternative. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the feeder buses for the Proposed Project and other Build Alternatives, which would extend along existing streets and within the street rights-of-way (ROWs), are addressed programmatically in this analysis, as described in Chapter 2, Project Description. The study area for seismic shaking impacts extends to approximately 20 miles around the collective footprint.

The analysis presented in this section is based on a review of existing reports and geologic maps; available geologic and geotechnical reports and information from the United States Geological Survey (USGS) and California Geological Survey (CGS); and project-specific investigations for various project components. The primary geotechnical documents reviewed in preparation of this EIR are as follows:

- Parikh Consultants (2016). Preliminary Geotechnical Report, BART to Livermore Extension (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.
- Parikh Consultants (2009). Geotechnical and Seismic Report, BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California.

The evaluation of paleontological resources is based on official records collection searches from the University of California Museum of Paleontology and the Natural History Museum of Los Angeles County and review of other maps and reports published by the CGS. In addition, published and unpublished paleontological literature was reviewed to determine previous paleontological resources recovered in the study area.

No comments pertaining to geology, soils, seismicity, mineral resources, or paleontology were received in response to the Notice of Preparation for this EIR or during the public scoping meeting held for the EIR.

## 2. Existing Conditions

This subsection describes the existing conditions for geology, soils, seismicity, mineral, and paleontological resources, providing the regional context and local setting, including the geologic units, seismicity and faults, landslides and subsidence, soils, mineral resources, and paleontological resources.

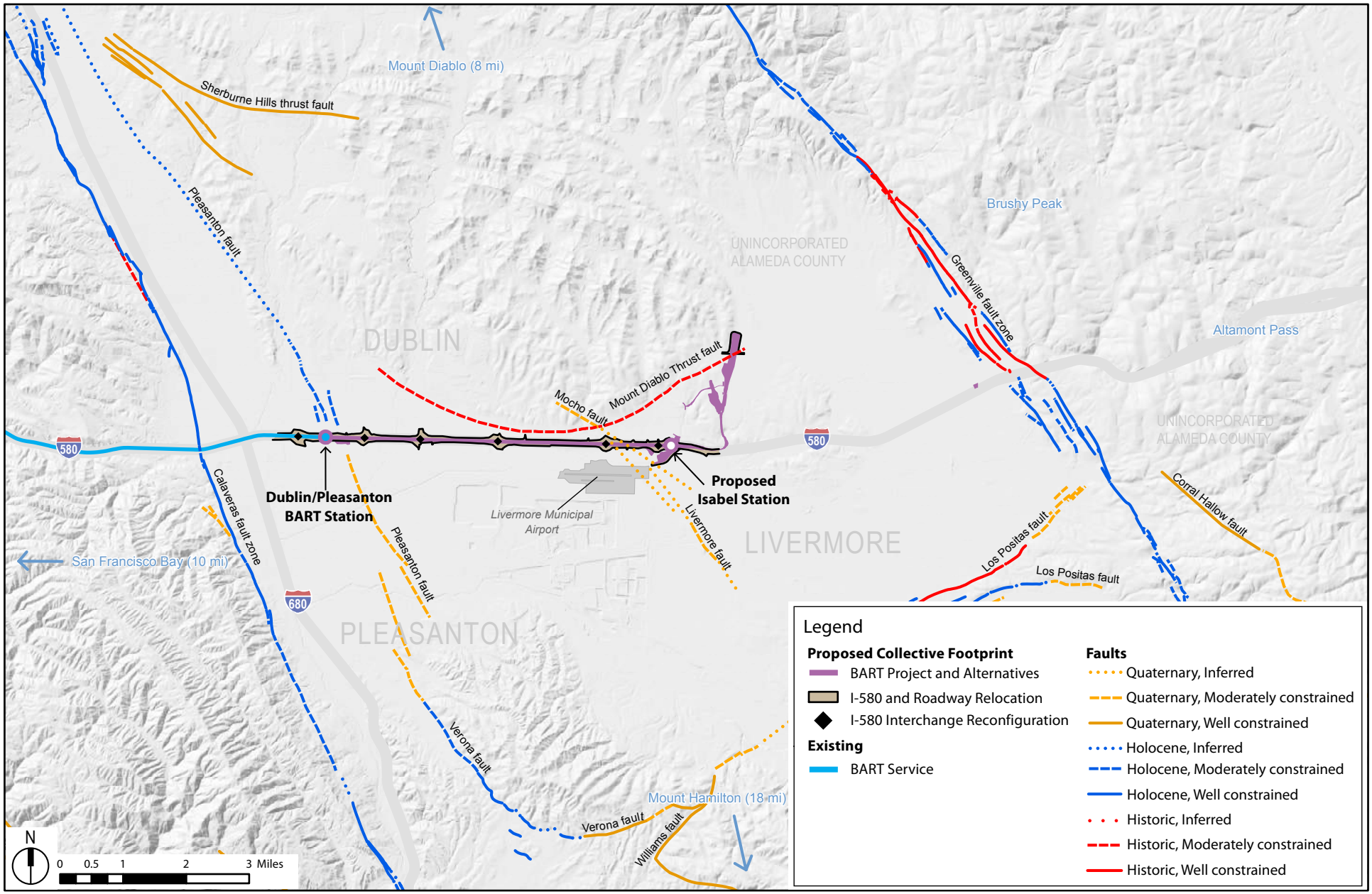
### a. Regional Overview

The study area is located in eastern Alameda County within the Livermore-Amador Valley at the northern end of the Diablo Range. This range is part of the northwest-trending Coast Ranges Geomorphic Province of mountain ranges and valleys that trend northwest, parallel to the San Andreas Fault.[1] The ranges have been intensely uplifted, folded, and faulted, and thus contain profound structural discontinuities. The diverse geologic conditions underlying the Livermore-Amador Valley and greater San Francisco Bay Area (Bay Area) are largely defined by the network of major active faults that occur within the region. The San Andreas Fault System is one of the most prominent geologic features in the region; it includes several major fault zones (San Andreas, Hayward, and Calaveras) as well as smaller active and potentially active faults. The San Andreas Fault System is one of the most seismically active areas in the United States. As such, the region is susceptible to potential seismic hazards, including fault rupture and groundshaking.

Figure 3.G-1 illustrates the local topography and locations of active faults in the study area. The existing Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) is about 2 miles east of the active Calaveras Fault Zone. The proposed Isabel Station would be about 7 miles east of the Calaveras Fault Zone and about 5 miles southwest of the Greenville Fault Zone.

The Livermore-Amador Valley is underlain by water-bearing unconsolidated alluvial stream channels and basin sediments, which were deposited beginning in the late Pleistocene epoch. Early in the period of alluvial deposition, large streams draining the Livermore-Amador Valley from east to west converged in the northwest corner of the valley and flowed northward through the San Ramon Valley to what is now Suisun Bay. When the northwest outlet of the valley was open and the stream gradient was steep,

[1] A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces. (California Geological Survey [CGS], 2002. California Geomorphic Provinces, CGS Note 36.)




Source: Arup, 2017; Sawyer, 2015; USGS, 2010.

**BART to Livermore Extension Project EIR**

Figure 3.G-1

Geology, Soils, Seismicity, Mineral, and Paleontological Resources

Regional Topography and Faults

sheets of gravel gradually accumulated over much of the valley floor. When the northwest outlet of the valley was blocked, swamps and lakes formed in the area, particularly in the western portion of the valley, and continuous sheets of silt and clay were deposited on top of the previously deposited gravel layers.

### b. Local Setting

The following sections describe the geologic and seismic setting of the study area, with a focus on potential hazards. The description of the geologic units was updated from the 2010 Program EIR, with additional information from the geotechnical investigations conducted by Parikh Consultants and recent geologic mapping of Quaternary units compiled by Witter et al.[2, 3, 4] The geologic units underlying the alignment of the Proposed Project and Build Alternatives are shown on Figure 3.G-2 and described below.

#### (1) Geologic Units

#### (a) Quaternary Alluvial Deposits

Quaternary Alluvial surficial deposits underlie the entire collective footprint, except within the Cayetano Creek Area. The alluvial deposits include gravels, sands, silts, and clays of the Holocene epoch and late Pleistocene epoch.[5] The deposits generally are fluvial in origin consisting of material eroded from the surrounding Coast Ranges that filled the structural trough, which today forms the Livermore-Amador Valley between the Calaveras fault on the west and the Greenville fault on the east.[6] The deposits are a heterogeneous mixture, the individual components of which vary proportionally to their mode of deposition. Coarser materials are from higher energy environments (main channels), whereas finer materials are from lower energy environments (backwaters). The alluvial deposits are common and widespread and would not be considered "unique geological features" under Title 14, Division 6, Chapter 3, California Code of Regulations 15000 et seq. (see CEQA Statute and Guidelines in the Regulatory Framework subsection below).

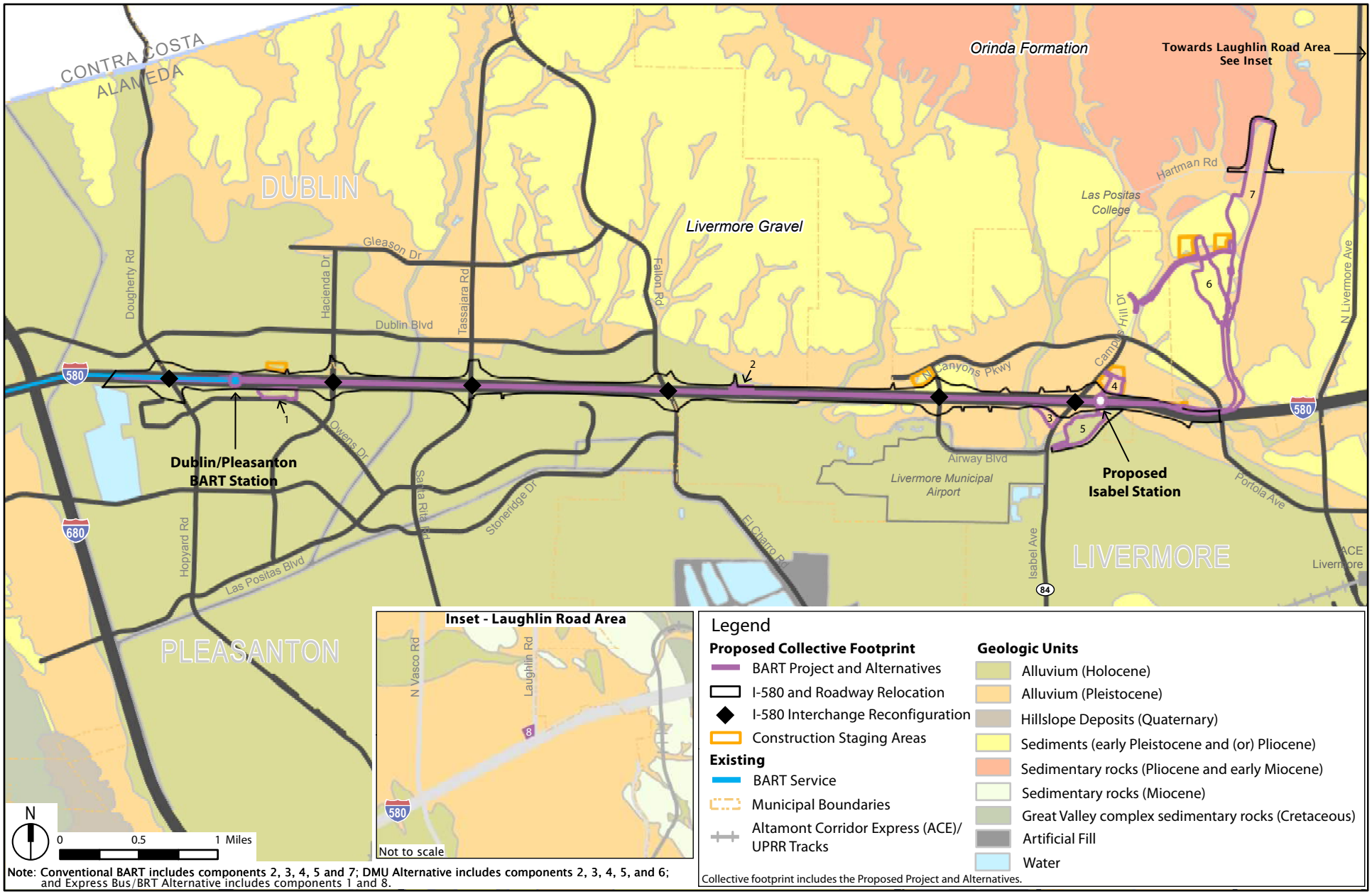
[2] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

[3] Parikh Consultants, 2009. Geotechnical and Seismic Report, BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California.

[4] 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., 2006. Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California: U.S. Geological Survey Open-File Report 2006-1037.

[5] The CGS considers Holocene time to be from the present to about 11,000 years ago, whereas the USGS considers it to be from the present to about 15,000 years ago.

[6] Fluvial deposits are borne, deposited, produced, or eroded by rivers and streams.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017; USGS, 2006.

**BART to Livermore Extension Project EIR**

Figure 3.G-2

Geology, Soils, Seismicity, Mineral, and Paleontological Resources

Geological Units

The geotechnical investigations completed for the Proposed Project and Build Alternatives summarize the materials encountered in exploratory borings that were drilled along the Interstate Highway (I-) 580 corridor during its construction and subsequent modifications.[7] The geotechnical investigations evaluate the study area along the I-580 alignment, including the Dublin/Pleasanton Station Area, the I-580 Corridor Area, the Isabel North and South Areas, and the southern portion of the Cayetano Creek Area. The Laughlin Road Area was not included in the geotechnical investigations; however, given that the Laughlin Road Area is also adjacent to the I-580 alignment, the geologic conditions are anticipated to be similar to those described in the I-580 Corridor Area.

The borings encountered non-native imported granular fill material over medium- to high-plasticity clay at shallow depth within the I-580 corridor. The surface and upper soil layers were modified during grading operations within the I-580 corridor to be the pavement subgrade. Generally, the near-surface soils all have the possibility of containing fine-grained materials (sandy to silty clay).

Beneath the fill materials, the subsurface soil conditions within the I-580 corridor generally consist of firm to stiff and very stiff clays interbedded with sand lenses and pockets to at least 80 feet below grade. Farther east toward the proposed Isabel Station and the hillside along the north side of the I-580 corridor (Cayetano Creek Area), the material grades to hard and dense, with more granular material. The clays range from lean to fat with high plasticity common at shallow depths. From an engineering standpoint, the plastic clays are typical indicators of materials with the potential to be expansive, also referred to as moderate to high shrink and swell potential due to the plasticity, as discussed further below.

Groundwater was generally encountered at approximately 15 to 25 feet below grade. In the vicinity of creeks, groundwater levels could be shallower, at less than about 10 feet in depth.

### (b) Livermore Gravel

The Pliocene to early Pleistocene Livermore Gravel unit underlies the Cayetano Creek Area.[8] This unit consists of reddish cobble-pebble gravel and sand, and may be mixed with some clay. Elsewhere and deeper, the unit is composed of gray, poorly to moderately consolidated, indistinctly bedded, cobble conglomeratic sandstone, and gray

[7] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

[8] Pliocene time is from approximately 2.6 million to 5.3 million years ago, and Pleistocene time is from approximately 11,000 to 1.6 million years ago.

coarse-grained sandstone with some siltstone and claystone.[9] The Livermore Gravel deposits are common and widespread and would not be considered unique geological features.

### (2) Seismicity and Faults

This section characterizes the study area's existing faults, describes historic earthquakes, estimates the likelihood of future earthquakes, and describes probable groundshaking effects.

#### (a) Earthquake Terminology and Concepts

**Earthquake Mechanisms and Fault Activity**. Faults are planar features within the earth's crust that have formed to release strain caused by the dynamic movements of the earth's major tectonic plates. An earthquake on a fault is produced when these strains overcome the inherent strength of the earth's crust, and the rock ruptures. The rupture causes seismic waves that propagate through the earth's crust, producing the groundshaking effect known as an earthquake. The rupture also causes variable amounts of slip along the fault, which may or may not be visible at the earth's surface.

Geologists commonly use the age of offset rocks as evidence of fault activity—the younger the displaced rocks, the more recently earthquakes have occurred. To evaluate the likelihood that a fault would produce an earthquake, geologists examine the magnitude and frequency of recorded earthquakes and evidence of past displacement along a fault. An active fault is defined by the State as a fault that has had surface displacement within Holocene time, up to 11,000 years ago.[10] A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary period, unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer.[11] This definition does not mean that a fault lacking evidence of surface displacement is necessarily inactive. The term "sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement has occurred on one or more of its segments or branches.[12]

For the purpose of delineating fault rupture zones, the CGS historically sought to apply a setback zone to faults defined as potentially active, which are faults that have shown

[9] California Geological Survey (CGS), 2008a. Seismic Hazard Evaluation of the Livermore 7.5-Minute Quadrangle, Alameda County, California, Seismic Hazard Zone Report 114.

[10] The CGS considers Holocene time to be from the present to about 11,000 years ago, whereas the USGS considers it to be from the present to about 15,000 years ago.

[11] The Quaternary period is from the present to 1.6 million years ago.

[12] California Geological Survey (CGS), 2007. Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, CGS Special Publication 42.

evidence of surface displacement during Quaternary time. However, usage of the term potentially active under the Alquist-Priolo Earthquake Fault Zoning Act was discontinued when it became apparent that the sheer number of Quaternary-age faults in the state made it meaningless to zone all of them.[13] In late 1975, the State geologist made a policy decision to zone only those faults that had a relatively high potential for ground rupture, determining that a fault be considered for zoning only if it was sufficiently active and well defined.[14] Blind faults do not show surface evidence of past earthquakes, even if they occurred in the recent past, and faults that are confined to pre-Quaternary rocks are considered inactive and incapable of generating an earthquake.

Although it is difficult to quantify the probability that an earthquake will occur on a specific fault, this classification assumes that if a fault has moved during the last 11,000 years, it is likely to produce earthquakes in the future. As noted above, the term potentially active, previously used to describe faults with geologic evidence of movement between 11,000 and 1.6 million years ago, is no longer used by the CGS, but the term does still appear on older reports and maps. In addition, potentially active faults are sometimes referred to as Quaternary faults.

**Earthquake Magnitude.** When an earthquake occurs along a fault, its size can be determined by measuring the energy released during the event. Seismographs record the amplitude and frequency of the seismic waves that an earthquake generates. The Richter magnitude (M) of an earthquake represents the highest amplitude measured by the seismograph at a distance of 100 kilometers from the epicenter. Richter magnitudes vary logarithmically with each whole-number step, representing a tenfold increase in the amplitude of the recorded seismic waves and 32 times the amount of energy released. While Richter magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude as the preferred way to express the size of an earthquake. The Moment Magnitude scale ($M_w$) is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that $M_w$ can reliably measure larger earthquakes and do so from greater distances.

**Peak Ground Acceleration.** A common measure of ground motion at any particular site during an earthquake is the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration. PGA is expressed as

[13] Bryant, W.A. and Earl W. Hart, 2007. Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, California Geological Survey (CGS) Special Publication 42, Interim Revision.

[14] Faults that show geologic evidence of movement during the Holocene along one or more of their segments or branches, and the traces of which may be identified by direct or indirect methods, are defined as sufficiently active and well-defined.

the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile accelerations, one 'g' of acceleration is equivalent to the motion of a car traveling 328 feet from rest in 4.5 seconds. For comparison purposes, the maximum PGA value recorded during the Loma Prieta earthquake in the vicinity of the epicenter, near Santa Cruz, was 0.64 g. Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place and is dependent on the distance from the epicenter and the character of the underlying geology (e.g., hard bedrock, soft sediments, or artificial fills).

**Modified Mercalli Intensity Scale.** The Modified Mercalli (MM) Intensity Scale assigns an intensity value based on the observed effects of groundshaking produced by an earthquake. Unlike measures of earthquake magnitude and PGA, this scale is qualitative, in that it is based on observed effects rather than measured values. Similar to PGA, MM intensity values for an earthquake at any one place can vary depending on the earthquake's magnitude, the distance from its epicenter, the focus of its energy, and the type of geologic material. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage. Because the MM is a measure of groundshaking effects, intensity values can be related to a range of average PGA values, as shown below in Table 3.G-1.

### (b) Faults and Historic Earthquake Activity

The 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.[15] 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 and Seal Cove Faults, 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

[15] To an observer of movement on a right-lateral fault, the far side of the fault moves to the right relative to the closer side of the fault.

**TABLE 3.G-1 MODIFIED MERCALLI INTENSITY SCALE**

| Intensity Value | Intensity Description | Average Peak Ground Acceleration[a] |
|---|---|---|
| I | Not felt | < 0.0017 g |
| II | Felt by people sitting or on upper floors of buildings | 0.0017 to 0.014 g |
| III | Felt by almost all indoors. Hanging objects swing. Vibration like passing of light trucks. May not be recognized as an earthquake. | 0.0017 to 0.014 g |
| IV | Vibration felt like passing of heavy trucks. Stopped cars rock. Hanging objects swing. Windows, dishes, doors rattle. Glasses clink. In the upper range of IV, wooden walls and frames creak. | 0.014 to 0.039 g |
| V (Light) | Felt outdoors. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures move. Pendulum clocks stop. | 0.035 to 0.092 g |
| VI (Moderate) | Felt by all. People walk unsteadily. Many frightened. Windows crack. Dishes, glassware, knickknacks, and books fall off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster, adobe buildings, and some poorly built masonry buildings cracked. Trees and bushes shake visibly. | 0.092 to 0.18 g |
| VII (Strong) | Difficult to stand or walk. Noticed by drivers of cars. Furniture broken. Damage to poorly built masonry buildings. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and porches. Some cracks in better masonry buildings. Waves on ponds. | 0.18 to 0.34 g |
| VIII (Very Strong) | Steering of cars affected. Extensive damage to unreinforced masonry buildings, including partial collapse. Fall of some masonry walls. Twisting, falling of chimneys and monuments. Wood-frame houses moved on foundations if not bolted; loose partition walls thrown out. Tree branches broken. | 0.34 to 0.65 g |
| IX (Violent) | General panic. Damage to masonry buildings ranges from collapse to serious damage unless modern design. Wood-frame structures rack, and, if not bolted, shifted off foundations. Underground pipes broken. | 0.65 to 1.24 g |
| X (Very Violent) | Poorly built structures destroyed with their foundations. Even some well-built wooden structures and bridges heavily damaged and needing replacement. Water thrown on banks of canals, rivers, lakes, etc. | > 1.24 g |
| XI (Very Violent) | Few, if any, masonry structures remain standing. Bridges destroyed. Rails bent greatly. Underground pipelines completely out of service. | > 1.24 g |
| XII (Very Violent) | Damage nearly total. Practically all works of construction are damaged greatly or destroyed. Large rock masses displaced. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown into the air. | > 1.24 g |

Notes:
[a] Average peak ground acceleration is expressed as a fraction of the acceleration due to gravity (g). g is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.
Sources: Association of Bay Area Governments (ABAG), 2016a; Wald, D., V. Quitoriano, T. Heaton, and H. Kanamori, 1999.

years.[16] 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.[17]

The Bay Area and surrounding areas are characterized by numerous geologically young faults, with the active faults close to the study area, as shown on Figure 3.G-1. Active faults within a 20-mile radius of the study area include the Greenville, Northern Calaveras, Concord-Green Valley, Pleasanton, and Las Positas faults. The Hayward and San Andreas faults are farther to the west within the Bay Area. These faults are considered to be the most probable sources of future earthquakes for this area and are in Alquist-Priolo Earthquake Fault Zones (see Regulatory Framework, below, for a discussion of Alquist-Priolo Earthquake Fault Zones and the Alquist-Priolo Earthquake Fault Zoning Act). In addition, the Mount Diablo Thrust Fault is considered active, as discussed further below. Other Quaternary faults within a 20-mile radius of the study area include the inactive Quaternary Livermore, Verona, and Williams Faults, none of which are in designated Alquist-Priolo Earthquake Fault Zones. Of all these faults, the Greenville, Northern Calaveras, Pleasanton, Las Positas, Livermore, and Mount Diablo Thrust faults are in, or closest to, the study area. These various fault zones are described below and are summarized in Table 3.G-2.

**Mount Diablo Thrust Fault.** The Mount Diablo Thrust Fault is a buried thrust fault/ inferred fault shown on Figure 3.G-1. The eastern end of the thrust fault extends to beneath the collective footprint in the Cayetano Creek Area. The central portion of the fault trace passes within about 0.25 mile of the north side of I-580 Corridor Area. The Association of Bay Area Governments identifies the Mount Diablo Thrust Fault as the most active thrust fault in the Bay Area.[18] According to a study of earthquake probabilities for the San Francisco Bay Region conducted by the USGS Working Group of California Earthquake Probabilities, the Mount Diablo Thrust Fault is capable of generating a magnitude 6.7 or greater earthquake with an estimated 0.03 probability (i.e., 3 percent probability) of occurrence over the next 30 years.[19] The geotechnical investigation cites

[16] Fenton and Hitchcock, 2001. Recent geomorphic and paleoseismic investigations of thrust faults in Santa Clara Valley, California, in H. Ferriz and R. Anderson, eds., Engineering Geology Practice in Northern California: California Geological Survey Bulletin 210, p. 239-257.

[17] A reverse-slip fault is one with predominantly vertical movement in which the upper block moves upward in relation to the lower block.

[18] Association of Bay Area Governments (ABAG), 2016b. See What Thrust Faults Can Do. Available at: http://resilience.abag.ca.gov/students/fieldtrip-mtdiablo/, accessed November 11, 2016.

[19] United States Geologic Survey (USGS), 2003. Earthquake Probability for the San Francisco Bay Region 2002-2031. Working Group on California Earthquake Probabilities. Open File Report 03-214.

**TABLE 3.G-2 ACTIVE AND POTENTIALLY ACTIVE FAULTS WITHIN THE STUDY AREA**

| Fault or Fault Zone | Proximity to Collective Footprint and Direction | Recency and Classification of Faulting | Slip Rate (millimeters/ year) | Maximum Moment Magnitude ($M_w$) | Historical Seismicity[a] |
|---|---|---|---|---|---|
| Mount Diablo Thrust | Beneath Cayetano Creek Area and 0.25 mile north of I-580 Corridor Area | Active | 1.7 to 1.8 | 6.6 | None known |
| Calaveras (northern) | 2 miles west of Dublin/ Pleasanton Station Area | Historic – Active | 12 to 18 | 6.9 | 6.2, 1984<br>6.5, 1911<br>6.3, 1897 |
| Greenville | 5 miles northeast of Isabel North/South Areas | Historic – Active | 1 to 3 | 6.9 | $M_L$ 5.8, 1980 |
| Las Positas | 5 miles southeast of Isabel North/South Areas | Active | unknown | 6.4 | 1980 |
| Hayward | 10 miles southwest of Dublin/ Pleasanton Station Area | Historic – Active | 7 to 11 | 7.3 | 5.6, 1889<br>5.8, 1870<br>7.0, 1868<br>5.8, 1864 |
| Concord-Green Valley | 16 miles north of Isabel North/South Areas | Historic – Active | 2 to 8 | unknown | 5.4, 1954 |
| San Andreas | 27 miles southwest of Isabel North/South Areas | Historic – Active | 13 to 21 | 7.1 | 6.0, 2004<br>6.9, 1989<br>7.8, 1906<br>6.7, 1898<br>6.5, 1885 |
| Pleasanton | 0.25 mile southeast of Dublin/ Pleasanton Station Area | Quaternary | unknown | 6.6 | None known |
| Livermore | Beneath the I 580 Corridor Area, 0.5 mile west of Isabel North/South Areas | Quaternary | unknown | unknown | None known |

Note:
[a] Richter (ML) or Moment Magnitude ($M_w$) of 6 or larger or causing damage
Sources:
Parikh Consultants, 2016; Bonilla, M.G., J.J. Lienkaemper, and J.C. Tinsley, 1980; California Geological Survey (CGS), 2007; California Geological Survey (CGS), 2008a; 2007 Working Group on California Earthquake Probabilities, 2008; Sawyer, Thomas L., 2015.

the Mount Diablo Thrust Fault as having a maximum earthquake potential of $M_w$ 6.6.[20] A recent geomorphological investigation identified late Holocene deformation on the thrust fault with movement during the last 900 years and a slip rate of 1.7 to 1.8 millimeters per year.[21] The State recognizes that buried thrust faults exist; however, their fault planes tend to extend under a wide area and are extremely difficult to identify and characterize. Consequently, regulations such as the Alquist-Priolo Earthquake Fault Zoning Act have not been applied to the Mount Diablo Thrust Fault.

The Mocho Fault is associated with the Mount Diablo Thrust Fault and is inferred to extend through the collective footprint near Airway Boulevard/I-580 interchange.[22] It is not known to be active.

**Northern Calaveras Fault Zone.** The Holocene Northern Calaveras Fault Zone is part of the 75-mile-long Calaveras Fault, which extends north 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.[23] The fault transects I-580 at San Ramon Road, approximately 2 miles west of the existing Dublin/Pleasanton BART Station and would not directly transect the collective footprint. The Calaveras Fault Zone has a maximum earthquake potential of $M_w$ 6.9.[24]

**Greenville Fault Zone.** The Holocene 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.[25] It is in an Alquist-Priolo Earthquake Fault Zone with surface traces along the western face of the Altamont Hills 5 miles northeast of Isabel Station. The Greenville Fault is a strike-slip fault. The fault is not a single trace, but contains numerous splays and en-echelon segments. Estimates of current slip rates, based on geologic structures and geomorphology, are in the range of 1 to 3 millimeters per year (0.04 to 0.12 inch per year).[26] The Greenville Fault has an estimated maximum earthquake potential of $M_w$ 6.9,

[20] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.
[21] Sawyer, Thomas L., 2015. Characterizing Rates of Contractional Deformation on the Mount Diablo Thrust Fault, Eastern San Francisco Bay Region, Northern California, April 7.
[22] Parikh Consultants, 2009. Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California.
[23] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.
[24] Ibid.
[25] Ibid.
[26] Parikh Consultants, 2009. Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California.

and the recurrence interval is estimated to be about 550 years.[27, 28] On January 24, 1980, an earthquake of M 5.8 struck approximately 11 miles north of Livermore on the Greenville-Marsh Creek Fault.[29] The earthquake caused discontinuous surface rupture along several fault traces in the Greenville Fault Zone. The Greenville Fault does not transect the collective footprint.

**Las Positas Fault Zone.** The Las Positas Fault is an active Holocene fault trending northeast to southwest approximately 2.5 miles southeast of Downtown Livermore. Two traces are designated as Alquist-Priolo Earthquake Fault Zones. The Las Positas Fault is about 5 miles southeast of the proposed Isabel Station. The January 1980 earthquake on the Greenville Fault also resulted in rupture along the Las Positas Fault.[30] The Las Positas Fault zone has a maximum earthquake potential of $M_w$ 6.4.[31] The Las Positas Fault does not transect the collective footprint.

**Hayward Fault Zone.** The active 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.[32] The Hayward Fault Zone is within about 10 miles of the Dublin/Pleasanton BART Station and has a maximum earthquake potential of $M_w$ 7.3.[33]

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 USGS describes the Hayward Fault as a tectonic hazard due anytime for another $M_w$ 6.8 to $M_w$ 7.0

[27] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.
[28] Parikh Consultants, 2009. Geotechnical and Seismic Report BART to Livermore Alternatives, Draft Environmental Impact Report, Alameda County, California.
[29] Bonilla, M.G., J.J. Lienkaemper, and J.C. Tinsley, 1980. Surface Faulting near Livermore, California, Associated with the January 1980 Earthquakes, U.S. Geological Survey Open-File Report 80-523.
[30] Ibid.
[31] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.
[32] San Francisco Bay Area Rapid Transit District (BART), 2006. Final Environmental Impact Statement, and 4(f)/6(f) Evaluation BART Warm Springs Extension.
[33] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

earthquake.[34] Specifically, the estimated probability for earthquakes of magnitude equal to or greater than $M_w$ 6.7 in the 30 years between 2000 and 2030 on the Hayward Fault system is 32 percent.

**Concord-Green Valley Fault Zone.** Formerly considered two faults because their surface expressions are separated by Suisun Bay, the active 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 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 16 miles north of the proposed Isabel Station does not transect the collective footprint.

**San Andreas Fault Zone.** The active right-lateral San Andreas Fault Zone is expected to produce strong earthquakes in Northern California. The Loma Prieta Earthquake of October 17, 1989, on the San Andreas Fault Zone, 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. The San Andreas Fault Zone is about 27 miles west of the Dublin/Pleasanton BART Station and has a maximum earthquake potential of $M_w$ 7.1.[35]

**Pleasanton Fault Zone.** The Pleasanton Fault is a Holocene strike-slip fault extending northwest of I-580 about 1.7 miles east of the Calaveras Fault. It is mostly concealed beneath the alluvial deposits of the Livermore-Amador Valley, but is sufficiently well-defined to be in an Alquist-Priolo Earthquake Fault Zone. The Pleasanton Fault zone extends southward toward the existing Dublin/Pleasanton Station, as shown in Figure 3G-1, but is not known to be present beneath the station. Recent trenching investigations indicate that the Pleasanton Fault was not observed in trenches just south of I-580 and there is no evidence of Holocene movement. The Pleasanton Fault Zone has a maximum earthquake potential of $M_w$ 6.6.[36]

**Livermore Fault Zone.** The Livermore Fault is considered a Quaternary fault approximately 5 miles long in Downtown Livermore. The fault is concealed and is inferred to possibly extend beneath the collective footprint in the I-580 Corridor Area, approximately 0.5 mile west of the proposed Isabel Station. The fault is not listed as an Alquist-Priolo Earthquake Fault Zone.

[34] United States Geological Survey (USGS), 2008. Understanding Earthquake Hazards in the San Francisco Bay Area – USGS Fact Sheet 2008-3019.

[35] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

[36] Ibid.

### (c) Groundshaking

Because active fault zones occur in study area, the area is susceptible to potentially high-intensity groundshaking in the event of an earthquake on these fault zones. The intensity of groundshaking depends on several factors, including 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.

Historically, earthquakes have caused strong groundshaking and damage in the Bay Area. For example, the $M_w$ 6.9 Loma Prieta earthquake in October 1989 on the San Andreas Fault, with an epicenter near Santa Cruz, produced very damaging groundshaking in Santa Cruz, but also in the Bay Area more than 50 miles away. However, disregarding local variations in ground conditions, the intensity of shaking at different locations within the area can generally be expected to decrease with distance from an earthquake source. A total of 44 earthquakes of magnitude 5.5 or greater (Richter or moment magnitude) have occurred in the Bay Area in historical times.[37] Earthquakes of this magnitude pose significant groundshaking hazard to the study area.

In 2007, the USGS, the CGS, and the Southern California Earthquake Center formed the Working Group on California Earthquake Probabilities to evaluate the probability of one or more earthquakes of $M_w$ 6.7 or higher occurring in the state over the next 30 years. Accounting for the wide range of possible earthquake sources, the Working Group estimated that the Bay Area has a 72 percent chance of experiencing an earthquake of $M_w$ 6.7 or higher over the next 30 years.[38] Using predictive seismic parameters, Parikh Consultants, Inc., estimated an earthquake moment magnitude of $M_w$ 6.6 and a PGA of 0.63 g at the location of the Airway Boulevard/I-580 overcrossing.[39]

### (d) Liquefaction and Lateral Spreading

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

[37] Toppozada, T. R. and D. Branum, 2002. California M >= 5.5 earthquakes, history and areas damaged, in Lee, W. H., H. Kanamori, and P. Jennings, International Handbook of Earthquake and Engineering Seismology, International Association of Seismology and Physics of the Earth's Interior.

[38] Working Group on California Earthquake Probabilities (WGCEP), 2015. UCERF3: A new earthquake forecast for California's complex fault system: U.S. Geological Survey Fact Sheet 2015-3009. March.

[39] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

groundwater tables are high. Lateral spreading occurs when liquefaction 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.

Figure 3.G-3 illustrates the area of liquefaction and lateral spreading susceptibility for the study area.[40, 41] Table 3.G-3 summarizes liquefaction and lateral spreading susceptibility hazard categories and describes the relative level of susceptibility to the PGA that a given area could be subjected to. The western portion of the study area along the I-580 corridor would be located within areas with moderate potential liquefaction susceptibility. The eastern portion of the study area along the I-580 corridor would be located within areas with variable liquefaction susceptibility ranging from very low to moderate. Further, the I-580 corridor is located within a relatively flat area and would have a very low susceptibility to lateral spreading. The Cayetano Creek Area is located within an area of very low liquefaction and lateral spreading susceptibility. The Laughlin Road Area is within an area with a potential for low liquefaction and lateral spreading.

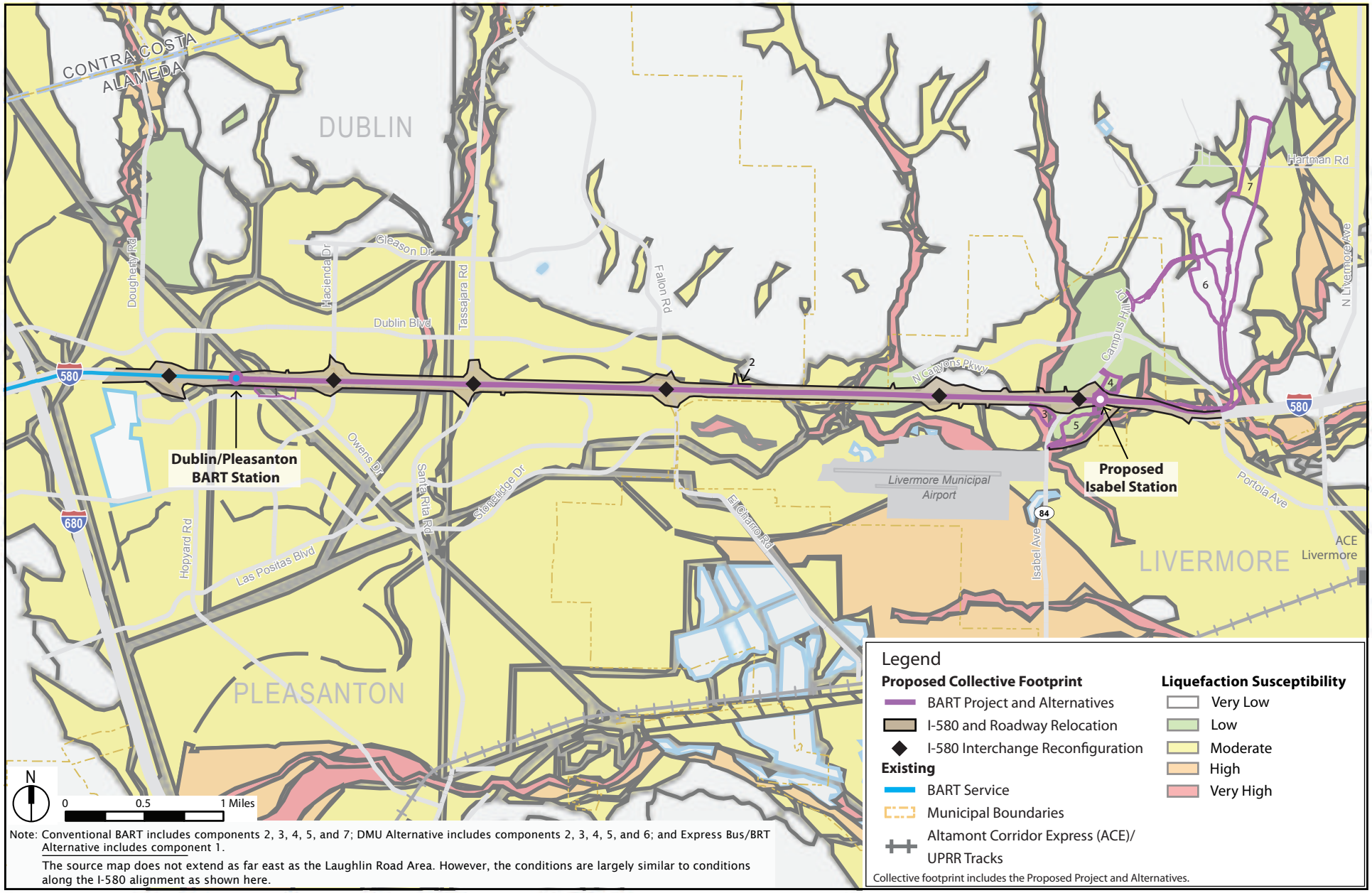
**TABLE 3.G-3 CATEGORIES OF LIQUEFACTION AND LATERAL SPREADING SUSCEPTIBILITY**

| Susceptibility | Description |
|---|---|
| Very Low | Expect less than 2% of future liquefaction effects to occur within geologic units assigned very low susceptibility. An estimated PGA of 0.6 times the force of gravity (0.6g) is necessary to trigger liquefaction in deposits assigned very low susceptibility. |
| 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. |

Note: PGA = peak ground acceleration
Source: 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., 2006.

[40] Ibid.

[41] 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., 2006. Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California: U.S. Geological Survey Open-File Report 2006-1037.




Note: Conventional BART includes components 2, 3, 4, 5, and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes component 1.

The source map does not extend as far east as the Laughlin Road Area. However, the conditions are largely similar to conditions along the I-580 alignment as shown here.

Source: Arup, 2017; Witter, et al., 2006.



Figure 3.G-3
Geology, Soils, Seismicity, Mineral, and Paleontological Resources
Liquefaction Susceptibility

### (3) Landslides and Subsidence

Other potential geologic hazards that may occur in the study area include landslides and subsidence.

#### (a) Landslides

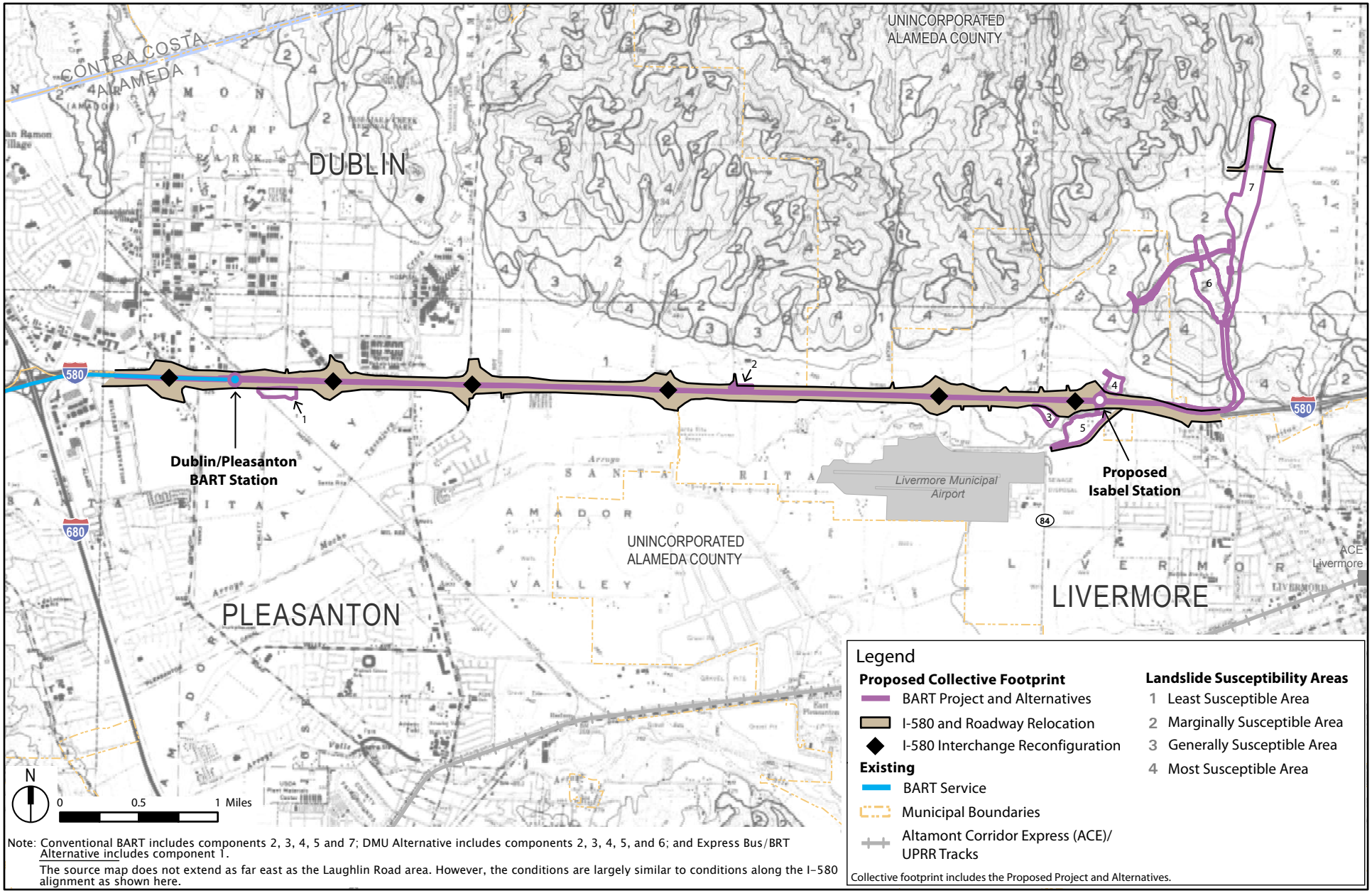
Areas with landslide potential generally have steeper slopes than the soil or rock material forming the slope can support. As shown on Figure 3.G-4, landslide potential is mapped in four categories—ranging from 1 (least susceptible) to 4 (most susceptible).[42] In the I-580 corridor, the study area is on relatively flat land with little to no susceptibility to landslides (area of least susceptibility). However, the Cayetano Creek Area, has higher landslide susceptibility due to the steeper slopes in the area (marginally to most susceptible), as shown on Figure 3.G-4.

#### (b) 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.[43] Weak soils also are prone to subsidence. The cities of Dublin, Livermore, and Pleasanton supplement 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 of the Alameda County Flood Control and Water Conservation District [Zone 7]) 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. However, the majority of recharge is through artificial recharge and recharge through stream channels. Consequently, potential for groundwater-induced subsidence is considered to be low within the study area because Zone 7 monitors and maintains groundwater levels.

[42] Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

[43] City of Pleasanton, 2008. Proposed Pleasanton General Plan 2005-2025 Draft Environmental Impact Report.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes component 1.

The source map does not extend as far east as the Laughlin Road area. However, the conditions are largely similar to conditions along the I-580 alignment as shown here.

Source: Arup, 2017; California Division of Mines and Geology, 1991.

**BART to Livermore Extension Project EIR**

Figure 3.G-4

Geology, Soils, Seismicity, Mineral, and Paleontological Resources

Landslide Susceptibility

### (4) Soils

According to the Natural Resources Conservation Survey, the soils in the study area include clay, clay and silty loams, and loams, as shown in Figure 3.G-5.[44] Soils within the study area are as follows:

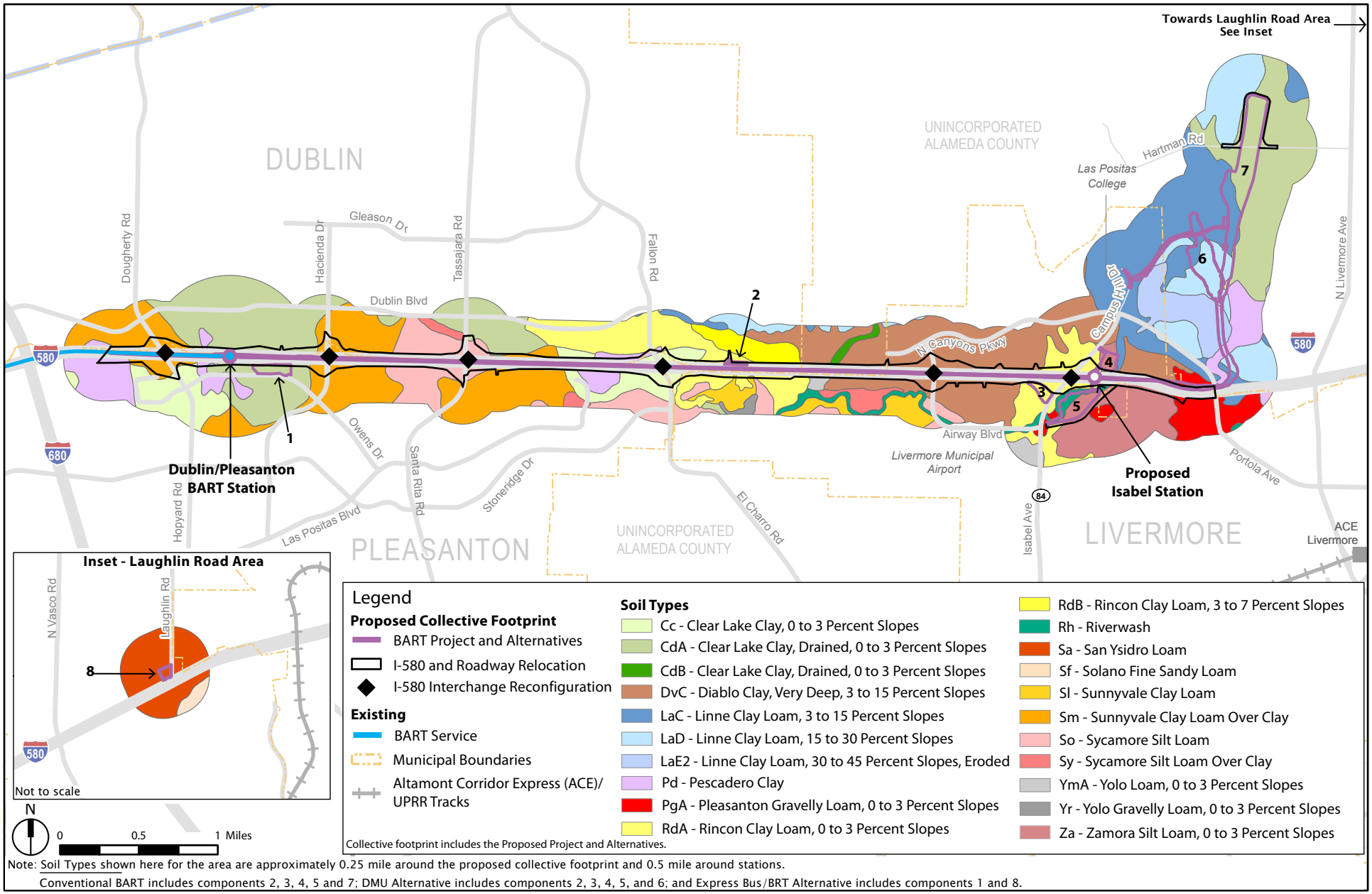
- Dublin/Pleasanton Station Area and I-580 Corridor Area – clay, clay loam, clay loam over clay, silty loam
- Isabel North and South Areas – clay loam (station area) and silt loam (parking garage area)
- Cayetano Creek Area – clay, clay loam, and gravelly loam
- Laughlin Road Area – loam

### (a) Expansive Soils

Expansive soils are soils that swell or shrink when they absorb or lose water. The potential for expansion, also referred to as linear extensibility or shrink-swell potential, refers to the change in length of an unconfined clod of soil as moisture content is increased or decreased between a moist and dry state. The amount and type of clay minerals in the soil influence changes in soil volume. 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 clayey soils underlying the study area, as shown in Figure 3.G-5, have a high expansion potential that could damage structure foundations. Areas with such soils include the Dublin/Pleasanton Station Area, I-580 Corridor Area, Isabel North and South Areas, and the Cayetano Creek Area. The Laughlin Road Area does not include clayey soils.

[44] Loam is a soils term that generally means a mix of grain sizes, along with organic matter. For example, a clay loam will have clay, silt, and sand particles but will be predominantly clay.




Note: Soil Types shown here for the area are approximately 0.25 mile around the proposed collective footprint and 0.5 mile around stations.
Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017; NRCS, 2016a.



Figure 3.G-5
Geology, Soils, Seismicity, Mineral, and Paleontological Resources
Soil Types in the Study Area

### (b) 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 that are more consolidated. Excessive soil erosion can lead to damage of building foundations and roadways. Erodible soils generally do not occur beneath the collective footprint.[45]

### (c) 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. Clayey soils in the area, as identified in Figure 3.G-5, extend beneath the collective footprint, except within Laughlin Road Area.

### (5) Mineral Resources

The 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

The region has been mapped by the CGS and the I-580 corridor is designated as MRZ-1 and the Cayetano Creek Area is designated as MRZ-4.

The Livermore-Amador Valley is underlain by alluvial deposits, which contain significant reserves of sand and gravel suitable for use as aggregate in cement production. In the study area, sand and gravel mining has been a common regional operation in the past.[46]

[45] U.S. Department of Agriculture, 1977. Soil Survey Alameda County Area, California.
[46] City of Livermore, 2007. Final Environmental Impact Report for the El Charro Specific Plan. April. Available at: http://www.cityoflivermore.net/citygov/cedd/planning/charro.htm.

The region has been mapped by the CGS and much of the Livermore-Amador Valley south of I-580 is classified as an area of significant mineral resources, including areas mapped as either MRZ-2 or MRZ-3.[47]

The City of Livermore General Plan Open Space and Conservation Element describes State-designated Mineral Resource Sectors—areas where mineral extraction is occurring and areas that have current land uses that are similar to areas where mining has occurred.[48] The General Plan identifies specific mineral resource sectors in the vicinity of the area in lands classified as MRZ-2.[49] Gravel is mined in an area known as the Chain of Lakes, in unincorporated Alameda County between I-580 and the Union Pacific Railroad tracks, south of Stanley Boulevard. Aggregate mining operations are 1 mile or more south of the I-580 corridor.

### (6) Paleontological Resources

Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones such as mammals, birds, fish, etc.), invertebrates (animals without backbones such as starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). They are nonrenewable, scientific resources that may be valuable 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 within which the plants or animals became fossilized usually were quite different from the present environments in which the geologic formations now exist. The fossil-bearing geologic formations in the area are relatively young, having been deposited between about 1 million and about 24 million years ago.

The unconsolidated deposits, such as recent Quaternary Alluvium (see Holocene and Pleistocene deposits on Figure 3.G-2), occur in the Livermore-Amador Valley along the majority of the collective footprint. The bedrock formations are just north of the I-580 corridor, in the Cayetano Creek Area. Many of the fossils in the undivided Quaternary sediments and the Livermore Gravel are fragmented vertebrate fossils, including extinct bison, camels, boney fish, mammoths, and horses. 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 I-680 in the upland foothills of the Diablo Range and in the Livermore Valley. Fossil localities diminish west of I-680

[47] City of Livermore, 2004. City of Livermore General Plan: 2003-2025.
[48] Ibid.
[49] California Department Of Conservation, Division of Mines and Geology, 1996. Mineral Resources Sectors Within Planning Area, Figure 8 3.

because much of that area is underlain by young alluvial and basin deposits that typically do not contain abundant fossil remains in their uppermost layers. Invertebrate paleontological resources occur throughout the Altamont Hills east of the study area.

Over 120 fossil localities are recorded for Alameda County in the University of California Museum of Paleontology database. Slightly more than half the localities contain megafossils (vertebrates or invertebrates identifiable without the aid of a microscope). Most of these localities—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 Gravel. 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, giant ground sloth, tapir, and camel suggests a Pleistocene rather than Holocene age for the fossil assemblage. The Cayetano Creek Area on the Livermore Gravel would be located on Pleistocene age materials. Additionally, a records search from the UCMP revealed three fossil localities to the northwest of the study area near the county line, where mammals such as mammoth, camel, and rodents were recovered).[50] A records search from the Natural History Museum of Los Angeles County returned an additional fossil locality where a specimen of fossil horse was discovered northwest of the study area near Martinez.[51]

Jefferson reported 11 vertebrate fossil localities from Livermore and Pleasanton, California.[52] Fossil taxa from these localities include frog (*Rana* sp.), salamander (*Aneides lugubris*), snake (*Colubridae*), turtle (*Clemmys* sp.), ducks or geese (*Anatidae*), dire wolf (*Canis dirus*), American lion or giant jaguar (*Panthera atrox*), mastodon (*Mammut* sp. cf. *M. americanum*), mammoth (*Mammuthus* sp.), horse (*Equus* sp.), camel (*Camelops hesternus* (type locality) and *Hemiauchenia* sp.), bison (*Bison antiquus*) and *Bison alaskensis*, ground sloth (*Paramylodon harlani*), gopher (*Thomomys* sp.), vole (*Microtus* sp.), and various rodents (*Thomomys* sp., *Reithrodontomys* sp., *Peromyscus* sp., *Neotoma* sp., *Microtus longicaudus*).

The Conformable Impact Mitigation Guidelines Committee of the Society of Vertebrate Paleontology (SVP) published Standard Guidelines in response to a recognized need to establish procedures for the investigation, collection, preservation, and cataloguing of

[50] Finger, 2016. University of California Museum of Paleontology (UCMP) Database, Livermore Extension.
[51] McLeod, 2016. Letter from Samuel A. McLeod, Vertebrate Paleontology, Los Angeles County Natural History Museum, with Environmental Science Associates. September 19.
[52] Jefferson, G.T., 1991. A Catalog of Late Quaternary Vertebrates from California: Part Two: Mammals. Natural History Museum of Los Angeles County. Technical Report No. 7.

fossil-bearing sites.[53] The Standard Guidelines are widely accepted among paleontologists, followed by most investigators, and identify the two key phases of paleontological resource protection: assessment and mitigation. 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. Mitigation involves formulating and applying measures to reduce such adverse effects, including pre-project survey and salvage, monitoring and screen washing during excavation to salvage fossils, conservation and inventory, and final reports and specimen curation. The SVP defines the level of potential as one of four sensitivity categories for sedimentary rocks—high potential, undetermined potential, low potential, and no potential—as listed below.

- **High Potential** – Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), and some low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential consists of both (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils; and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens and rock units that may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.
- **Undetermined Potential** – Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential

[53] Society of Vertebrate Paleontology (SVP), 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.

can sometimes be determined by strategically located excavations into subsurface stratigraphy.

- **Low Potential** – Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or, based on general scientific consensus, only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e.g., basalt flows or Recent (i.e., Holocene) colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
- **No Potential** – This designation is 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 and marine vertebrates, their environment, and associated geological, stratigraphical, taphonomical, and geographical data 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.

As shown in Figure 3.G-2, according to surficial geological mapping by Dibblee and Minch at a scale of 1:24,000, the majority of the study area along the I-580 corridor—including the Dublin/Pleasanton Station Area, the I-580 Corridor Area, Isabel North and South Areas, and Laughlin Road Area—is underlain by Quaternary alluvium.[54] Because it consists of recently deposited sediments, surficial exposures of Quaternary alluvium are considered to have low potential for paleontological resources; however, paleontological potential increases with depth below the ground surface (bgs), as age increases with depth. Therefore, below a depth of 5 feet bgs the Quaternary alluvium is considered to have high paleontological potential. In addition, within the Cayetano Creek Area, surficial geological units are composed of the Livermore Gravel geological unit. The Livermore Gravel fits the definition of high potential for paleontological resources, as these are readily identifiable sedimentary deposits with a discrete age range that does not extend to the Holocene.

In summary, areas of the study area that are generally along the I-580 corridor, are underlain by Quaternary alluvium and are considered to have low paleontological potential from the surface to 5 feet bgs and high paleontological potential below 5 feet bgs. While areas below 5 feet bgs could have high paleontological potential, the I-580 corridor has generally been previously disturbed and includes an unknown thickness of fill that was

[54] Dibblee, T.W. and J.A. Minch, 2006. Geologic Map of the Livermore Quadrangle, Contra Costa & Alameda Counties, California. In Parikh Consultants, 2016. Preliminary Geotechnical Report, BART to Livermore Extension, (Existing Dublin/Pleasanton Station to Future Isabel Station & Storage Yard), Alameda County, California. January 21.

placed for the freeway. The fill would not yield significant paleontological resources. The Cayetano Creek Area is underlain by the Livermore Gravel and is considered to have a high potential for paleontological resources. A field paleontological survey has not been completed for this analysis due to access limitations.

## 3. Regulatory Framework

This subsection describes the State and local environmental laws and policies relevant to geology, soils, seismicity, minerals, and paleontological resources.

### a. State Regulations

#### (1) 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 1972 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. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch that may experience ground surface rupture. 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.[55]

The 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.

#### (2) 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,

[55] San Francisco Bay Area Rapid Transit District (BART), 2006. Warm Springs Extension Final Environmental Impact Statement, Section 4(f)/6(f) Evaluation.

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 CGS 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. Seismic Hazard Maps have been published for the 7.5-minute quadrangles of Livermore and Altamont, which include the study area.

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 must be prepared by the project applicant defining and delineating any seismic hazard and providing recommendations to address seismic hazards. After the report is approved by the permitting agency, subsequent geotechnical reports are not required, provided that new geologic information warranting further investigation is not recorded for the subject project. The CBC requires that the recommendations of the report be incorporated in the building design.

**(3) California Building Code**

The CBC, which is codified in Title 24 of the California Code of Regulations, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, means of egress facilities, and general stability of buildings. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. The provisions of the CBC apply to the construction, alteration, movement, replacement, location, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The 2016 edition of the CBC is based on the 2015 International Building Code published by the International Code Council. The code is updated every 3 years, and the 2016 edition of the CBC was published by the California Building Standards Commission in July 1, 2016, and takes effect starting January 1, 2017. The 2016 CBC contains California

amendments based on the American Society of Civil Engineers Minimum Design Standard ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures, provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (such as wind loads) for inclusion into building codes.[56] Seismic design provisions of the building code generally prescribe minimum lateral forces applied statically to the structure, combined with the gravity forces of the dead and live loads of the structure, which the structure then must be designed to withstand. The prescribed lateral forces are generally smaller than the actual peak forces that would be associated with a major earthquake. Consequently, structures should be able to (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage, but with some nonstructural damage; and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute a guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake. However, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a seismic design category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site; SDC ranges from A (very small seismic vulnerability) to E/F (very high seismic vulnerability and near a major fault). Seismic design specifications are determined according to the SDC in accordance with Chapter 16 of the CBC. Chapter 18 of the CBC covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load-bearing of soils (1806), as well as foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810). For Seismic Design Categories D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses measures to be considered in structural design, which may include ground stabilization, selecting appropriate foundation type and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

[56] A load is the overall force to which a structure is subjected in supporting a weight or mass, or in resisting externally applied forces. Excess load or overloading may cause structural failure.

Chapter 18 also describes analysis of expansive soils and the determination of the depth to groundwater table. Expansive soils are defined in the CBC as follows:

> **1803.5.3 Expansive Soil**. In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist. Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2, and 3 shall not be required if the test prescribed in Item 4 is conducted:
>
> 1. Plasticity index of 15 or greater, determined in accordance with American Society for Testing and Materials (ASTM) D 4318
> 2. More than 10 percent of the soil particles pass a No. 200 sieve (75 micrometers), determined in accordance with ASTM D 422
> 3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422
> 4. Expansion index greater than 20, determined in accordance with ASTM D 4829

The design of the Proposed Project and Build Alternatives would be required to comply with CBC requirements, which would make the proposed action consistent with the CBC.

### (4) California Department of Transportation

Much of the study area is located in the I-580 ROW, and any work in this ROW is subject to California Department of Transportation (Caltrans) requirements governing allowable actions and modifications to the ROW. 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 1.7 (April 2013), Highway Design Manual, Sections 110.6, Earthquake Consideration (May 7, 2012), and 113, Geotechnical Design Report (May 7, 2012), 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 and recommended seismic-protection measures are required to be accommodated in 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.

### (5) California Public Resources Code

Several sections of the California Public Resources Code 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 30244 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 California Department of Parks and Recreation 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[57]).

California Public Resources Code Section 5097.5 specifies that any unauthorized removal of paleontological remains is a misdemeanor. Further, the California Penal Code Section 622.5 sets the penalties for the damage or removal of paleontological resources. 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.

[57] As cited in United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG), 2006.

### (6) National Pollutant Discharge Elimination System Construction General Permit

The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002, Construction General Permit, as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb 1 or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than 1 acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings and structures; and linear underground projects.

The Construction General Permit requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. The Construction General Permit contains requirements for each Risk Level category. Depending on its location within a sensitive watershed area or floodplain, the level of receiving water risk could be considered low, medium, or high. Depending on the Risk Level, the construction projects could be subject to the following Construction General Permit requirements:

- Effluent standards
- Good site management housekeeping
- Non-stormwater management
- Erosion and sediment controls
- Run-on and runoff controls
- Inspection, maintenance, and repair
- Monitoring and reporting requirements

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent pollutants from contacting stormwater and keep all products of erosion from moving offsite into receiving waters. The SWPPP BMPs are intended to protect surface water quality by preventing the offsite migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit. In addition, the SWPPP is required to contain a visual monitoring program, a chemical monitoring

program for non-visible pollutants, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings and structures, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the study area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations and vehicle and equipment washing and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

In the study area, the Construction General Permit is implemented and enforced by the San Francisco Bay Regional Water Quality Control Board (RWQCB), which administers the stormwater permitting program. Dischargers are required to electronically submit a notice of intent and permit registration documents to obtain coverage under this Construction General Permit. Dischargers are responsible for notifying the RWQCB of violations or incidents of non-compliance, as well as for submitting annual reports identifying deficiencies of the BMPs and how the deficiencies were corrected.

The permit contains several additional compliance items, including (1) additional mandatory BMPs to reduce erosion and sedimentation, which may include vegetated swales, setbacks and buffers, rooftop and impervious surface disconnection, bioretention cells, rain gardens, rain cisterns, implementation of pollution/sediment/spill control plans, training, and other structural and nonstructural actions; (2) sampling and monitoring for non-visible pollutants; (3) effluent monitoring and annual compliance reports; (4) development and adherence to a Rain Event Action Plan; (5) requirements for post-construction; (6) numeric action levels and effluent limits for pH and turbidity; (7) monitoring of soil characteristics on site; and (8) mandatory training under a specific curriculum.

### (7) California Environmental Quality Act Statute and Guidelines

CEQA requires that public agencies identify the environmental consequences of their proposed projects and project approvals and as such, unique paleontological resources and geologic features are afforded consideration under CEQA. Appendix G of the CEQA guidelines (Title 14, Division 6, Chapter 3, California Code of Regulations: 15000 et seq.)

includes as one of the questions to be answered in the Environmental Checklist (Appendix G, Section V, Part c) the following: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?"

### b. Local Regulations

#### (1) BART Facilities Standards

The BART Facilities Standards specify design criteria to protect structures and persons from seismic hazards. The BART Facilities 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, rail 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 3.0.2 (January 2015), The design criteria include the following:

- Aerial structure design shall meet the requirements of the Caltrans Bridge Design Specifications, American Concrete Institute Building Code Requirements for Reinforced Concrete, ACI 318 (which covers material design and construction of concrete structures); American Institute of Steel Construction, Steel Construction Manual Allowable Stress Design, Part 5 – Specifications and Codes; and American Institute of Steel Construction, Load and Resistance Factor Design.
- Design of at-grade-station structures and buildings would be governed by the provisions of the CBC as modified in Articles 6.5.2 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.

#### (2) Soil Erosion Control Regulations

Also see Section 3.H, Hydrology and Water Quality, Regulatory Framework, for an additional description of the NPDES Construction General Permit and the Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) Permit, administered by the RWQCB.

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to assess impacts, discusses the methodology used in the analysis, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purposes of this EIR, impacts on geology, soils, seismicity, mineral resources, or paleontological resources are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

- Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or Seismic Hazards Map issued by the State Geologist for the area or based on other substantial evidence of a known fault [refer to CGS Special Publications 42]

      Strong seismic groundshaking

      Seismic-related ground failure, including liquefaction
    - Landslides
- Result in substantial soil erosion or the loss of topsoil
- 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, subsidence, liquefaction, or collapse
- Be located on expansive or corrosive soil creating substantial risks to life or property[58]
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater
- 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
- Directly or indirectly destroy unique paleontological resource or site or unique geologic feature

[58] As discussed in Regulatory Framework, the current CBC no longer provides Table 18-1-B, which is still cited in the Appendix G Guidelines.

### b. Impact Methodology

The analysis focuses on the proposed activities that would result in ground disturbing activities and the construction of new or additional infrastructure for the Proposed Project and Build Alternatives. The EMU Option would result in the same impacts as the DMU Alternative; therefore, the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service under the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

Many of the potential impacts related to geologic, soils, and seismic conditions could be the same during construction and operation of the Proposed Project or Build Alternatives. Because the nature of many these impacts would be the same, they are collectively discussed below under Operational Impacts. However, permanent erosion or loss of topsoil, loss of mineral resources, and loss of paleontological resources occurring only during construction are discussed in the Construction Impacts subsection below.

### c. Summary of Impacts

Table 3.G-4 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.G-4 SUMMARY OF GEOLOGY, SOILS, SEISMICITY, MINERAL, AND PALEONTOLOGICAL RESOURCES IMPACTS**

| Impacts | No Project Alternative | Conventional BART Project[b] | DMU Alternative (with EMU Option)[b] | Express Bus/BRT Alternative[b] | Enhanced Bus Alternative |
|---|---|---|---|---|---|
| **Construction** | | | | | |
| **Project Analysis** | | | | | |
| Impact GEO-1: Soil erosion or loss of topsoil during construction | NI | LS | LS | LS | LS |
| Impact GEO-2: Result in a loss of availability of mineral resources during construction | NI | LS | LS | NI | NI |
| Impact PALEO-1: Loss of paleontological resources during construction | NI | LSM | LSM | LSM | NI |
| **Cumulative Analysis** | | | | | |
| Impact GEO-3(CU): Soil erosion or loss of topsoil during construction under Cumulative Conditions | NI | LS | LS | LS | LS |
| Impact GEO-4(CU): Result in a loss of availability of mineral resources during construction under Cumulative Conditions | NI | LS | LS | NI | NI |
| Impact PALEO-2(CU): Loss of paleontological resources during construction under Cumulative Conditions | NI | LS | LS | LS | NI |
| **Operational** | | | | | |
| **Project Analysis** | | | | | |
| Impact GEO-5: Fault rupture during operations | NI | LSM | LS | LS | LS |
| Impact GEO-6: Seismic shaking, seismic-induced ground failure, and landslides during operations | NI | LS | LS | LS | LS |
| Impact GEO-7: Unstable geologic units or soil during operations | NI | LS | LS | LS | LS |

**TABLE 3.G-4 SUMMARY OF GEOLOGY, SOILS, SEISMICITY, MINERAL, AND PALEONTOLOGICAL RESOURCES IMPACTS**

| Impacts | No Project Alternative | Conventional BART Project[b] | DMU Alternative (with EMU Option)[b] | Express Bus/BRT Alternative[b] | Enhanced Bus Alternative |
|---|---|---|---|---|---|
| Impact GEO-8: Expansive or corrosive soil during operations | NI | LS | LS | LS | LS |
| Impact GEO-9: Soils supporting septic tanks or alternative wastewater systems during operations | NI | NI | NI | NI | NI |
| **Cumulative Analysis** | | | | | |
| Impact GEO-10(CU): Fault rupture, seismic shaking, seismic-induced ground failure, landslides, unstable geologic units or soil, and expansive or corrosive soil during operations under Cumulative Conditions | NI | LS | LS | LS | LS |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation.
DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts related to project construction are described below, followed by operations impacts.

#### (1) Construction Impacts

Potential impacts pertaining to project construction are described below, followed by cumulative construction impacts.

Construction associated with the Proposed Project and Alternatives would permanently affect potential geological and paleontological resources during ground disturbing activities. Therefore, the construction impacts described below are considered to be permanent (rather than temporary).

### (a) Construction – Project Analysis

***Impact GEO-1: Result in substantial soil erosion or the loss of topsoil during construction.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

As discussed in Chapter 2, Project Description, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would each disturb more than 1 acre of ground. The Enhanced Bus improvements would be in previously developed, urbanized (generally paved) areas. Collectively, the improvements under the Enhanced Bus Alternative could disturb more than 1 acre and, if so, would be required to comply with the Construction General Permit and the MS4 Permit, similar to the Proposed Project. Project construction would involve short-term ground disturbance (e.g., grading, excavation, and drilling) associated with the construction of buildings and structures. While many of the facilities would be constructed in relatively flat areas with minimal slope, which would minimize the potential for soil erosion during construction, the Cayetano Creek Area is an area with greater topographic slope, and therefore has a greater potential for erosion.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, the Altamont Corridor Express (ACE), and the Livermore-Amador Valley Transit Authority (LAVTA) would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including construction of both residential and commercial uses.

Construction of these improvements and development projects could adversely impact soil erosion or the loss of topsoil. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to soil erosion and topsoil. **(NI)**

**Conventional BART Project.** Approximately 411 acres are within the permanent project footprint and approximately 29 acres are within the temporary construction staging area footprint. While much of the permanent footprint consists of I-580 and would have a limited amount of ground disturbance for construction, many parcels are not currently developed with transportation uses and would be redeveloped—approximately 182 acres.

Because the overall footprint of construction activities would exceed 1 acre, the Proposed Project would be required to comply with the NPDES Construction General Permit and the MS-4 Permit, described in the Regulatory Framework subsection above. These State requirements were developed to ensure that stormwater is managed and erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a SWPPP, which requires application of BMPs to control runoff of water from construction work sites. The BMPs would include but not be limited to physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of bioinfiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction.

Because project construction activities would be subject to the requirements discussed above, which would control erosion, the Proposed Project would not cause substantial increases in soil erosion during construction. Therefore, through compliance with the Construction General Permit, the Proposed Project would have less-than-significant impacts related to soil erosion, and no mitigation measures are required. **(LS)**

**DMU Alternative.** Approximately 405 acres are within the permanent DMU Alternative footprint and approximately 32 acres are within the temporary construction staging area footprint. While much of the permanent footprint consists of I-580 and would have a limited amount of ground disturbance for construction, many acres are not currently developed with transportation uses and would be redeveloped—approximately 137 acres. The DMU Alternative would have the same general footprint as the Proposed Project with the addition of improvements at the Dublin/Pleasanton Station Area, and would thus have the same potential for substantial soil erosion as the Proposed Project. However, similar to the Proposed Project, construction activities would be subject to the requirements of the Construction General Permit and the MS-4 Permit and would not cause substantial increases in soil erosion. Therefore, the DMU Alternative would have less-than-significant impacts related to soil erosion and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** Approximately 77 acres are within the permanent Express Bus/BRT Alternative footprint and approximately 6 acres within the temporary construction staging area footprint. The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area, as well as at the Laughlin Road Area. While much of the permanent footprint consists of I-580 and would have a limited amount of ground disturbance for construction, many acres are not currently developed with transportation uses and would be redeveloped—approximately 22 acres. The Express Bus/BRT Alternative would disturb more than 1 acre, and therefore would be required to comply with the Construction General Permit and the MS-4 Permit. Therefore, the Express Bus/BRT Alternative would have less-than-significant impacts related to soil erosion, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative within existing street ROWs, east of the Dublin/Pleasanton Station. Collectively, the improvements under the Enhanced Bus Alternative may disturb more than 1 acre and, if so, would be required to comply with the Construction General Permit and the MS-4 Permit. Therefore, the Enhanced Bus Alternative would have less-than-significant impacts related to soil erosion and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to soil erosion, and no mitigation measures are required.

***Impact GEO-2: 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 or a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan during construction.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could adversely impact mineral resources. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to mineral resources. **(NI)**

**Conventional BART Project and DMU Alternative.** As discussed in the Mineral Resources subsection above, the I-580 corridor is designated as MRZ-1 and the Cayetano Creek Area is designated as MRZ-4.[59] There are no known mineral resources that would be of value to the region and the residents of the State or a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan within the

[59] MRZ-1 zones are 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-4 zones are areas where available information is inadequate for assignment to any other MRZ zone with mineral deposits.

footprints of the Proposed Project or DMU Alternative. While the Cayetano Creek Area extends into an area underlain by the Livermore Gravel, which could be a source of aggregate, it has been designated as MRZ-4 by the CGS, and therefore is not a known mineral resource. Additionally, as described in Section 3.C, Land Use and Agricultural Resources, this area is zoned for agricultural uses. Therefore, the Proposed Project and DMU Alternative would have less-than-significant impacts related to mineral resources. **(LS)**

**Express Bus/BRT Alternative and Enhanced Bus Alternative.** As described above, the I-580 corridor is designated as MRZ-1. There are no known mineral resources that would be of value to the region and the residents of the State or a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan within the footprints of the Express Bus/BRT Alternative and Enhanced Bus Alternative. Therefore, the Express Bus/BRT Alternative and Enhanced Bus Alternative would have no impacts related to mineral resources. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to loss of mineral resources, and no mitigation measures are required.

***Impact PALEO-1: Directly or indirectly destroy unique paleontological resource or site or unique geologic feature during construction.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: LSM)***

As discussed in the Geologic Units subsection above, the Quaternary Alluvial Deposits and the Livermore Gravel are not unique geologic units and are not discussed further. Therefore, the analysis below focuses on the potential for paleontological resources within those units.

As discussed in the Paleontological Resources subsection above, the I-580 corridor—including the Dublin/Pleasanton Station Area, the I-580 Corridor Area, Isabel North and South Areas, and Laughlin Road Area—is generally underlain by Quaternary alluvium and is considered to have low paleontological potential from the surface to 5 feet bgs, but has high paleontological potential below 5 feet bgs. The I-580 corridor has generally been previously disturbed due to prior construction activities and has an unknown thickness of fill placed for the construction of the freeway, which would not yield significant paleontological resources. Within the Cayetano Creek Area, the Livermore Gravels are considered to have a high potential for paleontological resources.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented, and there would be no physical changes in the

environment associated with construction of the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could adversely impact paleontological resources. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to paleontological resources. **(NI)**

**Conventional BART Project.** As described above, within the I-580 corridor, the soils have low potential for paleontological resources up to 5 feet bgs. However, excavation and construction below 5 feet bgs could disturb previously undisturbed native materials with high paleontological potential. Within the Cayetano Creek Area, the Livermore Gravels have high paleontological potential.

As shown in Table 2-13 in Chapter 2, Project Description, typical construction activities for the Proposed Project would generally be up to 4 feet bgs for such activities as construction staging, I-580 relocation and surface frontage road relocations, installation of new or replacement rail tracks, Isabel Station pedestrian touchdown structures, storage and maintenance facility buildings and structures, and construction of surface parking lots and parking garage structures. The range of excavation for other construction activities would include approximately 10 feet bgs for construction of the Isabel Station; approximately 25 feet bgs for construction of the underpass structure under westbound I-580 for the tail tracks; and up to 70 feet for the hillside tunnel in the Cayetano Creek Area. Where piles are needed for structural support, they could be driven or drilled to approximately 60 feet bgs. Where pile driving is required, the upper 5 feet of soils would be exposed due to other construction activities, thus exposing paleontological resources if present. For deeper depths, the process of installing the piles would not enable the inspection of subsurface materials.

Construction of the Proposed Project has the potential to damage paleontological resources and could result in significant impacts to these resources. This potential impact would be reduced to a less-than-significant level with implementation of the following mitigation measures: **Mitigation Measure PALEO-1A**, which includes provisions for conducting the paleontological survey in the Cayetano Creek Area; **Mitigation Measure PALEO-1B**, which requires a paleontological monitor during construction activities in areas with a high paleontological potential; and **Mitigation Measure PALEO-1C**, which provides protocols to follow in the event of an unanticipated discovery of a paleontological resource during any construction activities. **(LSM)**

**DMU Alternative.** The DMU Alternative would have the same general footprint as the Proposed Project, as well as improvements at the Dublin/Pleasanton Station Area. As shown in Table 2-13 in Chapter 2, Project Description, excavation and construction activities for the components of the DMU Alternative would generally be approximately 4 feet bgs, with some areas of excavation ranging from 10 to 70 feet bgs, similar to the Proposed Project. The DMU Alternative components would be located on the same geologic units as the Proposed Project and there would be a similar potential for encountering paleontological resources during construction. Thus, impacts related to paleontological resources under the DMU Alternative could be significant.

Implementation of the following mitigation measures would reduce potential impacts to a less-than-significant level: **Mitigation Measure PALEO-1A**, which includes provisions for conducting the paleontological survey in the Cayetano Creek Area; **Mitigation Measure PALEO-1B**, which requires a paleontological monitor during construction activities in areas with a high paleontological potential; and **Mitigation Measure PALEO-1C**, which provides protocols to follow in the event of an unanticipated discovery of a paleontological resource during any construction activities. **(LSM)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the existing Dublin/Pleasanton Station Area, as well as at the Laughlin Road Area. As shown in Table 2-13 in Chapter 2, Project Description, excavation and construction activities for the components of the Express Bus/BRT Alternative would generally be approximately 4 feet bgs, with some areas of excavation ranging up to 25 feet bgs. Although the locations of the improvements for the Express Bus/BRT Alternative are all in previously disturbed areas within existing ROWs, the construction of the bus transfer platform would include excavation to 25 feet bgs and could encounter previously undisturbed soil. Thus, impacts related to paleontological resources under the Express Bus/BRT Alternative could be significant.

Implementation of the following mitigation measures would reduce potential impacts to a less-than-significant level: **Mitigation Measure PALEO-1B**, which requires a paleontological monitor during construction activities in areas with a high paleontological potential; and **Mitigation Measure PALEO-1C**, which provides protocols to follow in the event of an unanticipated discovery of a paleontological resource during any construction activities. **(LSM)**

**Enhanced Bus Alternative.** Under the Enhanced Bus Alternative, construction would occur within existing street ROWs, east of the Dublin/Pleasanton Station. Excavation and construction activities for the components of the Enhanced Bus Alternative would be up to approximately 2 feet bgs. It is likely that paleontological resources, if any had been present, would have already been destroyed or removed due to construction of roadways and infrastructure. Consequently, the improvements for the Enhanced Bus Alternative

would be constructed in areas with no paleontological resource potential. Therefore, there would be no impacts related to paleontological resources under the Enhanced Bus Alternative and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant impacts to paleontological resources. However, for the Proposed Project and DMU Alternative, with implementation of **Mitigation Measure PALEO-1A**, which would require a paleontological survey of the Cayetano Creek Area, potential impacts would be reduced. Furthermore, for the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, with implementation of **Mitigation Measure PALEO-1B**, which requires a paleontological monitor during construction activities in areas with a high paleontological potential, and **Mitigation Measure PALEO-1C**, which would require discovery protocols be followed in the event of an unanticipated discovery of a paleontological resource during any construction activities, potential impacts would be reduced to a less-than-significant level.

As described above, the Enhanced Bus Alternative would not result in significant impacts related to paleontological resources, and no mitigation measures are required for this alternative.

**Mitigation Measure PALEO-1A: Surface Paleontological Survey of the Cayetano Creek Area (Conventional BART Project and DMU Alternative).**

During the design phase and prior to any ground disturbing activity in the Cayetano Creek Area, BART shall retain a professional paleontologist, who meets the professional standards of the SVP, to conduct a field (surface) paleontological survey of the Cayetano Creek Area in accordance with SVP standards. The survey shall include a formal evaluation to determine if paleontological resources are present pursuant to SVP Guidelines. If unique paleontological resources are present, the paleontologist shall review project design plans and geotechnical investigations to ascertain which activities could impact highly sensitive sediments. The paleontologist shall prepare a detailed monitoring plan that describes where and when paleontological monitoring shall be required during construction in the Cayetano Creek Area, which shall be implemented as part of **Mitigation Measure PALEO-1B**.

**Mitigation Measure PALEO-1B: Paleontological Monitoring (Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative).**

All construction workers, regardless of where they are working, shall receive training in the recognition of paleontological resources by a qualified paleontologist. During any excavation or grading activities that extend to below 5 feet bgs, either along the I-580 alignment (Dublin/Pleasanton Station Area, I-580 Corridor Area, Isabel North and South Areas, and Laughlin Road Area) or in the Cayetano Creek Area (if required by

the monitoring plan developed under **Mitigation Measure PALEO-1A**), BART shall retain a qualified paleontologist meeting the professional standards of the SVP and Caltrans to conduct paleontological monitoring in accordance with Caltrans standards. The paleontological monitor shall have the authority to halt any excavation or grading activities to collect discovered paleontological resources and implement **Mitigation Measure PALEO-1C**.

**Mitigation Measure PALEO-1C: Discovery of Previously Unknown Paleontological Resources (Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative).**

1. If paleontological resources are encountered by construction personnel, all construction activities within 100 feet shall halt until a qualified paleontologist can assess the significance of the find.
2. If the resources are significant, the paleontologist shall prepare a mitigation plan that shall recommend avoidance or, if avoidance is not feasible, resource recovery through excavation.
3. If avoidance is feasible, this may be accomplished through one of the following means: (1) modifying the construction plan to avoid the resource; (2) incorporating the resource within open space; or (3) deeding the resource site into a permanent conservation easement.
4. If avoidance is not feasible, a qualified paleontologist shall document, excavate, preserve, and recover the paleontological resource. The paleontological resource shall be sent to a facility appropriate for the preservation of paleontological resources as designated by the paleontologist.

### (b) Construction – Cumulative Analysis

The geographic study area for the cumulative analysis would be the same as that described in the Introduction subsection above. The cumulative context for construction impacts includes various projects in the Livermore-Amador Valley, and the cities of Dublin, Pleasanton, and Livermore as described in Section 3.A, Introduction to Environmental Analysis and Appendix E, and focuses on the projects that would occur along the I-580 corridor.

***Impact GEO-3(CU): Result in substantial soil erosion or the loss of topsoil during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact GEO-1** above, the No Project Alternative would have no impact on soils during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Several of the cumulative projects could be under construction at the same time as the Proposed Project and Build Alternatives. For example, a portion of the Isabel Neighborhood Plan (INP) is scheduled to be under construction concurrently with the Proposed Project and DMU Alternative. A similar schedule overlap could occur for the Kaiser Dublin Medical Center project as well as several other cumulative projects. Each of these projects would be subject to the State Construction General Permit, which requires the preparation and implementation of a SWPPP for each project that disturbs more than 1 acre. The SWPPPs would describe BMPs to control runoff and prevent erosion. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and maintains the cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would both be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels. Therefore, the Proposed Project and Build Alternatives, in combination with cumulative projects that may be under construction currently, would result in less-than-significant cumulative impacts related to soil erosion. **(LS)**

**Mitigation Measures.** As described above, Proposed Project and Alternatives in combination with probable future projects would not result in significant cumulative impacts related to soil erosion, and no mitigation measures are required.

***Impact GEO-4(CU): 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 or a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact GEO-2** above, the No Project Alternative would have no impact related to loss of mineral resources. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and DMU Alternative.** Some of the cumulative projects could be constructed in areas with potential for mineral resources. Together, the Proposed Project or DMU Alternative and the cumulative projects could result in the general loss of the resource due to construction of projects in areas with potential resources. However, the cumulative projects would undergo their own environmental review and would be required to comply with regulations pertaining to mineral resources. Therefore, potential cumulative impacts to mineral resources would be avoided and/or reduced to less than significant. Therefore, cumulative impacts to mineral resources would be less than significant. **(LS)**

**Express Bus/BRT Alternative and Enhanced Bus Alternative.** As described in **Impact GEO-2** above, these alternatives would have no impact related to loss of mineral resources. Therefore, the Express Bus/BRT Alternative and Enhanced Bus Alternative would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant cumulative impacts related to loss of mineral resources, and no mitigation measures are required.

***Impact PALEO-2(CU): Directly or indirectly destroy unique paleontological resource during construction under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact PALEO-1** above, the No Project Alternative would have no impact on paleontological resources during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** Several of the cumulative projects, including the INP, would be constructed in areas with

potential for paleontological resources, similar to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative. Together, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and the cumulative projects, could result in the general loss of the resource due to construction of projects in areas with potential resources.

However, as described in **Impact PALEO-1**, the Proposed Project and DMU Alternative would implement **Mitigation Measure PALEO-1A**, which would require a paleontological survey of the Cayetano Creek Area. In addition, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, would implement **Mitigation Measure PALEO-1B**, which requires a paleontological monitor during construction activities in areas with a high paleontological potential, and **Mitigation Measure PALEO-1C**, which requires discovery protocols be followed in the event of an unanticipated discovery of a paleontological resource during any construction activities. In addition, cumulative projects would undergo their own environmental review and would also be required to comply with the similar requirements to mitigate potential impacts to paleontological resources. With implementation of these measures, potential cumulative impacts to paleontological resources would be avoided and/or reduced to less than significant. Therefore, cumulative impacts to paleontological resources would be less than significant. **(LS)**

**Enhanced Bus Alternative.** The Enhanced Bus Alternative would result in no project impacts as described in **Impact PALEO-1** above, and therefore would not contribute to cumulative paleontological impacts (no impact). **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives, in combination with past, present, or probable future projects, would not result in significant cumulative impacts to paleontological resources, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operations impacts.

#### (a) Operations – Project Analysis

***Impact GEO-5: Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault during operations.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

As discussed in the Local Setting subsection above, there are a number of known active faults within 20 miles of the collective footprint. A significant impact relative to the rupture of a known active fault could occur if the new structures and facilities were to be located directly on a known active fault. The rupture of a fault could damage rail lines, foundations, and structures, resulting in the risk of injury or death to the public or structural failure.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could have adverse impacts related to fault rupture. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no fault rupture impacts. **(NI)**

**Conventional BART Project.** None of the new structures or facilities that would be constructed under the Proposed Project would be located within a State-designated Alquist-Priolo Earthquake Fault Zone (i.e., on a State-recognized active fault trace).

Although there are no State-designated Alquist-Priolo Earthquake Fault Zones beneath the footprint of the Proposed Project, several other faults extend beneath the footprint. Both the Mocho and Livermore faults are not known to be active; therefore, the area beneath these faults is not designated as an Alquist-Priolo Earthquake Fault Zone. However, the Mount Diablo Thrust Fault is active, with movement over the past 900 years and a slip rate of 1.7 to 1.8 millimeters per year, according to recent studies.[60] Therefore, while the Mount Diablo Thrust Fault is not a State-designated Alquist-Priolo Earthquake Fault Zone, the fault could experience fault rupture. The storage and maintenance facility in the Cayetano Creek Area is bisected by the Mount Diablo Thrust Fault. Therefore, placement of structures on the Mount Diablo Thrust Fault could result in significant impacts related to fault rupture that could damage structures and place workers at risk.

Given the location of the Mount Diablo Thrust Fault beneath the proposed storage and maintenance facility, the Proposed Project could result in significant impacts related to fault rupture, although the Proposed Project would not alter the seismic environment or increase the risk of fault rupture. This potential impact would be reduced with the

[60] Sawyer, Thomas L., 2015. Characterizing Rates of Contractional Deformation on the Mount Diablo Thrust Fault, Eastern San Francisco Bay Region, Northern California. April 7.

implementation of **Mitigation Measure GEO-5**, which requires a geotechnical investigation of the storage and maintenance facility area to determine the location of the fault and development of project design features in compliance with the CBC and BART design standards to reduce the risk of damage from a potential fault rupture. With compliance with existing regulations and implementation of **Mitigation Measure GEO-5**, potential impacts would be reduced to less than significant. **(LSM)**

**DMU Alternative.** The DMU Alternative would have the same general footprint as the Proposed Project along the I-580 corridor, with the following exceptions: (1) additional improvements that would be constructed at the Dublin/Pleasanton Station Area; and (2) different footprint in the Cayetano Creek Area. Thus, it would be located on or near many of the same faults. However, unlike the Proposed Project, the storage and maintenance facility would not be located on the Mount Diablo Thrust Fault. Under the DMU Alternative, none of the proposed structures would be located on a known active fault or within an Alquist-Priolo Earthquake Fault Zone. Therefore, the DMU Alternative would have a less-than-significant impact related to fault rupture, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area as well as the Laughlin Road Area. None of the proposed structures or facilities would be located within an Alquist-Priolo Earthquake Fault Zone or on a known active fault. Therefore, the Express Bus/BRT Alternative would have a less-than-significant impact related to fault rupture, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** Bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be located within the existing street ROWs east of the Dublin/Pleasanton Station. None of the proposed structures or facilities would be located within an Alquist-Priolo Earthquake Fault Zone or on a known active fault. Therefore, the Enhanced Bus Alternative would have a less-than-significant impact related to fault rupture, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project would have a potentially significant impact related to fault rupture related to the placement of structures on the Mount Diablo Thrust Fault. However, this impact would be reduced with implementation of **Mitigation Measure GEO-5**, which requires a geotechnical investigation of the storage and maintenance facility area to determine the location of the fault and development of project design features in compliance with the CBC and BART design standards to reduce the risk of damage from a potential fault rupture. With compliance with existing regulations and implementation of **Mitigation Measure GEO-5**, the potential impacts would be reduced to less than significant.

As described above, the DMU Alternative, Express Bus/BRT Alternative, and Enhanced Bus Alternative would not result in significant impacts related to fault rupture and no mitigation measures are required for these alternatives. **(LS)**

**Mitigation Measure GEO-5: Geotechnical Investigation of the Cayetano Creek Area and Development of Project Design Features (Conventional BART Project).**

During the design phase and prior to any ground disturbing activity in the Cayetano Creek Area, where the Mount Diablo Thrust Fault is inferred, BART shall retain a professional geotechnical engineer or engineering geologist to conduct a field (surface) geotechnical investigation of the Cayetano Creek Area with a focus on the Mount Diablo Thrust Fault. The investigation shall include the following tasks:

1. Conduct a literature search of the most recent local investigations. The search shall include contacting and discussing the thrust fault location with the author of the most recent fault investigation (completed by Thomas L. Sawyer of Piedmont GeoSciences).[61]
2. Conduct a field investigation consisting of trenching the Cayetano Creek Area to investigate whether the Mount Diablo Thrust Fault is located within the storage and maintenance facility footprint.
3. The geotechnical investigator shall prepare a detailed report that describes the results and provide that report to BART design engineers.
4. BART's engineers shall evaluate the results of the geotechnical investigation and develop project design features in compliance with the CBC and BART design standards to reduce the risk of damage from a potential fault rupture.

***Impact GEO-6: Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving strong seismic groundshaking, and seismic-induced ground failures, including liquefaction, and landslides during operations.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

As discussed in the Local Setting subsection above, the Bay Area may experience a large regional earthquake ($M_w$ 6.7 or greater) over the next 30 years. There is a potential for high-intensity groundshaking associated with a characteristic earthquake in this region. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the moment magnitude, the duration of shaking, and the nature of the geologic materials beneath the project components. Intense groundshaking and high ground

[61] Ibid.

accelerations could affect the entire study area. Seismic groundshaking could damage rail lines, foundations, and structures, resulting in structural failure.

In addition, the groundshaking and high ground accelerations as the result of an earthquake could cause seismic-induced ground failures, such as liquefaction or lateral spreading, which could also damage rail lines, foundations, and structures, resulting in structural failure.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. The planned and programmed transportation improvements and continued land use development, including new residential and commercial uses under the No Project Alternative would be subject to potential risk of loss, injury, or death from strong seismic groundshaking, and seismic induced ground failures, including liquefaction, and landslides during operations. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented. These improvements would be required to follow applicable geotechnical evaluations and regulations that would reduce the significant exposure of people or structures to harm. The No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to strong seismic shaking, seismic-induced ground failure, and landslides. **(NI)**

**Conventional BART Project.** As discussed in the Liquefaction and Lateral Spreading subsection above and shown on Figure 3.G-3, portions of the Proposed Project footprint along I-580 would be underlain with soils susceptible to moderate liquefaction and lateral spreading. The western portion of the footprint within the I-580 corridor would be located within areas with moderate liquefaction susceptibility. The eastern half of the footprint along the I-580 corridor would be located within areas with variable liquefaction susceptibility ranging from very low to moderate.

The groundshaking and high ground accelerations could also cause seismic-induced landslides, which could damage rail lines, foundations, and structures, resulting in structural failure. In addition, landslides can be caused by inappropriate grading, such as the removal of the toe or lower portions of a landslide-prone slope, which is supporting the upper portions of the landslide-prone material. Alternatively, landslides can be caused by the inappropriate addition of water, such irrigation at the top of a landslide-prone area, which would increase the weight of materials or result in erosion. As discussed in the Landslides and Subsidence subsection and shown on Figure 3.G-4, the I-580 Corridor Area is on relatively flat land with little to no susceptibility to landslides, whereas the Cayetano

Creek Area extends through an area with steeper slopes and a higher susceptibility to landslides.

In the event of an earthquake, intense groundshaking could cause damage and outages to facility infrastructure and could result in hazards to the public associated with falling debris (e.g., collapsing roofs) and damaged infrastructure (e.g., tripping and falling hazards).

The structural elements of the Proposed Project would undergo appropriate design-level geotechnical evaluations prior to final design and construction. The Proposed Project would implement the applicable regulatory requirements in the CBC, Caltrans construction standards and design criteria, and BART Facilities Design Standards. Specifically, the California Professional Engineers Act (Building and Professions Code Sections 6700-6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provide the basis for regulating and enforcing engineering practice in California. During project design, the geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC, Caltrans construction standards and design criteria, and BART Facilities Standards, while applying standard engineering practice and the appropriate standard of care for the particular region in California.[62] In addition, Caltrans and BART are responsible for inspections and ensuring compliance with the applicable codes and standards described above. Therefore, compliance with regulatory standards would reduce potential impacts related to strong seismic shaking, seismic-induced ground failure, and landslides to less-than-significant levels, and no mitigation measures are required. **(LS)**

**DMU Alternative.** The DMU Alternative would have the same general footprint as the Proposed Project, with the addition of improvements that would be constructed at the Dublin/Pleasanton Station Area. This area is generally exposed to the same level of seismic shaking and risk of seismic-induced ground failure, has moderate liquefaction susceptibility, and is relatively flat land with little to no susceptibility to landslides. Thus, the DMU Alternative components would be exposed to the same level of seismic shaking and risk of seismic-induced ground failure as the Proposed Project. Similar to the Proposed Project, the DMU Alternative would undergo appropriate design-level geotechnical evaluations prior to final design and construction and would implement the applicable regulatory requirements in the CBC, Caltrans construction standards and design criteria, and BART Facilities Design Standards, described above. Caltrans and BART are responsible for inspections and ensuring compliance with the applicable codes and standards. Therefore, the DMU Alternative would have less-than-significant impacts

[62] Geotechnical engineers specialize in structural behavior of soil and rocks. They conduct soil investigations, determine soil and rock characteristics, provide input to structural engineers, and provide recommendations to address problematic soils.

related to strong seismic groundshaking and seismic-induced ground failure, and landslides, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area, as well as at the Laughlin Road Area. These areas would generally be exposed to the same level of seismic shaking and risk of seismic-induced ground failure as the Proposed Project; however, unlike the Proposed Project, there would be no facilities in the Cayetano Creek Area, which has higher susceptibility to landslides. The design of the Express Bus/BRT Alternative would be required to comply with the same regulatory codes and standards as the Proposed Project, described above. Therefore, the Express Bus/BRT Alternative would have less-than-significant impacts related to strong seismic groundshaking and seismic-induced ground failure, as well as landslides, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be along existing street ROWs, east of the Dublin/Pleasanton Station. These facilities would be exposed to the same level of seismic shaking and risk of seismic-induced ground failure as the Proposed Project. Therefore, the Enhanced Bus Alternative would have less-than-significant impacts related to strong seismic groundshaking, seismic-induced ground failure, and landslides, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to strong seismic groundshaking, seismic-induced ground failure, and landslides and no mitigation measures are required.

***Impact GEO-7: 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, subsidence, liquefaction, or collapse during operations.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could be located on an unstable geologic unit that could result in landslide, lateral spreading, subsidence, liquefaction, or collapse. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are

implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to unstable geologic units. **(NI)**

**Conventional BART Project and Build Alternatives.** Potential impacts from the Proposed Project and Alternatives related to liquefaction, lateral spreading, and landslides are addressed in **Impact GEO-6** above.

Subsidence is caused by the extraction of groundwater in excess of an aquifer's sustainable yield. The Proposed Project and Build Alternatives do not include the extraction of any groundwater, and therefore would not cause subsidence. Collapse is also associated with the extraction or movement of water, which is not included as a part of the Proposed Project or Build Alternatives. In addition, the Zone 7 administers oversight of the local groundwater basin—the Livermore Groundwater Basin—and prevents groundwater overdraft through its Groundwater Management Program.[63] The recently enacted Sustainable Groundwater Management Act designates Zone 7 as the exclusive Groundwater Sustainability Agency with the responsibility for preventing "undesirable results," such as subsidence due to groundwater overdraft. Zone 7 implemented conjunctive use as part of its Groundwater Management Program.[64] Zone 7's policy is to maintain groundwater levels above historic lows to minimize the risk of inducing land subsidence. As a result, the components of the Proposed Project and Build Alternatives would not be placed in areas subject to potential subsidence that could damage facility components and pose risks to people from falling debris.

Therefore, impacts related to unstable geologic units that could result in landslide, lateral spreading, subsidence, liquefaction, or collapse would be less than significant. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to liquefaction, lateral spreading, landslides, subsidence, or collapse and no mitigation measures are required.

***Impact GEO-8: Be located on expansive or corrosive soil creating substantial risks to life or property during operations.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

[63] Zone 7 Water Agency, 2016. 2015 Urban Water Management Plan, March 31.

[64] Conjunctive use means the use of groundwater mixed with surface water to meet water demands and water quality requirements and includes the use of surface water resources to artificially recharge groundwater

Surface structures with foundations constructed in expansive soils would experience expansion and contraction depending on the season and the amount of surface water infiltration. The expansion and contraction, also referred to as linear extensibility or shrink-swell, could exert enough pressure on the structures to result in cracking, settlement, and uplift. Depending on the depth of buried utilities, soil in expansion or contraction could lead to lateral stress and stress of structural joints. Lateral stresses could, over time, lead to rupture or leaks in the coupling joints. Shrinkage cracks could form in native soils adjacent to utility trenches or in backfill material if expansive soils are used. If shrinkage cracks extend to sufficient depths, groundwater can infiltrate into the trench, causing piping (progressive erosion of soil particles along flow paths) or settlement failure of the backfill materials. Settlement failure can also occur if expansive soils are used in backfill and undergo continued expansion and contraction. Over time these soils could settle, resulting in misalignment or damage to buried facilities. Proper removal or reconditioning of expansive soils during construction can prevent such effects and the resulting damage.

In addition, clayey soils can be corrosive to unprotected steel or concrete. Over time, the corrosion could weaken the materials, resulting in fatigue and eventual failure of steel or concrete materials. Clayey soils are considered to have a high corrosion potential, and could cause damage to surface piping and weaken building foundations, unless treated.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could be located on expansive or corrosive soil creating substantial risks to life or property during operations. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. These improvements would be required to follow applicable geotechnical evaluations and regulations that would reduce the significant exposure of people or structures to harm. Therefore, the No Project Alternative is considered to have no impacts related to expansive or corrosive soils. **(NI)**

**Conventional BART Project.** As discussed in the Soils subsection above, and shown in Figure 3.G-5, clayey soils that could be expansive or corrosive in the footprint of the Proposed Project extend under the I-580 Corridor Area, Isabel North and South Areas, and the Cayetano Creek Area. Therefore, the entire footprint of the Proposed Project has the potential for expansive or corrosive soils. As described in **Impact GEO-6** above, the structural elements of the Proposed Project would undergo appropriate design-level

geotechnical evaluations prior to final design and construction, which would include additional investigations for the presence of expansive or corrosive soils, and inclusion of recommendations to address such soils. Therefore, with compliance with regulatory standards, impacts related to expansive or corrosive soil under the Proposed Project would be less than significant, and no mitigation measures are required. **(LS)**

**DMU Alternative.** The DMU Alternative would have the same general footprint as the Proposed Project, with the addition of areas at the Dublin/Pleasanton Station Area, which includes clayey soils that could be expansive or corrosive. Therefore, the footprint of the DMU Alternative has the potential for expansive or corrosive soils. Similar to the Proposed Project, the DMU Alternative would be subject to the same requirements to investigate for expansive or corrosive soils and address them. Therefore, the DMU Alternative would have less-than-significant impacts related to expansive and corrosive soils, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area, as well as at the Laughlin Road Area. The Dublin/Pleasanton Station Area has potential for expansive or corrosive soils; however, the Laughlin Road Area does not. Similar to the Proposed Project, the Express Bus/BRT Alternative would be subject to requirements to investigate for expansive or corrosive soils and address them, where present. Therefore, the Express Bus/BRT Alternative would have less-than-significant impacts related to expansive and corrosive soils, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be located in the existing street ROWs, east of the Dublin/Pleasanton Station. This alternative would be subject to the same requirements described above for the Proposed Project—to investigate for expansive or corrosive soils and address them, if present. Therefore, the Enhanced Bus Alternative would have less-than-significant impacts related to expansive and corrosive soils, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to expansive or corrosive soil and no mitigation measures are required.

***Impact GEO-9: Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater during operations.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Construction of the planned and programmed transportation improvements and continued land use development, including construction of residential and commercial uses under the No Project Alternative, could be located in areas where sewers are not available for the disposal of wastewater during operations and have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to use of septic tanks or alternative wastewater disposal systems. **(NI)**

**Conventional BART Project and Build Alternatives.** The structures proposed for construction under the Proposed Project and Build Alternatives would be located in areas where connections to sewers are available. The Proposed Project and Build Alternatives do not include the construction of buildings or structures for human occupancy that would require the use of septic systems or alternative wastewater disposal systems. All wastewater from the station and facilities would be treated by the local wastewater service providers as described in Section 3.P, Utilities. Therefore, the Proposed Project and Build Alternatives would have no impact related to septic treatment of wastewater. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to use of septic tanks or alternative wastewater disposal systems and no mitigation measures are required.

### (b) Operations – Cumulative Analysis

The geographic study area for the cumulative analysis would be the same as that described in the Introduction subsection above. The cumulative context for impacts relative to geology, soils, and seismicity includes various projects in the Livermore-Amador Valley and the cities of Dublin, Pleasanton, and Livermore, as described in Section 3.A, Introduction to Environmental Analysis and Appendix E, and focuses on the projects that would occur along the I-580 corridor.

As described in **Impact GEO-9** above, the Proposed Project and Alternatives would have no impact related to septic tanks or alternative wastewater. Therefore, the Proposed Project and Alternatives would not contribute to cumulative septic tank or alternative wastewater impacts during operations.

***Impact GEO-10(CU): Expose people or structures to potential substantial adverse effects related to known faults, strong seismic groundshaking, seismic-related ground failure, including liquefaction, landslides, unstable soils or geologic units, or expansive or corrosive soils during operations under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact GEO-5** through **GEO-8** above, the No Project Alternative would have no impacts related to exposure of people or structures to potential substantial adverse effects related to known faults, strong seismic groundshaking, seismic related ground failure, including liquefaction, landslides, unstable soils or geologic units, or expansive or corrosive soils during operations. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Several of the cumulative projects would be located along the I-580 corridor and would subject to similar geological and soils conditions as the Proposed Project and Build Alternatives. The Dublin/Pleasanton BART Station Parking Expansion and the INP would both involve the operations of facilities that could result in similar impacts relative to geology, soils, and seismicity to the Proposed Project and Build Alternatives. However, because of the localized nature of the potential geologic impacts, it is not anticipated that the impacts would combine with the potential impacts of the Proposed Project or Build Alternatives.

For example, if a future expansive soils issue were to damage a component of the Proposed Project or Build Alternatives, as well as nearby cumulative projects, the damage would be limited to the footprints of the respective structures and the expansion of soil at one property would not combine to worsen the damage of an adjacent structure. Similarly, impacts relative to each of the significance criteria would be largely limited to the footprints of those individual structures and would not typically be additive or cumulative in nature. As discussed above for **Impact GEO-5**, under the Proposed Project, the location of the storage and maintenance facility on the Mount Diablo Thrust Fault would result in potential impacts that would be reduced to less than significant with compliance with existing regulations and implementation of **Mitigation Measure GEO-5**. In addition, any potential impacts would be localized and would not result in cumulative impacts. Therefore, potential cumulative geologic, soil, or seismic impacts associated with fault rupture, seismic shaking, seismic-related ground failure, landslides, unstable geologic units or soil, or expansive or corrosive soils would not be anticipated to result from the operation of the Proposed Project or Build Alternatives and other cumulative projects.

In addition, each individual project, including the Proposed Project and Build Alternatives, would also be required to comply with the same CBC and local geotechnical requirements

during the design phase of the project, including the preparation of geotechnical investigations, identification of geotechnical issues, and implementation of recommendations to address such issues, if present. Therefore, the operation of the Proposed Project and Build Alternatives, in combination with the cumulative projects, would result in less-than-significant cumulative impacts. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts related to geologic, soil, or seismic impacts associated with fault rupture, seismic shaking, seismic-related ground failure, landslides, expansive or corrosive soil, unstable geologic units, or soil expansive or corrosive soils, and no mitigation measures are required.

# H. HYDROLOGY AND WATER QUALITY

## 1. Introduction

This section describes the hydrological resources and water quality setting as it relates to the BART to Livermore Extension Project, discusses the applicable regulations, and assesses the potential impacts to hydrological resources and water quality from construction and operation of the Proposed Project and Alternatives.

For the purpose of analyzing the hydrological and water quality impacts, the study area includes the collective footprint—i.e., the combined footprints of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative. In addition, the bus routes and bus infrastructure improvements for the Enhanced Bus Alternative—as well as for the feeder buses for the Proposed Project and other Build Alternatives, which are anticipated to extend along existing streets and within the street rights-of-way (ROWs)—are addressed programmatically in this analysis, as described in Chapter 2, Project Description. The study area also includes the channel reaches downstream of the collective footprint, as well as adjacent areas that could be inundated because of modification to surface water channels and stormflow conveyance facilities. The downstream channel reaches are part of the study area because pollutants can be transported downstream or downgradient to sensitive receiving waters farther away, such as Arroyo de la Laguna and Alameda Creek. The study area is primarily within the Lower Arroyo Mocho watershed, as well as portions of Lower Arroyo las Positas and South San Ramon Creek watershed; these areas are all part of the Arroyo de la Laguna watershed. Arroyo las Positas, a tributary to Arroyo Mocho traverses through the eastern part of the study area, is part of the Lower Arroyo Mocho watershed.

The Zone 7 Water Agency (Zone 7) is the primary entity responsible for overseeing water supply and flood control operations within the study area.

Sources of data and information used to prepare this section include but are not limited to the following resources:

- Zone 7 Stream Management Master Plan[1]
- Zone 7 Stream Management Master Plan Environmental Impact Report[2]

[1] Zone 7 Water Agency, 2006a. Zone 7 Stream Management Master Plan. August.
[2] Zone 7 Water Agency, 2006b. Zone 7 Stream Management Master Plan Environmental Impact Report. March.

- BART Livermore Extension, Water Quality and Hydromodification Study: Technical Memorandum[3]
- BART Livermore Extension, Hydraulic Analysis of Las Positas Creek[4]

Also referenced for this analysis were hazard maps from the Association of Bay Area Governments, soil surveys from the United States (U.S.) Department of Agriculture, publications of the California Department of Water Resources (DWR), and various scientific studies. In addition, standard reference materials were used, including U.S. Geological Survey (USGS) topographic maps and climate information.

No scoping comments pertaining to hydrology or water quality were received in response to the Notice of Preparation for this EIR or during the public scoping meeting held for the EIR.

## 2. Existing Conditions

This subsection describes the existing conditions for hydrology and water quality—including the regional context, surface water hydrology, flooding and flood hazards, dam inundation areas, groundwater hydrology, and water quality.

### a. Regional Overview

The study area is located within the Arroyo de la Laguna watershed, which is part of the larger Alameda Creek watershed that covers approximately 630 square miles over three counties: (1) Alameda County (approximately 55 percent of the watershed); (2) Contra Costa County (10 percent); and (3) Santa Clara County (35 percent). Arroyo de la Laguna is the main tributary to Alameda Creek and comprises a watershed area of approximately 400 square miles, making up approximately 66 percent of the total Alameda Creek watershed. The watershed lies within the California Coast Ranges geographic unit, which is composed chiefly of a complex assemblage of marine sedimentary rocks and a series of northwest-trending ridges and valleys.[5]

Land uses in the Arroyo de la Laguna watershed include residential, commercial, light industrial, agricultural, ranch, and parklands. Land use in the project corridor is described in detail in Section 3.C, Land Use and Agricultural Resources. Five incorporated cities are completely or partially located within the Arroyo de la Laguna watershed: Livermore,

[3] Arup, 2016. BART Livermore Extension, Water Quality and Hydromodification Study: Technical Memorandum. April 5.
[4] Arup, 2017a. BART Livermore Extension, Hydraulic Analysis of Las Positas Creek, Draft 5. July 6.
[5] Rantz, S.E., 1972. Runoff Characteristics of California Streams. U.S. Geological Survey Water-Supply Paper 2009-A.

Pleasanton, Dublin, and the southeastern portions of San Ramon and Danville. The watershed is generally defined by the Altamont Pass (near Livermore) to the east; Mount Diablo to the north; the Coast Range hills to the south; and the watershed outlet to Alameda Creek on the west, from where it eventually flows into San Francisco Bay at Union City. The southern portion of the watershed—which is primarily the upland and headwater areas of the long, narrow Arroyo del Valle and Lower Arroyo Mocho watersheds—consists of higher elevations and more rugged topography and is relatively undeveloped. The northern portion of the watershed consists of the predominantly developed Livermore-Amador Valley[6] and includes the broader, less steep Alamo Creek, Tassajara Creek, and Arroyo las Positas watersheds. South San Ramon Creek, an Alamo Creek tributary, enters the Arroyo de la Laguna watershed at the Arroyo Mocho confluence on the western edge of the study area.

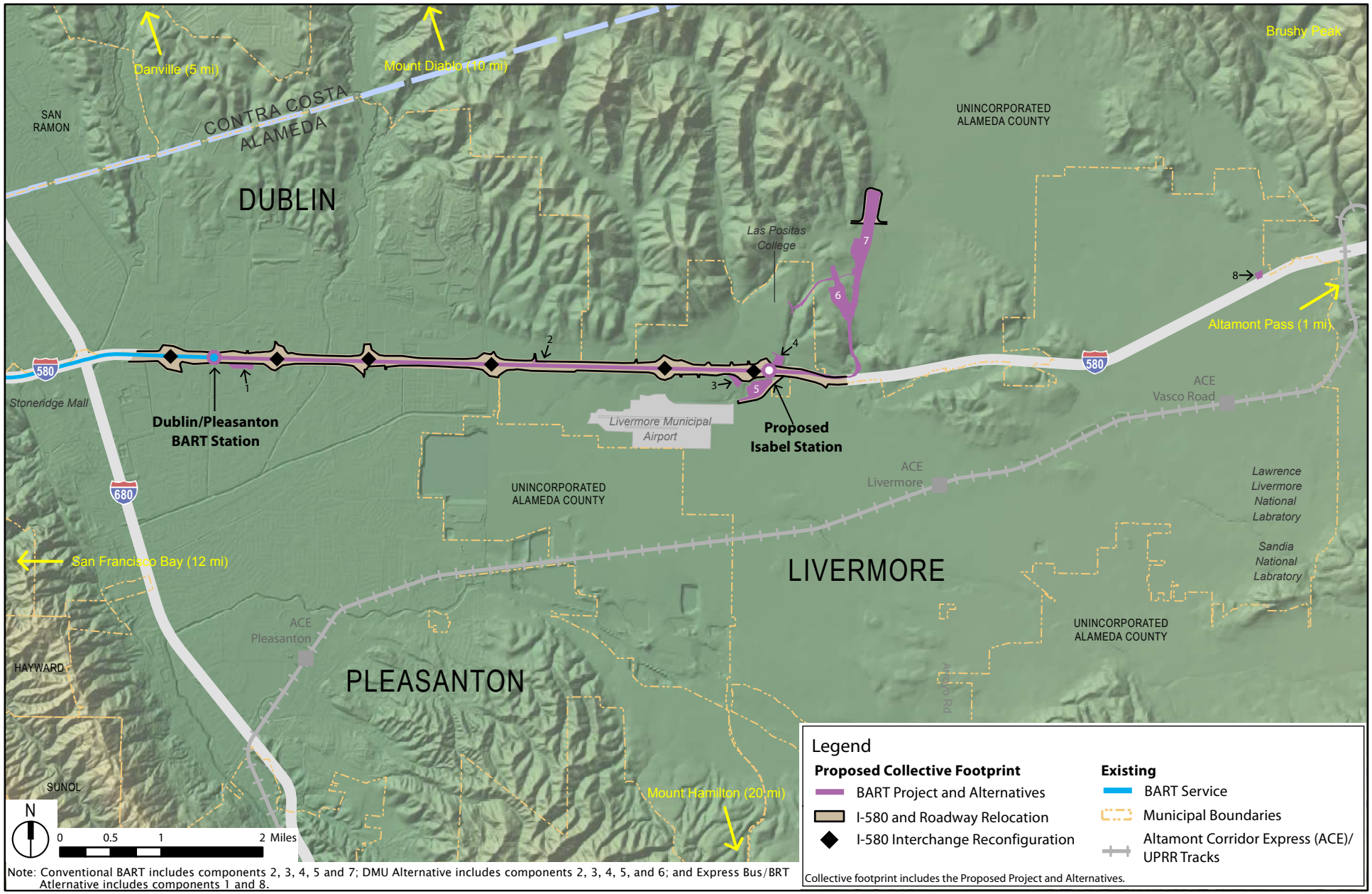
The study area is within the Livermore-Amador Valley and is relatively flat with elevations ranging from about 330 feet above mean sea level (msl) on the west to 600 feet above msl on the east.[7, 8] The Diablo Mountain Range runs through the project corridor, trending in a southeast-to-northwest direction and most of the hills and mountains north and south of the project corridor are part of this range. See Figure 3.H-1 for an overview of the topographic relief in Livermore-Amador Valley.

The regional climate in the study area is Mediterranean, with wet winters and dry summers. As shown in Table 3.H-1, the city of Livermore receives approximately 14.18 inches of rain annually, over 80 percent of which occurs during November to March, with little or no rainfall during summer months. Based on 107 years of rainfall data for Livermore, the 100-year storm is estimated to produce about 3.32 inches in a 24-hour period.[9]

### b. Surface Water Hydrology

The Arroyo de la Laguna watershed, in the South Bay hydrologic unit in Alameda County, is a large and diverse landscape that supports a variety of land uses, habitats, and natural resources. Arroyo de la Laguna was historically the outlet of a permanent, marshy lagoon that occurred at a low point in what is now northwest Pleasanton.[10] Streams that currently

[6] The Livermore and Amador valleys are often referred to as the Livermore-Amador Valley when discussing the combined system.
[7] United States Geological Survey (USGS), 2012a. Dublin, California, United States, Topographic Map.
[8] United States Geological Survey (USGS), 2012b. Livermore, California, United States, Topographic Map.
[9] Zone 7 Water Agency, 2006b. Zone 7 Stream Management Master Plan Environmental Impact Report. March.
[10] Cardno ENTRIX, 2013. Draft Arroyo del Valle and Arroyo de la Laguna Steelhead Habitat Assessment. November.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; NOAA, 2016.

**BART to Livermore Extension Project EIR**

Figure 3.H-1
Hydrology and Water Quality
Topography

**TABLE 3.H-1 PERIOD OF RECORD MONTHLY CLIMATE SUMMARY FOR LIVERMORE 1/1/1903 TO 12/31/2013**

| | Average Max. Temperature (ºF) | Average Min. Temperature (ºF) | Average Total Precipitation (inches) |
|---|---|---|---|
| January | 56.8 | 36.7 | 2.97 |
| February | 61.2 | 39.4 | 2.47 |
| March | 65.2 | 41.3 | 2.15 |
| April | 70.5 | 43.6 | 1.00 |
| May | 76.4 | 47.6 | 0.44 |
| June | 83.1 | 51.7 | 0.11 |
| July | 89.0 | 54.2 | 0.02 |
| August | 88.2 | 54.0 | 0.04 |
| September | 86.0 | 52.5 | 0.22 |
| October | 77.7 | 47.7 | 0.67 |
| November | 66.3 | 41.1 | 1.54 |
| December | 57.5 | 37.0 | 2.56 |
| **Annual** | **73.2** | **45.6** | **14.18** |

Note: ºF = degrees Fahrenheit.
Source: Western Region Climate Center, 2013.

drain to Arroyo de la Laguna, such as Arroyo del Valle and Arroyo Mocho, likely terminated before the lagoon, percolating into the alluvium layer covering the Livermore-Amador Valley, although Arroyo del Valle may have occasionally connected with the lagoon depending on hydrologic conditions.[11] Three major tributaries—Alamo Creek, Arroyo del Valle, and Arroyo Mocho—contribute to Arroyo de la Laguna before it flows into Alameda Creek near the town of Sunol.[12] A few additional, relatively large watersheds also contribute to Arroyo de la Laguna by draining into the principal tributaries: South San Ramon Creek contributes flow to Alamo Creek/Canal, and Arroyo las Positas contributes to Arroyo Mocho. The South San Ramon Creek watershed includes areas in the hills west of Dublin and Pleasanton and south of Mount Diablo. South San Ramon Creek generally

[11] Ibid.
[12] Between I-580 and the confluence with Arroyo de la Laguna, Alamo Creek is referred to as Alamo Canal.

flows to the south, meeting its confluence with Alamo Creek to the east of Interstate Highway (I-) 680 and north of I-580. Arroyo Las Positas generally flows west along I-580; its tributaries include Arroyo Seco, Altamont, Cayetano, Collier Canyon, and Cottonwood Creeks. Along with runoff from more rural and undeveloped areas, the Arroyo de la Laguna watershed collects and drains runoff from the cities of Livermore, Pleasanton, and Dublin, and from urban areas of San Ramon and Danville.

The collective footprint crosses and is located adjacent to intermittent and perennial (year-round) creeks, arroyos, and flood control channels that traverse the alluvial Livermore-Amador Valley. The main streams in the vicinity of the study area are Alamo Creek/Canal, Arroyo de la Laguna, Arroyo del Valle, Tassajara Creek, Arroyo Mocho, Cottonwood Creek, and Arroyo las Positas. Arroyo Mocho and Arroyo del Valle converge on the floor of the Livermore-Amador Valley and drain into Arroyo de la Laguna at its confluence with Alamo Canal. Arroyo de la Laguna eventually drains into Alameda Creek, and Alameda Creek drains to the southern part of San Francisco Bay.

Annual runoff within the Arroyo de la Laguna watershed is highly variable. Many of the tributaries that supply flow to Arroyo de la Laguna are historically intermittent and can become isolated from the mainstem[13] beginning in early to mid-summer, particularly the natural and channelized streams draining the Livermore-Amador Valley.[14] The arroyos and creeks draining to the Livermore-Amador Valley exhibit highly variable daily flows and are rarely perennial in their lower reaches.[15] Some channels are also used as conduits to move water supplies from one area to another, and in certain cases the flow regime is artificially controlled.[16] Artificial lakes are located to the south of I-580, on the south side of Arroyo Mocho where it flows east to west. These lakes were formed by the conversion of abandoned gravel quarry pits to groundwater recharge basins and are called the Chain of Lakes. Additionally, though tributary inputs and total annual runoff volumes can be highly variable, discharges from quarries in the Pleasanton area generally result in year-round flow in the lower reach of Arroyo Mocho and downstream to Arroyo de la Laguna.[17]

[13] The mainstem of a river is the main drainage pathway, as opposed to tributaries that feed into the main drainage pathway.

[14] Gunther, A.J, J. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Fisheries Restoration Workgroup. February 7.

[15] Zone 7 Water Agency, 2006c. Zone 7 Stream Management Master Plan Final Master Environmental Impact Report, Chapter 3. August-.

[16] Gunther, A.J, J. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Fisheries Restoration Workgroup. February 7.

[17] Ibid.

### (1) Water Features in the Study Area

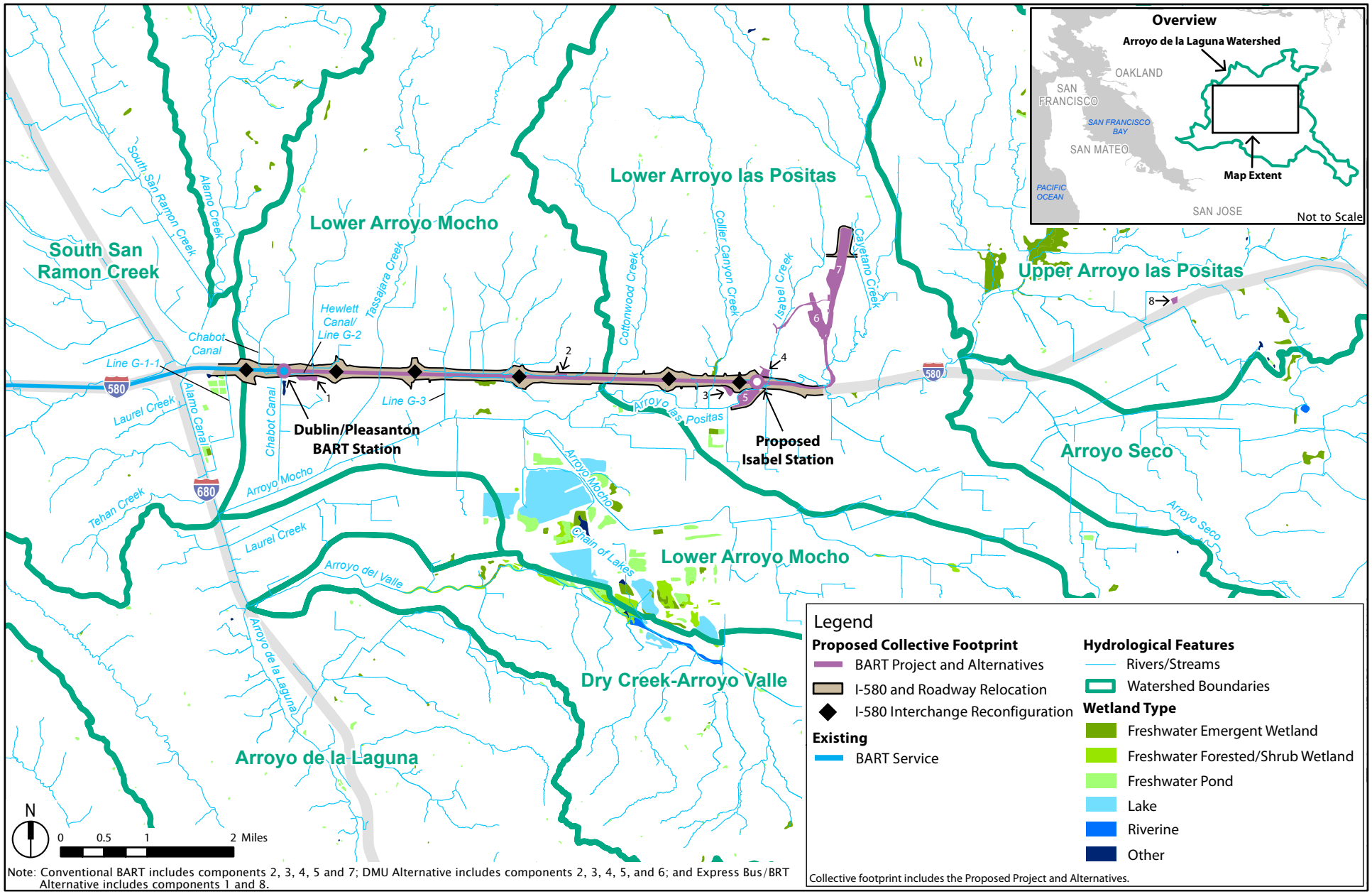
Streams and surface waters that extend through the collective footprint, from west to east, include the following: Line G-1-1; Chabot Canal and its tributary Line G-2 (also referred to as Hewlett Canal); Tassajara Creek; Line G-3; Arroyo las Positas; Cottonwood Creek; Collier Canyon Creek; Isabel Creek; Cayetano Creek; and other unnamed surface water features and drainages. [18, 19] These features are described in detail below. Other receiving surface water features, those downstream of waterways extending through the project corridor, include Arroyo Mocho, local wetlands, and unnamed local drainage features. Figure 3.H-2 shows the location of these water features as well as others within the area. These creeks and unnamed tributaries drain into Arroyo Mocho, which drains into Arroyo de la Laguna and ultimately into Alameda Creek downstream of the study area.

#### (a) Alamo Canal and Line G-1-1

Alamo Canal is a trapezoid flood-control channel that flows generally south through the study area, but does not extend through the collective footprint. The channel originates north of I-580 as Alamo Creek, which drains the Dougherty Valley. Alamo Creek flows south and becomes Alamo Canal on the upstream (north) side of I-580. Water drains to this channel from creeks to the west, including Dublin Creek, and from South San Ramon Creek to the north, which connects to Alamo Creek approximately 1 mile north of I-580. Upstream of the South San Ramon Creek confluence, Alamo Creek has a more natural form, which includes a more sinuous flow path and a narrow riparian corridor; downstream of this confluence, the channel is generally straight, trapezoidal, and lacking in any riparian vegetation. Alamo Canal flows into Arroyo de la Laguna near the southwest border of Pleasanton, at the point where Arroyo Mocho also flows into Arroyo de la Laguna. Zone 7 Stream Management Master Plan Reach 9 is located within the Alamo Canal drainage area.

Line G-1-1 is a tributary flood control channel that flows into Alamo Canal between West Las Positas Boulevard and Stoneridge Drive, approximately 0.5 mile upstream of Arroyo de la Laguna. In some areas, the channel bottom of Line G-1-1 is below the groundwater table, which tends to result in areas of slow, stagnant flow during low-flow periods.[20]

[18] Zone 7 commonly uses the term “line” to refer to unnamed sections of flood control channels (e.g., Line J-1, Line-G-3).
[19] Summarized from Zone 7 Water Agency, 2006c.
[20] Zone 7 Water Agency, 2006c. Zone 7 Stream Management Master Plan Final Master Environmental Impact Report, Chapter 3. August-.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; DWR, 2004; USFW (NWI), 2012; Zone 7, 2016.

**BART to Livermore Extension Project EIR**

Figure 3.H-2
Hydrology and Water Quality
Surface Hydrology

### (b) Chabot Canal and Line G-2

Chabot Canal is a long, uniform-depth, trapezoidal flood control channel that traverses commercial and industrial areas and flows south toward Arroyo Mocho. Line G-2, which is also referred to as Hewlett Canal, is a tributary to Chabot Canal and parallels the south side of the freeway adjacent to the Dublin/Pleasanton BART Station (Dublin/Pleasanton Station) before flowing into Chabot Canal and eventually Arroyo Mocho farther south. Line G-2 is characterized by perennial flows and shallow water with bottom substrates consisting of native clay materials, gravel, and silt.

### (c) Tassajara Creek

Tassajara Creek consists of two distinct channel segments with an indeterminate connection. The upstream portion of Tassajara Creek is a primarily natural channel that drains areas south of Mount Diablo, crosses beneath I-580, and flows into Arroyo Mocho as a flood control channel in the city of Pleasanton. Tassajara Creek drains about 27 square miles of the northern hills to its confluence with Arroyo Mocho, near Dublin Boulevard. North of I-580, Tassajara Creek runs through a narrow riparian corridor and is generally considered a losing stream, meaning that water flows from the creek bed and bank and infiltrates the surrounding groundwater basin. South of I-580, Tassajara Creek is a trapezoidal flood control channel, generally considered a gaining stream, which is recharged with flow from the shallow groundwater aquifer.

### (d) Line G-3

Line G-3 is an isolated trapezoidal urban flood control channel that receives high-volume flows from a large area north of I-580 and contributes surface runoff to Arroyo Mocho. This channel parallels I-580 to the north along Northside Drive before crossing under I-580 and flowing south. The base of the channel is about 8 to 12 feet wide as measured from the toe of slope. Line G-3 catches the underground flows through three underground channel tunnels that receive perennial flows from an expansive upland area north of I-580 and are approximately 10 to 12 feet wide.[12] The tunnels are part of an extensive underground storm drain system that receives urban runoff north of I-580. Upstream of Line G-3 is a natural unnamed drainage, referred to herein as the Fallon Road Drainage, which flows between Croak Road and Fallon Road just north of the Fallon Road/I-580 westbound off-ramp. The bottom substrate of the Fallon Road Drainage consists of concrete and riprap, with limited coverage by native clay.

### (e) Arroyo Las Positas

Arroyo las Positas is a major drainage feature of the Livermore-Amador Valley in the northeast portion of the Alameda Creek watershed. It drains approximately 80 square miles prior to its confluence with Arroyo Mocho. Summer flows include a combination of

irrigation, urban flows, and agricultural runoff, all of which maintain Arroyo las Positas as a perennial creek. Arroyo las Positas begins in the Altamont Hills east of Livermore and flows westward to its confluence with Arroyo Mocho at El Charro Road. Arroyo las Positas flows primarily east-west through the city of Livermore, through the Las Positas Golf Course. The main-stem parallels I-580 through the city of Livermore and crosses under I-580 at several locations. Southeast of the Isabel Avenue/I-580 interchange, Arroyo las Positas runs through the Isabel South Area parallel to the north side of the proposed Isabel Station parking area. Inadequate channel capacity leads to associated periodic flooding in the lower, flat-gradient reach of Arroyo las Positas near its confluence with Arroyo Mocho.

The Arroyo las Positas watershed consists of a broad alluvial plain and gently sloped upland areas drained by several tributaries: Cottonwood Creek, Collier Canyon Creek, Isabel Creek, Cayetano Creek, Altamont Creek, and Arroyo Seco. The watershed is characterized by heavily incised channels through primarily commercial, agricultural, and ranch lands. All channels in this watershed are either flood control channels or natural channels traversing heavily grazed grasslands.[21] The predominant substrate size is fine silts with virtually no riparian vegetation. Base flows in these channels are generally low.

The tributaries to Arroyo las Positas within the collective footprint are described further below.

**Cottonwood Creek**

The Cottonwood Creek watershed is located north of I-580 between the cities of Dublin and Livermore. It flows north to south along Doolan Road through Doolan Canyon, which is bordered in the west, north, and east by the rolling foothills of Mount Diablo. Cottonwood Creek crosses under I-580 and into Arroyo las Positas near the Las Positas Golf Course. Stock ponds, natural springs, and seasonal wetlands are dispersed throughout Doolan Canyon.[22] Cottonwood Creek is a natural, seasonally dry ephemeral stream (only flowing immediately following rainfall events) that traverses grazing land and has a moderate slope. The stream channel is approximately 6 to 10 feet wide at the toe of slope near I-580. The bottom substrate in Cottonwood Creek consists of gravel and native soil.

[21] Gunther, A.J, J. Hagar, and P. Salop, 2000. An Assessment of the Potential for Restoring a Viable Steelhead Trout Population in the Alameda Creek Watershed. Prepared for the Alameda Fisheries Restoration Workgroup. February 7.

[22] City of Livermore, 2013. City of Livermore Doolan and Springtown Preserve Mitigation Bank Request for Proposal. June.

### Collier Canyon Creek

Collier Canyon Creek is a channelized perennial drainage located in an area that has recently constructed development, particularly around Las Positas College. Upstream of I-580, this creek is a natural narrow channel with moderate slope; downstream from I-580, it is a concrete-lined channel. Collier Canyon Creek crosses under I-580 and into Arroyo las Positas east of the Las Positas Golf Course.

### Isabel Creek

Isabel Creek drains a relatively small watershed that is situated between the larger Collier Canyon Creek and Cayetano Creek watersheds. The watershed is located north of I-580 and drains mostly rural areas before flowing into the lower Arroyo las Positas on the north side of I-580. This channel is unnamed on USGS maps, but is referred to as Isabel Creek by Zone 7.

### Cayetano Creek

The Cayetano Creek watershed is located north of I-580 in the city of Livermore. Cayetano Creek flows from north to south and drains into Arroyo las Positas north of I-580. The creek has been channelized along much of its length, though the lower quarter maintains a somewhat more natural, sinuous plan form. The watershed is heavily grazed by ranching land uses and riparian vegetation is generally limited. Wetlands and other aquatic features in the Cayetano Creek watershed are discussed in more detail in Section 3.I, Biological Resources.

### Arroyo Mocho

Arroyo Mocho drains approximately 36,000 acres of mixed agricultural, 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, 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 Arroyo Mocho is variable. Summer flows are typically low, often depending on releases from Zone 7 to the Chain of Lakes system for groundwater recharge, and may sometimes run dry during the summer due to inadequate release volumes.

The lower reach of Arroyo Mocho, between Arroyo de la Laguna and Santa Rita Road, has been subject to considerable deposition, resulting in a 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 2 to 3 feet

deep and 5 to 10 feet wide. The reach between Stoneridge Drive and the confluence of Arroyo las Positas (at El Charro Road) has been widened to 60 feet at the channel bottom and 160 feet from bank to bank.

The portion of Arroyo Mocho flowing through the Chain of Lakes area is naturally ephemeral. During the dry season, Arroyo Mocho is effectively two distinct segments separated by an approximately 200-yard dry length in the Pleasanton gravel quarry area. Arroyo Mocho is an important source of groundwater recharge for the Livermore-Amador Valley, particularly between Robertson Park in the city of Livermore and through the Chain of Lakes area. Flows in the upper watershed are supported by DWR releases from the California Aqueduct, which are intended to seep into the streambed and recharge groundwater in areas downstream. Flows below the quarries are supported by a National Pollution Discharge Elimination System (NPDES)-permitted discharge from quarry operators. Zone 7 manages the releases from DWR to maintain the dry length, ensuring that the water purchased from the State of California (State) is entering the groundwater basin.

Through the city of Livermore, Arroyo Mocho is an urban stream; however, some fairly natural segments contain gravel and cobble stream substrates. Sedimentation, gravel transport, and deposition periodically occur along Arroyo Mocho. Gravel deposition at Holmes Street and Stanley Boulevard bridges has resulted in capacity constraints at these two locations. Additionally, Arroyo Mocho tends to deposit gravel through the Chain of Lakes area, which decreases the channel capacity.

Aggradation (i.e., deposition of material by a river, stream, or current) is prevalent from the Chain of Lakes, downstream to its confluence with Arroyo de la Laguna, which periodically results in decreased channel capacity and an increased occurrence of flooding events in Arroyo Mocho. This section of Arroyo Mocho is not generally considered integral for water supply or aquifer recharge.

### (f) Chain of Lakes

A complex of large, active and inactive gravel mining pits, collectively known as the Chain of Lakes, is located in the middle of the Livermore-Amador Valley, south of I-580 in unincorporated Alameda County, on the south side of Arroyo Mocho. As part of mitigation and the long-term plan for reclamation of the former gravel mines, most of the lakes will eventually be deeded to Zone 7 and used primarily for water surface water storage, stormwater retention, and/or groundwater recharge.[23] Three of the lakes are managed by Zone 7, and the rest are still actively mined. Zone 7 has developed a near-term delivery

[23] Zone 7 Water Agency, 2015. Annual Report for the Groundwater Management Program 2014 Water Year, Livermore Valley Groundwater Basin. July.

and groundwater recharge plan using these lakes.[24] As part of the Zone 7 plan, some of the lakes are proposed to be used primarily for groundwater recharge because the permeable soils along the lakes' sides allow for lateral seepage and efficient recharge of groundwater. Other lakes are proposed for conveyance and storage because recharge is not feasible as the silt in the bottom inhibits significant water infiltration into the groundwater table.

### (g) Other Water Features

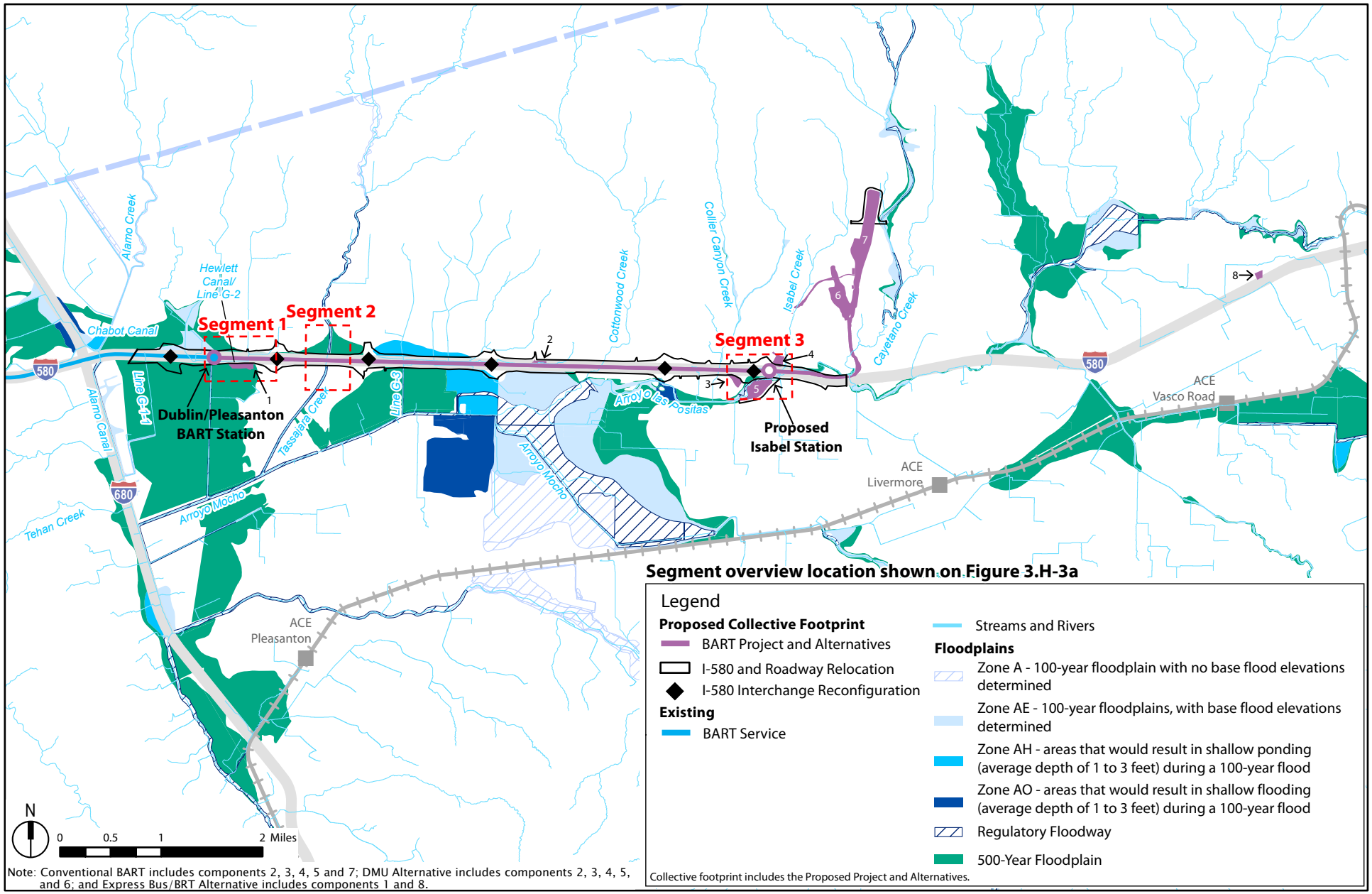
Additional unnamed drainages intersect the collective footprint, and several natural and man-made water features are also present in the study area. Man-made ponds are located within the Las Positas Golf Course (in the city of Livermore, adjacent to and south of I-580). Wetlands also occur within the study area and small, local aquatic features pass through the collective footprint, including a small pond in the Cayetano Creek area along Hartman Road. See Section 3.I, Biological Resources for additional discussion of wetlands.

## c. Flooding and Flood Hazards

The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps that identify areas subject to flooding (Special Flood Hazard Areas). Special Flood Hazard Areas are rated by FEMA by the risk of flooding and projected depth of flooding, and are generally defined by the 100-year flood zone (also known as the 1-percent-annual-chance flood, or base flood) and the 500-year flood zone (also known as the 0.2-percent-annual-chance flood). Some areas within 100-year flood zones are further designated as regulatory floodways and have more stringent limitations on encroachment of fill and structures. See the Regulatory Framework subsection below for further discussion of regulatory floodways. The Special Flood Hazard Areas for the 100-year and 500-year flood are shown in Figures 3.H-3a and 3.H-3b. Flood zones and designations within the study area are as follows:

- 100-year floodplain:
  - 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 1 to 3 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 elevations of 1 to 3 feet.

[24] Zone 7 Water Agency, 2014. Preliminary Lake Use Evaluation for the Chain of Lakes. March.

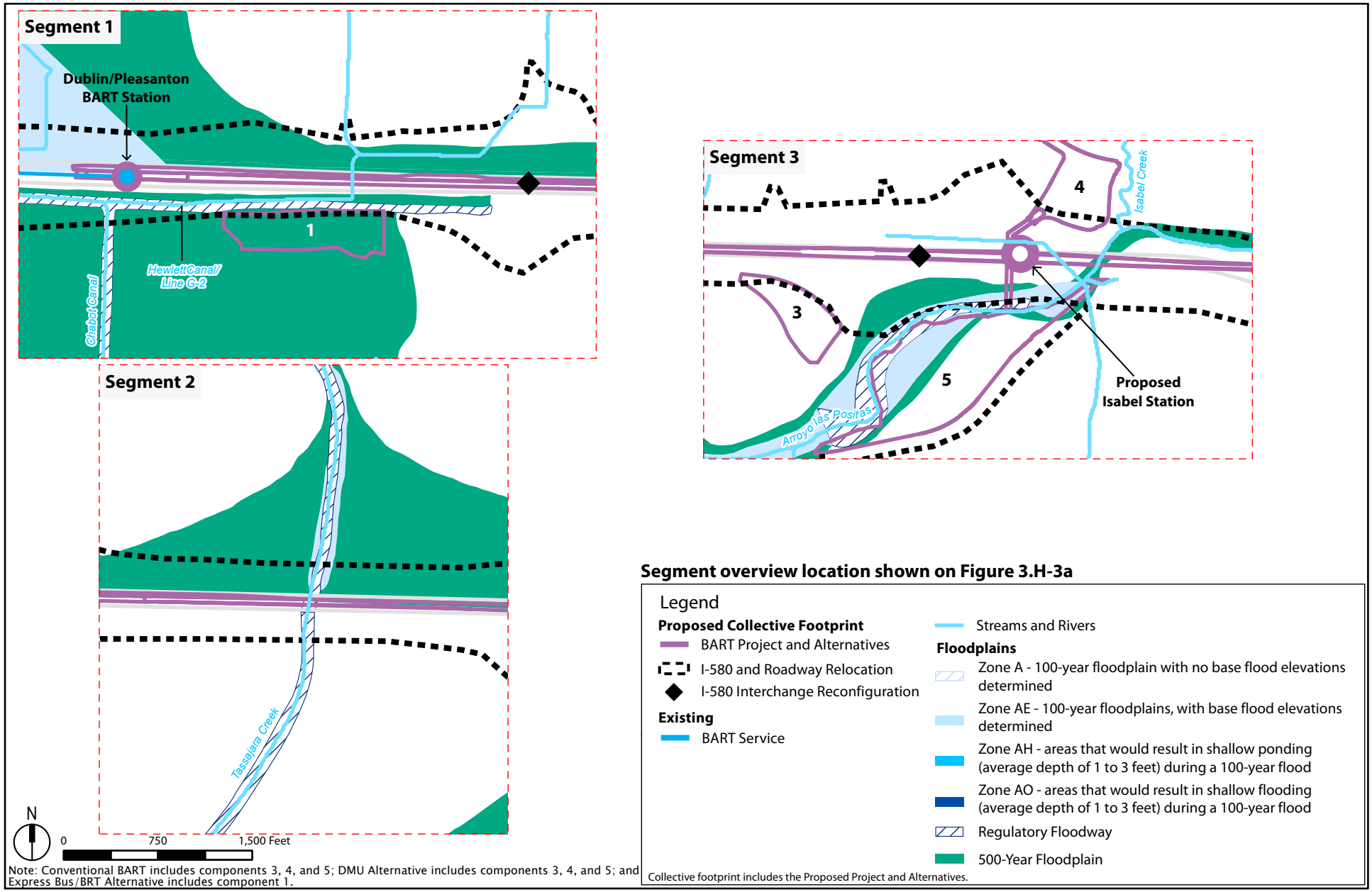



Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; FEMA, 2009a.

**BART to Livermore Extension Project EIR**

Figure 3.H-3a
Hydrology and Water Quality
Special Flood Hazard Areas – Overview




Note: Conventional BART includes components 3, 4, and 5; DMU Alternative includes components 3, 4, and 5; and Express Bus/BRT Alternative includes component 1.

Source: Arup, 2017b; FEMA, 2009a.

BART to Livermore Extension Project EIR

Figure 3.H-3b
Hydrology and Water Quality
Special Flood Hazard Areas – Detail

- 100-year floodplain (regulatory floodway):
  - Zone AE Special Flood Hazard Areas that have also been designated as a regulatory floodway. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1 foot.[25]
- 500-year floodplain
- Areas with no floodplain designation

Special Flood Hazard Areas underlie portions of the collective footprint. For example, as shown in Figures 3.H-3a and 3.H-3b, portions of the study area are within a Zone AE 100-year floodplain. The largest 100-year floodplains within the study area include the following areas: Alamo Canal adjacent to the I-580/I-680 crossing; areas draining to Chabot Canal upstream of I-580; the north side of I-580 between Tassajara Road and Fallon Road; Arroyo Mocho and the Chain of Lakes area; and the Las Positas Golf Course area. In addition, regulatory floodways relevant to the collective footprint include those for Chabot Canal and Line G-2 near the Dublin/Pleasanton BART Station, Tassajara Creek at I-580, and Arroyo las Positas just upstream (east) of Isabel Avenue (adjacent to the proposed Isabel BART Station).

Ultimately, flood control management, policy promulgation, and enforcement are under the authority of FEMA. However, under the federal code, these responsibilities can also be delegated to a local floodplain manager, such as a city and/or municipality or a local agency. Flood control within the Livermore-Amador Valley is primarily under the jurisdiction of Zone 7 and individual municipalities, which are collectively responsible for most flood control structures and conveyances in the study area.[26] The City of Livermore, the City of Pleasanton, and the City of Dublin also provide local floodplain management and maintenance of unimproved drainage channels and storm drain systems within their jurisdictions. Zone 7 maintains a large network of improved flood control channels.

Over time, urban development has encroached on floodplain areas of the Livermore-Amador Valley. Some broad arroyos have been converted to trapezoidal channels, and construction of new roads and buildings has increased the total impervious surface area in the watershed and resulted in an overall reduction in infiltration area and an associated increase in peak runoff rates and volumes within the valley. As the Livermore-Amador Valley continues to change from rural to urban and suburban land

[25] Federal Emergency Management Agency (FEMA), 2009b. Flood Insurance Study, Alameda County, California, and Incorporated Areas, Volume 1 of 3. August 3.
[26] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.

uses, increases in both peak runoff and runoff volume are predicted for most of the principal creeks and arroyos in and around the study area.[27] Further, growth and development encroachment onto historic floodplains has exacerbated the risk of flood damage.[28] In the past, flooding has occurred within the Livermore-Amador Valley at several locations: 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 the confluence of Arroyo las Positas and Arroyo Mocho.

### d. Dam Inundation Areas

Del Valle Dam at Lake Del Valle is approximately 7 miles south of the study area. The dam was constructed in 1969 and is under the jurisdiction of the DWR Division of Safety of Dams. The maximum capacity of the Del Valle Dam reservoir is 77,106 acre-feet, but its operating capacity is typically approximately 50 percent of the maximum capacity or less to maintain flood control storage capacity.[29, 30] The dam averages about 44,000 acre-feet of storage. As shown in Figure 3.H-4, the portion of the study area west of Airway Boulevard is within the Del Valle Dam failure inundation area, which means that in 5 to 40 minutes after a catastrophic dam failure, this area would be inundated with water from the reservoir.[31]

### e. Groundwater Hydrology

The study area is within the Livermore-Amador Valley Groundwater Basin.[32] 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.

[27] Zone 7 Water Agency, 2006c. Zone 7 Stream Management Master Plan Final Master Environmental Impact Report, Chapter 3. August-.

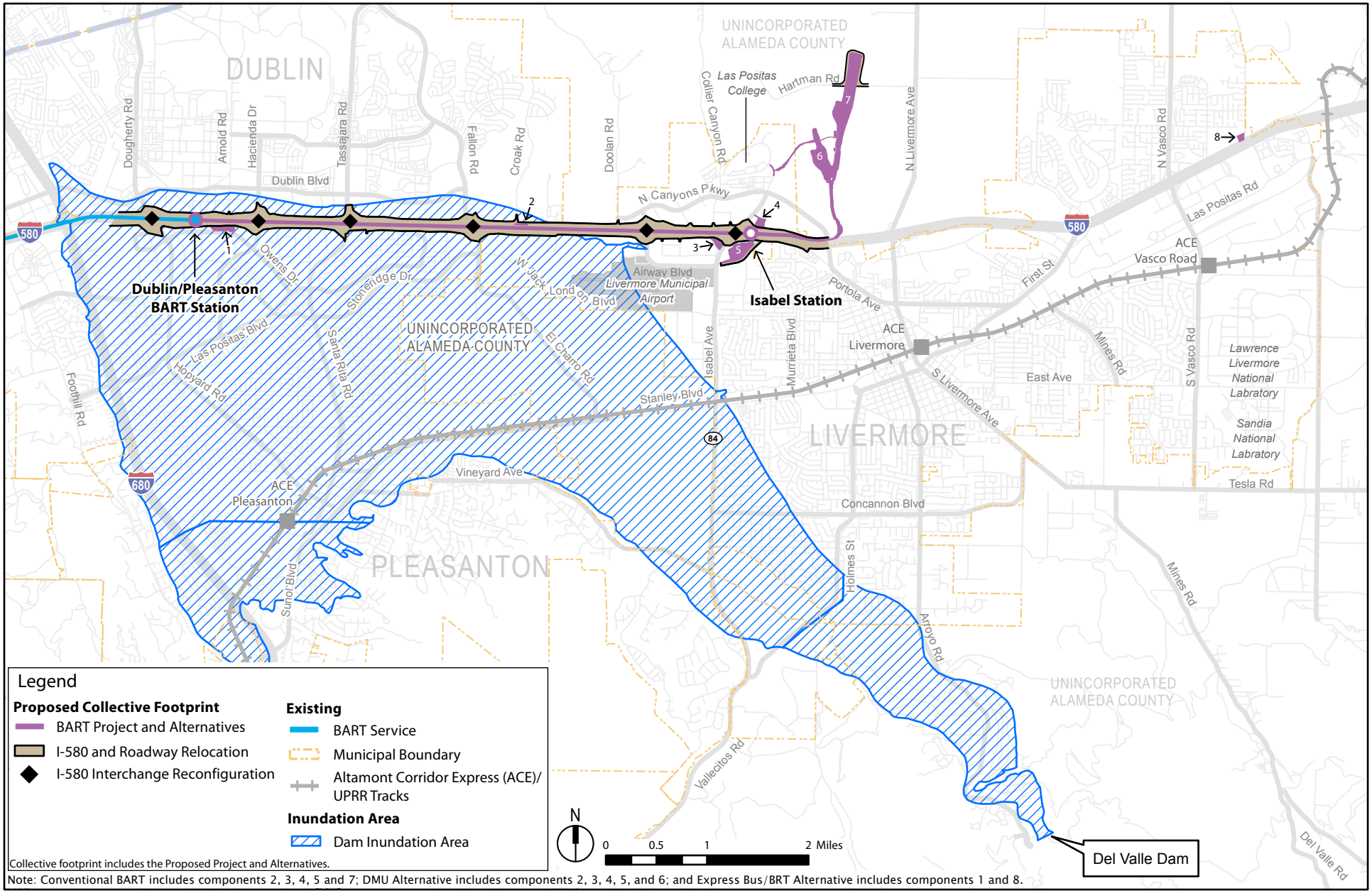
[28] Ibid.

[29] California Department of Water Resources (DWR), 2008. Bulletin 132-07: Management of the California State Water Project, Chapter 8 Water Supply.

[30] Lunn, David, 2008. Personal communication from David Lunn, Zone 7 Senior Water Engineer, with PBS&J. January 23.

[31] City of Livermore, 2004. City of Livermore General Plan 2003 – 2025, Public Safety Element, Figure 10-5 Dam Failure Inundation Areas Del Valle Dam.

[32] California Department of Water Resources (DWR), 2003. California Groundwater Bulletin 118; San Francisco Bay Hydrologic Region, Livermore Valley Groundwater Basin.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; OES, 2002.

**BART to Livermore Extension Project EIR**

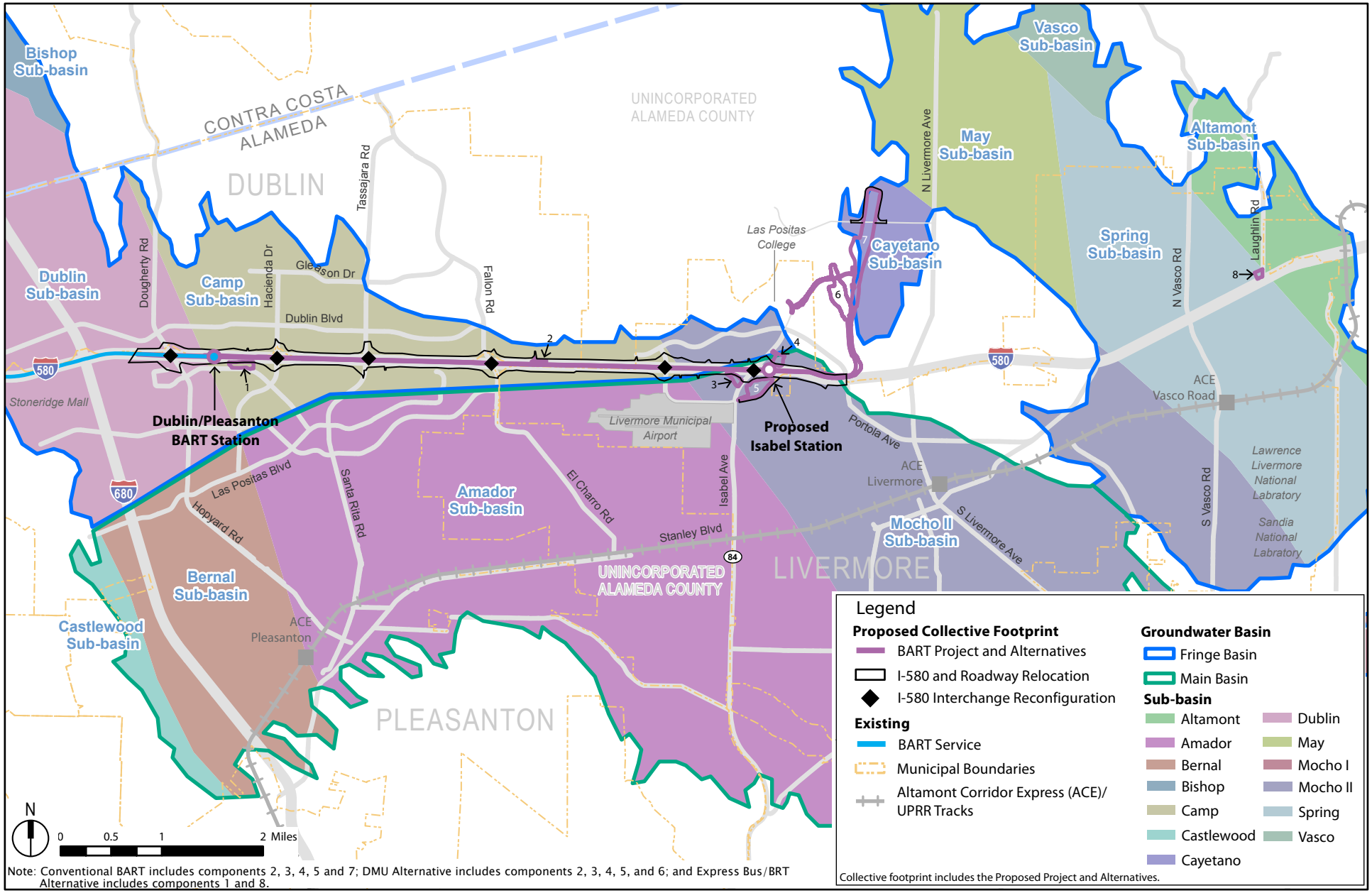
Figure 3.H-4
Hydrology and Water Quality
Dam Inundation Areas

Within the Livermore-Amador Valley Groundwater Basin, ground surface elevations 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; it 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.[33] The floor of the Livermore-Amador Valley and portions of the upland areas of the valley overlie groundwater-bearing materials. The three major faults—Livermore Fault, Pleasanton Fault, and Parks Fault—prevent lateral groundwater movement. The general groundwater gradient is from east to west then south toward Arroyo de la Laguna.[34] Groundwater levels within the study area can range from less than 10 feet below ground surface in unconfined aquifers to more than 70 feet below ground surface.[35] Zone 7 administers oversight of the Livermore-Amador Valley Groundwater Basin through its Groundwater Management Program. The DWR has not identified the Livermore-Amador Valley Groundwater Basin as either in overdraft or expected to be in overdraft.

The Livermore-Amador Valley Groundwater Basin has been divided into two major basins based on importance for water supply: the Main Basin, which is the primary basin for groundwater storage and supply, and the Fringe Basin, which is a secondary basin surrounding the Main Basin that provides limited storage and supply. The Main Basin is composed of the Castlewood, Bernal, Amador, and Mocho II sub-basins, and represents the portion of the groundwater basin with the highest yield and highest quality of water within the Livermore-Amador Valley Groundwater Basin.[36] The Fringe Basin is considered to be less important for groundwater supply and management.[37] The collective footprint is primarily within the boundaries of the Fringe Basin, with a small portion of the area overlying the Main Basin at the Isabel North and South Areas, as shown in Figure 3.H-5.

The Main Basin covers over 17,000 acres and has an estimated storage capacity of 250,000 acre-feet, which is essentially equivalent to the estimated capacity of the entire Livermore-Amador Valley Groundwater Basin.[38] Though the overall extent of the area covered by the Fringe Basin is much greater (approximately 45,000 acres), it has much less capacity for groundwater storage. Currently, Zone 7 manages the Main Basin so that,

[33] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.
[34] California Department of Water Resources (DWR), 2003. California Groundwater Bulletin 118; San Francisco Bay Hydrologic Region, Livermore Valley Groundwater Basin.
[35] Zone 7 Water Agency, 2015. Annual Report for the Groundwater Management Program 2014 Water Year, Livermore Valley Groundwater Basin. July.
[36] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.
[37] Ibid.
[38] Ibid.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; Zone 7, 2013a.



Figure 3.H-5
Hydrology and Water Quality
Groundwater Basins

under non-emergency conditions, including several multi-year droughts, groundwater elevations do not drop below historic low levels through annual conjunctive use practices.[39] Groundwater recharge occurs through natural and artificial recharge from rainfall, releases from the South Bay Aqueduct of Lake del Valle, and gravel mining (water) recharge to Arroyo Mocho and Arroyo del Valle; however, the majority of recharge is through artificial recharge and recharge through stream channels. The annual average natural recharge into the groundwater basin is approximately 13,400 acre-feet per year.

Zone 7 artificially recharges the basin with additional surface water supplies by releasing water into Arroyo Mocho and Arroyo Valle. The existing artificial recharge capacity ranges from 12,300 to 20,000 acre-feet per year.[40]

Similar to surface streams in the study area, groundwater generally follows a westerly flow pattern along the axis of the valley.[41] The southeastern region of the Livermore-Amador Valley, farther southeast beyond the study area at the edge of the valley, is the most important groundwater recharge area, consisting mainly of sand and gravel deposited by the ancestral and present Arroyo del Valle and Arroyo Mocho.

### f. Water Quality

#### (1) Surface Water Quality

While limited water quality data are available for the streams within the study area, water quality is expected to reflect the land uses in the watershed. The type and concentrations of pollutants in runoff water tend to be related to land cover, land uses, topography, and the amount of impervious cover, as well as to the intensity and frequency of rainfall and, in some cases, irrigation. Land uses surrounding the waterways draining the study area include open space, urban/industrial, and agriculture. Runoff in developed areas may 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 to runoff. Open space lands typically contribute bacteria, sediment from steep areas, and landscaping materials, if landscaped.

[39] Conjunctive use means the use of groundwater mixed with surface water to meet water demands and water quality requirements, and includes the use of surface water resources to artificially recharge groundwater.

[40] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.

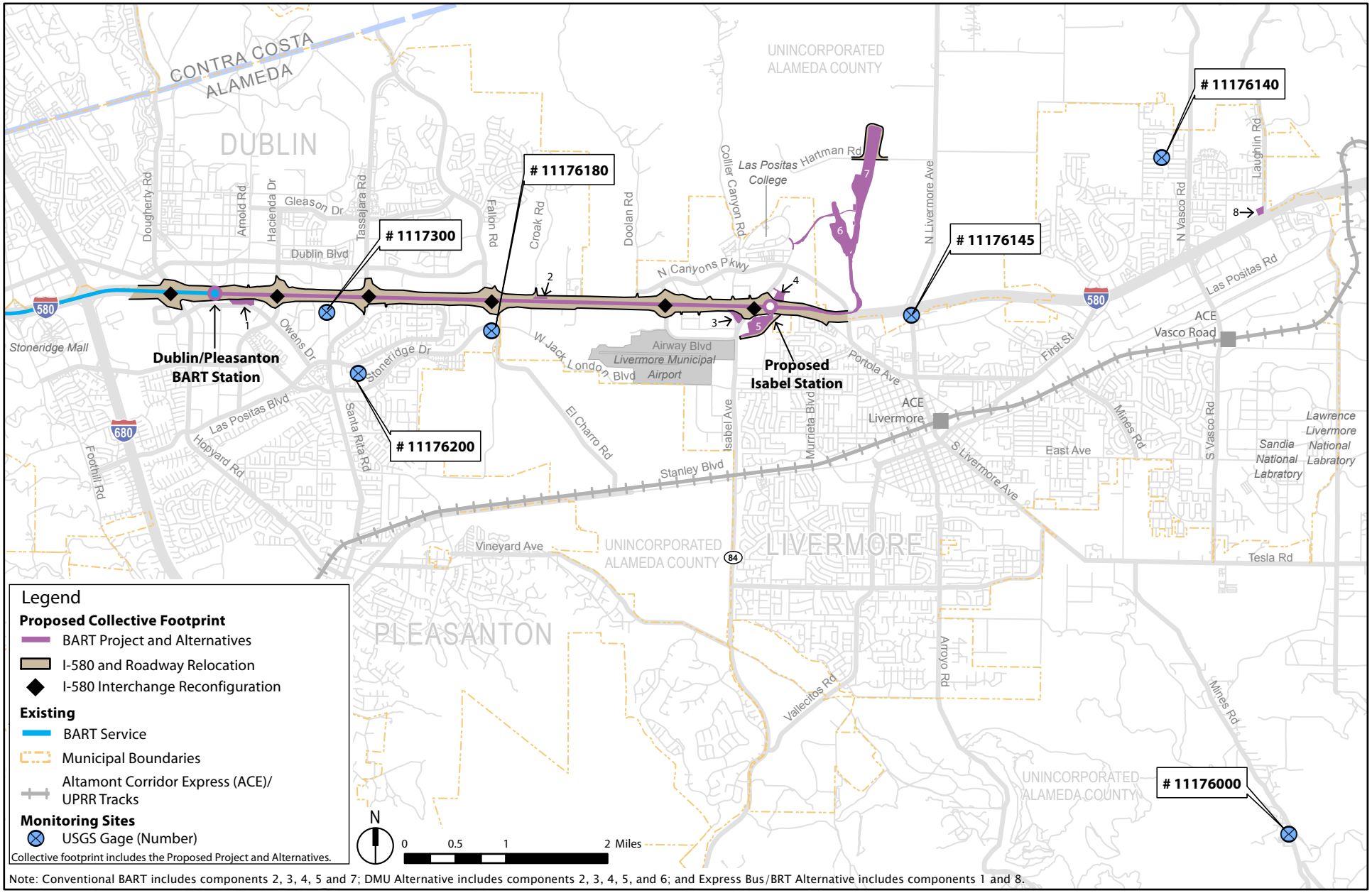
[41] Zone 7 Water Agency, 2016a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin. December.

Available water quality data for the study area include water quality data gathered by the USGS during the early 1980s and more recent data collected by Zone 7. Available data suggest that the water quality of Arroyo Las Positas has remained relatively unchanged throughout the past 20 years, and that Zone 7 water quality objectives are being met for most constituents. [42] Total dissolved solids (TDS) thresholds, however, are exceeded regularly, and the water is generally high in chlorides. Alkaline soils in natural sections of the creek are a contributing factor to the elevated TDS levels. Ongoing erosion of stream bed and banks is also contributing sediment to the creek. Table 3.H-2 lists the range of historic water quality measurements in Tassajara Creek, Arroyo las Positas, Arroyo Mocho, and Altamont Creek. Figure 3.H-6 summarizes the locations of the water quality monitoring sites described in Table 3.H-2 relative to the study area and features. Historic measures of surface water quality indicate generally high salinity or hardness, nitrogen, and chloride, and moderately high pH. Table 3.H-3 lists measured water quality parameters in Arroyo Mocho and Arroyo las Positas for the 2014 water year (October 1, 2013 through September 30, 2014).

In accordance with State policy for water quality control, the San Francisco Bay Regional Water Quality Control Board (RWQCB) employs a range of beneficial use definitions for surface waters, groundwater, marshes, and mudflats that serve as the basis for establishing water quality objectives and discharge conditions and prohibitions. The San Francisco Bay RWQCB has identified existing and potential beneficial uses supported by the key surface water drainages throughout the Bay Area in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan).[43] Many of the water bodies within the study area are tributaries to either Arroyo las Positas or Arroyo Mocho, and have been assigned the following existing and potential beneficial uses in the Basin Plan: groundwater recharge, cold freshwater habitat, warm freshwater habitat, fish migration, fish spawning, wildlife habitat, contact water recreation, and non-contact water recreation. Because the beneficial uses of any specifically identified water body generally apply to all its tributaries, the beneficial use of wildlife habitat applies to the tributaries of Arroyo las Positas and Arroyo Mocho. The beneficial uses designated in the Basin Plan for the creeks and arroyos in the proposed location of the Proposed Project and Build Alternatives are identified in Table 3.H-4.

[42] City of Livermore, 2016. El Charro Specific Plan Draft Environmental Impact Report. Available at: http://www.cityoflivermore.net/citygov/cedd/planning/charro.htm.

[43] Regional Water Quality Control Board, 2015. San Francisco Bay Basin Water Quality Control Plan. RWQCB San Francisco Bay Region. March.




Note: Conventional BART includes components 2, 3, 4, 5 and 7; DMU Alternative includes components 2, 3, 4, 5, and 6; and Express Bus/BRT Alternative includes components 1 and 8.

Source: Arup, 2017b; USGS, 2013a.



Figure 3.H-6
Hydrology and Water Quality
USGS Water Monitoring Sites

**TABLE 3.H-2 HISTORIC SURFACE WATER QUALITY WITHIN THE STUDY AREA**

| | Location | | | | | |
|---|---|---|---|---|---|---|
| **Constituent** | **Tassajara Creek Near Pleasanton** | **Arroyo Mocho Near Pleasanton** | **Arroyo las Positas at El Charro Road Near Pleasanton** | **Arroyo las Positas at Livermore** | **Altamont Creek Near Livermore** | **Arroyo Mocho Near Livermore** |
| USGS Gage # | 11176300 | 11176200 | 11176180 | 11176145 | 11176140 | 11176000 |
| Date | 1/80–6/83 | 11/70–6/83 | 12/79–6/83 | 3/81–6/83 | 1/80–3/80 | 10/79–8/83 |
| Specific Conductivity (µS/cm) | 345–1,300 | 500–1,610 | 340–2,500 | 1,050–3,250 | 670–4,440 | 270–1,300 |
| pH | 7.7–8.6 | 7.8–8.8 | 7.5–8.6 | 7.0–8.4 | 8.3 | 7.7–8.6 |
| Nitrate + Nitrite as Nitrogen (mg/L) | 0.04–2.60 | 0.15–4.40 | 0.58–6.20 | 0.02–7.40 | 2.10–5.00 | 0.010–1.70 |
| Hardness as Calcium Carbonate (mg/L) | 73–320 | 190–370 | 59–460 | 37–110 | 100–480 | 120–600 |
| Sodium (mg/L) | 41–160 | 45–110 | 49–420 | 3.3–8.7 | 140–770 | 12–63 |
| Chloride (mg/L) | 16–100 | 47–280 | 48–640 | 170–730 | 120–1,200 | 7.1–79 |
| Residue Filtered, Sum of Constituents (Dissolved Solids) (mg/L) | 243–730 | 260–671 | 203–1,450 | 501–2,050 | 478–2,510 | 159–734 |

Notes: µS/cm = microSiemens per centimeter; pH = potential of hydrogen (scale of acidity); mg/L = milligrams per liter
Source: U.S. Geological Survey (USGS), 2013b.

**TABLE 3.H-3 RECENT SURFACE WATER QUALITY IN ARROYO MOCHO AND ARROYO LAS POSITAS**

| Location | Electrical Conductivity (µS/cm) | pH | TDS (mg/L) | Hardness (mg/L) | Nitrogen (mg/L) | Chloride (mg/L) |
|---|---|---|---|---|---|---|
| **Arroyo Mocho** | | | | | | |
| Near Livermore | 1,104–2,533 | 7.6–7.9 | 678–1,533 | 544–1,047 | <0.44–0.97 | 54–394 |
| Near Pleasanton | 1,217 | 8.4 | 697 | 307 | <0.44 | 197 |
| **Arroyo las Positas** | | | | | | |
| At Livermore | 1,219 | 8.0 | 711 | 374 | 13.46 | 150 |
| At El Charro Road | 1,222 | 8.1 | 688 | 344 | 1.95 | 164 |

Note: µS/cm = microSiemens per centimeter; pH = potential of hydrogen (scale of acidity); mg/L = milligrams per liter; TDS = total dissolved solids.
Source: Zone 7 Water Agency, 2015.

**TABLE 3.H-4 DESIGNATED BENEFICIAL USES**

| Waterbody | Cold Freshwater Habitat | Groundwater Recharge | Fish Migration | Water Contact Recreation | Non-contact Water Recreation | Fish Spawning | Warm Fish Habitat | Preservation of Rare Species | Wildlife Habitat |
|---|---|---|---|---|---|---|---|---|---|
| Arroyo Mocho | E | E | E | E | E | E | E | | E |
| Tassajara Creek | P | E | E | E | E | E | E | E | E |
| Cottonwood Creek | | | | E | E | | E | E | E |
| Collier Canyon Creek | | | | E | E | | E | E | E |
| Cayetano Creek | | | | E | E | | E | E | E |
| Altamont Creek | E | E | | E | E | | E | E | E |
| Arroyo las Positas | E | E | E | E | E | E | E | E | E |
| Arroyo Seco (Alameda) | E | E | E | E | E | E | E | E | E |

Notes: E = existing beneficial use; P = potential beneficial use.
Source: Regional Water Quality Control Board (RWQCB), 2015.

Some water bodies have been given special status under Section 303(d) of the federal Clean Water Act (CWA), 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 states must determine the total maximum daily load (TMDL) that the water body can assimilate without violating that state's water quality standards. A TMDL is also a written plan that describes how an impaired water body will meet water quality standards.

Alameda Creek, Arroyo de la Laguna, Arroyo Mocho, and Arroyo las Positas are all listed as impaired by diazinon, an insecticide found in urban runoff and storm sewers.[44] The diazinon impairment is currently being addressed by a U.S. Environmental Protection Agency (EPA)-approved TMDL that was completed in 2006. In addition, Arroyo Mocho is listed as impaired by high water temperatures, and Arroyo las Positas is listed as impaired by nutrients and indicators of eutrophication, which is the process by which a body of water becomes enriched by dissolved nutrients that stimulate the growth of aquatic plant life, usually resulting in depletion of dissolved oxygen. The specific sources of nutrients are listed as unknown in both cases.[45]

These drainages ultimately discharge into the lower San Francisco Bay. The lower San Francisco Bay is listed as impaired by the following contaminants: chlordane, dichlorodiphenyltrichloroethane, dieldrin, and mercury from nonpoint sources; dioxin compounds, furan compounds, and mercury from atmospheric deposition; exotic species from ballast water; polychlorinated biphenyls (PCBs) and dioxin-like PCBs from unknown nonpoint sources; and trash from illegal dumping and urban runoff.[46] Industrial and municipal point sources, resource extraction, and natural sources are also considered to contribute to mercury degradation of the lower San Francisco Bay. The lower San Francisco Bay was previously categorized as "TMDL required." Proposed changes designate this water body as "now being addressed by EPA-approved TMDLs" (for PCBs and dioxin-like PCBs).[47]

### (2) Groundwater Quality

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. Groundwater quality has been highly variable throughout the Main Basin. [48]

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 TDS (or hardness), nitrate, boron, and organic

[44] Regional Water Quality Control Board, San Francisco Bay Region, 2012. Final 2012 Integrated Report (CWA Section 303(d) List / 305(b) Report).
[45] Ibid.
[46] Ibid.
[47] Regional Water Quality Control Board, San Francisco Bay Region, 2016. Proposed Changes to 303 (d) List. Accessed April 12, 2017.
[48] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.

compounds.[49] Groundwater in the Fringe sub-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 removed from, the groundwater basin.[50] Zone 7 has identified recharge of local streamflow and imported water, subsurface inflow, and irrigation returns as major contributors to increasing TDS concentrations. Localized elevated groundwater nitrate levels are associated with livestock operations and septic tank usage in the central and eastern portions of the Livermore-Amador Valley.

The northern portion of the Livermore-Amador Valley Groundwater Basin is dominated by sodium-rich water, while much of the western part of the basin near the city of Pleasanton has a magnesium-sodium characteristic (i.e., both magnesium and sodium are dominant cations).[51] The area along the eastern portion of the basin, beneath the Livermore area, has magnesium as the predominant cation. In the western portion of the 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 saline shallow groundwater flowing from the Fringe sub-basins 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 are used by plants and then washed down into groundwater during subsequent rain or irrigation events.

Trace amounts of boron are present in the eastern portion of the Fringe sub-basins (associated with natural marine geologic formations) and with shallow groundwater in the northern Fringe sub-basins. High boron levels and lower aquifer yields can limit the use of some Fringe sub-basins for agricultural irrigation.

Local impairments include some areas with boron concentrations exceeding 2 milligrams per liter (mg/L). Nitrates have also impaired portions of the Main Basin, especially in the east. Nitrate levels of 30 to 65 mg/L have been identified in a 670-acre area of unincorporated residential and agricultural land located south of Livermore.[52] Nitrates from in-basin wastewater disposal historically contributed to this problem prior to 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.[53] Chlorinated organic solvent releases to soil and

[49] Total dissolved solids is a measure of water salinity and hardness.
[50] Environmental Sciences Associates, 2004. Draft Zone 7 Water Agency Well Master Plan EIR, Chapter 3. Prepared for the Zone 7 Water Agency. April.
[51] A cation is a positively charged ion.
[52] Zone 7 Water Agency, 2005. Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin. September-.
[53] Ibid.

groundwater are also an issue in the region, primarily in the Fringe sub-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 to more than 1,000 mg/L.[54] The highest quality surface water recharging the basin occurs within Arroyo Mocho and Arroyo del Valle, where TDS is generally less than 500 mg/L. The poorest quality surface water recharging the basin has approximately 1,000 mg/L of TDS and occurs within Arroyo las Positas.

## 3. Regulatory Framework

This subsection describes the federal, State, and local environmental laws and policies relevant to water quality and hydrological resources.

### a. Federal Regulations

#### (1) Clean Water Act

The purpose of the federal CWA (33 United States Code, Section 1251 et seq.) 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 U.S. The State Water Resources Control Board (SWRCB) is the California agency primarily responsible for implementing State and federal regulations relating to hydrology and water quality issues. Most regulatory requirements are implemented by the SWRCB through its nine RWQCBs. 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 sections of the CWA are most relevant to this analysis.

#### (a) Clean Water Act Section 303 – Total Maximum Daily Load Program

California adopts water quality standards to protect beneficial uses of waters of the State as required by Section 303 of the CWA and the State's Porter-Cologne Water Quality Control Act of 1969. Section 303 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.

[54] Ibid.

The TMDL is the maximum amount of pollution (both point and nonpoint 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 EPA TMDL program provides a process for determining pollution budgets for the nation's impaired waters. Pollutant loading limits are set and implemented by the SWRCB and the RWQCBs under the Porter-Cologne Water Quality Control Act, which provides the basis for water quality regulation within California.

### (b) Clean Water Act Section 401 – Clean Water Quality Certification

Under Section 401 of the CWA, 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. All projects that have a federal component and may affect the quality of the states' waters (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. In California, Section 401 certification or waiver thereof, is under the jurisdiction of the applicable RWQCB.

### (c) Clean Water Act Section 402 – National Pollutant Discharge Elimination System Program

Section 402 of the CWA regulates discharges to surface waters through the NPDES program, administered by the 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 categories of 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 regulated under the NPDES permit program because they are conveyed in a discrete conveyance system and discharged 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.

### (d) Clean Water Act 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 U.S., 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.I, Biological Resources, for further discussion.

### (2) Executive Orders 11988 and 13690 and the Federal Emergency Management Agency

Under Executive Order 11988, FEMA is responsible for managing floodplain areas. FEMA administers the National Flood Insurance Program to provide subsidized flood insurance to communities (e.g., the City of Livermore) that comply with FEMA regulations limiting development in floodplains. FEMA also issues Flood Insurance Rate Maps that identify land areas subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The FEMA design standard establishes the minimum level of flood protection for new development at the 1-percent chance annual exceedance event (i.e., the 100-year flood event).

On January 30, 2015, President Obama issued Executive Order 13690 that revises Executive Order 11988 and proposes a new Federal Flood Risk Management Standard. Under Executive Order 13690, agencies are required to expand management beyond the base flood elevation for federal projects and, where possible, use natural systems, ecosystem processes, and nature-based approaches. However, regulations implementing some or all of Executive Order 13690 have not yet been issued within the study area or within Alameda County.

Encroachment within floodplains or regulatory floodways, such as structures and fill, generally reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic benefit of floodplain development against the resulting increase in flood hazard. Minimum federal standards limit such increases within the 100-year floodplain to 1 foot, cumulatively, during the 100-year flood event, provided that hazardous velocities are not produced. Within regulatory floodways, federal standards prohibit any increase in the 100-year flood elevation as a result of encroachment, unless a conditional floodway revision is applied for and ultimately approved by FEMA. Buildings, structures, and other development activities (such as fill) placed within a regulatory floodway are more likely to obstruct flood flows, causing the water to slow down and back up, resulting in higher flood elevations.

All projects in the regulatory floodway must undergo an encroachment review to determine their effect on flood flows and ensure that they do not cause unanticipated flooding.[55] Development projects in the flood fringe, by definition, do not increase flood heights above the allowable level; thus, encroachment reviews are not needed. Title 44 of the Code of Federal Regulations (CFR) 60.3(d)(3) states that communities must prohibit encroachments—including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway—unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the base flood discharge. Further, for any proposed alteration or relocation of a watercourse within a special flood hazard area, Title 44 of the CFR 60.3(b)(6) states that the community shall notify the National Flood Insurance Program State Coordinating Office and submit copies of such notifications to FEMA.

The floodways in the flood insurance study for Alameda County are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.[56]

### b. State Regulations

#### (1) Porter-Cologne Water Quality Act

The San Francisco Bay RWQCB has regulatory authority over wetlands and waterways under both the federal CWA and the State of California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Section 13000 et seq.). Under the CWA, the San Francisco Bay RWQCB has regulatory authority over actions in waters of the U.S. through the issuance of water quality certifications under Section 401; these certifications are issued in combination with permits by the USACE under Section 404 of the CWA. When the San Francisco Bay RWQCB issues Section 401 certifications, it simultaneously issues waste discharge requirements (WDRs) for projects under the Porter-Cologne Water Quality Control Act. Activities in areas outside the jurisdiction of the USACE (e.g., isolated wetlands, vernal pools, or stream banks above the ordinary high water mark) are regulated by the San Francisco Bay RWQCB under the authority of the Porter-Cologne Water Quality Control Act. Activities that lie outside USACE jurisdiction may require the issuance of either individual or general WDRs from the San Francisco Bay RWQCB.

[55] Federal Emergency Management Agency (FEMA), 2013. National Flood Insurance Program Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. Available at: www.fema.gov/media-library-data/20130726-1539-20490-9157/nfip_sg_full.pdf.

[56] Federal Emergency Management Agency (FEMA), 2009. Flood Insurance Study, Alameda County, California, and Incorporated Areas, Volume 1 of 3. August 3.

Under the authority of the Porter-Cologne Water Quality Act, the San Francisco Bay RWQCB has developed and implements the Basin Plan, which defines the beneficial uses of waters of the State within the San Francisco Bay Region. Beneficial uses designated for the Livermore-Amador Valley Groundwater Basin include municipal and domestic supply, industrial process supply, industrial service supply, and agricultural supply. Arroyo Mocho, Arroyo las Positas, Tassajara Creek, Arroyo Seco, and Arroyo de la Laguna have designated beneficial uses of groundwater recharge, fish migration, fish spawning, wildlife habitat, cold and warm freshwater habitat, and recreation (both water-contact and non-water-contact). Any permit action taken by the San Francisco Bay RWQCB must be consistent with maintaining beneficial uses of waters of the State.

### (2) Sustainable Groundwater Management Act of 2014

The Sustainable Groundwater Management Act (SGMA), signed into law by the California Legislature in 2014, under California Water Code Section 10723, provides a framework for sustainable management of groundwater resources. In groundwater basins designated by DWR as medium and high priority, local public agencies and groundwater sustainability agencies are required to develop and implement groundwater sustainability plans (or alternative). Each groundwater sustainability plan or alternative must include measurable objectives and interim milestones for achieving sustainability goals for the given groundwater basin. Plans must also include a physical description of the basin—including information on groundwater levels, groundwater quality, subsidence and groundwater-surface water interaction, historical and projected water demand and supply data, monitoring and management provisions, and a description of how the plan will affect other plans. The Livermore Valley, managed by Zone 7, has been designated as a medium- or high-priority groundwater basin within the context of the SGMA. Zone 7 has produced an alternative groundwater sustainability plan; while Zone 7 recognizes that the management criteria concepts set forth by the SGMA have not yet been incorporated into its policies and actions, Zone 7's current groundwater management practices are functionally equivalent to the SGMA process.[57]

### (3) NPDES Program

Discussed below are the permit programs implemented under the CWA and administered by the SWRCB and RWQCBs that are most relevant to this analysis.

[57] Zone 7 Water Agency, 2016a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin. December.

### (a) NPDES Construction General Permit

The SWRCB permits all regulated construction activities under Order No. 2009-0009-DWQ (effective July 1, 2010), which requires, prior to beginning any construction activities, that the permit applicant obtain coverage under the Construction General Permit (CGP) by preparing and submitting a Notice of Intent to the SWRCB, and preparing and implementing a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the CGP requirements for all construction activities disturbing 1 or more acres of land surface. In addition, 2003 revisions to the original CGP clarify that all construction activity, including at small construction sites that are part of a larger common plan, must obtain coverage under this CGP.

### (b) Dewatering Activities

Small and/or temporary construction-related dewatering activities (e.g., excavations during construction) are covered under the CGP or a general WDR permit for low-threat discharges to land.[58] Large amounts of dewatering, particularly over lengthy periods of time, or dewatering discharges to surface waters, may necessitate individual WDRs. Project-related dewatering is likely to be limited in nature and scope and covered under the CGP or a general WDR permit.

### (c) 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 ROWs. Stormwater discharges from Caltrans' stormwater systems are regulated under a statewide permit for all stormwater discharges from Caltrans-owned Municipal Separate Storm Sewer Systems, maintenance facilities, and construction activities (NPDES Statewide Stormwater Permit Waste Discharge Requirements for State of California Department of Transportation [Order No. 2012-0011-DWQ]).[59] This permit applies to projects within Caltrans ROWs, regardless of the level of Caltrans involvement. Thus, construction and operation of the Proposed Project and Build Alternatives within Caltrans ROWs would be subject to the Caltrans statewide permit. All treatment measures designed to comply with the provisions of the Caltrans statewide permit—e.g., site design, source control best

[58] California State Water Resources Control Board Water Quality Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality.

[59] California State Water Resources Control Board Order 2012-0011-DWQ, as amended by Order WQ 2014-0006-EXEC, Order WQ 2014-0077-DWQ, and Order WQ 2015-0036-EXEC, National Pollutant Discharge Elimination System (No. CAS000003) Statewide Storm Water Permit, Waste Discharge Requirements for State of California Department of Transportation.

management practices (BMPs)—would be submitted to Caltrans' engineering staff for review. BART would evaluate any subsequent comments and any proposed revisions for potential incorporation into the project design, as appropriate.

### (d) Caltrans Stormwater Management Plan

Caltrans' Stormwater Management Plan (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 a Municipal Separate Storm Sewer System. 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
- 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 an iterative process of use, evaluation, and modification of BMPs to provide continuing progress toward achieving compliance with stormwater quality requirements. Projects constructed by other agencies on Caltrans property require a Caltrans encroachment permit. The sponsor must file the Notice of Intent and seek coverage under the SWRCB's CGP before Caltrans will issue an encroachment permit for any construction activity within the Caltrans ROW.

### (e) Municipal Regional Stormwater NPDES Permit

Municipal stormwater runoff from the Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo permittees' areas are subject to the NPDES municipal stormwater program under the Municipal Regional Stormwater NPDES Permit (MRP) (Permit No. CAS612008, Order No. R2-2015-0049).[60] The MRP is an extensive regulatory mechanism with provisions aimed specifically at substantially limiting the potential hydrological impacts of new development. One of the primary objectives of the regulations for pollutant dischargers is the reduction of pollutants in urban stormwater by

[60] San Francisco Bay Regional Water Quality Control Board, 2015. Municipal Regional Stormwater NPDES Permit (Permit No. CAS612008, Order No. R2-2015-0049). November 19.

using BMPs. The study area lies within the cities of Dublin, Pleasanton, Livermore, and unincorporated areas of Alameda County, all of which are subject to the provisions the MRP.

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) are considered regulated projects under the MRP, which requires such projects to implement low-impact development (LID) source control BMPs, site design BMPs, and stormwater treatment BMPs, either on site or at a joint stormwater treatment facility, unless the MRP Provision C.3.e alternate compliance applies. The MRP requires regulated projects to treat 100 percent of project site runoff with LID measures, including harvesting and use, infiltration, evapotranspiration, and biotreatment. The bus infrastructure improvements under the Enhanced Bus Alternative, as well as the feeder bus improvements for the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would be regulated projects if they create or replace 10,000 square feet or more of impervious surfaces. Regulated projects must provide permanent post-construction treatment controls for stormwater according to specific calculations (Provision C.3.d.).

For projects where increased flow or volume is likely to cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses, MRP Provision C.3.g requires additional stormwater management controls for compliance with the Hydromodification Management Standard.[61] Stormwater discharges from hydromodification projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) conditions. A hydromodification project is a regulated project that creates and/or replaces 1 acre or more of impervious surface and is not specifically excluded in the MRP. Thus, the Proposed Project and Build Alternatives would be located within an area subject to the Hydromodification Management Standard. [62]

A Hydrograph Modification Management Plan was prepared by the Alameda Countywide Clean Water Program in partial fulfillment of requirements in its third 5-year municipal stormwater discharge permit. [63] Additionally, a C.3 Stormwater Technical Guidance handbook was prepared to help developers and project applicants implement the C.3 provisions.[64]

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[61] Ibid.

[62] Changes in the timing and volume of runoff from a site are known as hydrograph modification or hydromodification.

[63] Alameda County Public Works Agency, 2005. Alameda Countywide Clean Water Program, Hydrograph Modification Management Plan, Part A: General Provisions for Hydromodification Management. May 15.

[64] Alameda County Public Works Agency, 2016. Alameda Countywide Clean Water Program, C.3 Stormwater Technical Guidance – A handbook for developers, builders and project applicants. Version 5.0, April 11.

### (f) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems Permit

Phase II of the Municipal Separate Storm Sewer Systems (MS4) Permit—referred to as the Small MS4 Permit (SWRCB Order Number 2013-0001-DWQ, NPDES General Permit Number S000004)—contains specific actions necessary to reduce discharge of pollutants into stormwater to the maximum extent practicable, in a manner designed to achieve compliance with specific water quality standards and objectives under the CWA and the California Water Code. Phase II differs from Phase I in that it applies to special districts and other non-traditional entities, such as parks departments, universities, and the military. Many of the stormwater treatment BMPs and source control measures outlined in the MRP section are comparable to the actions described in the Phase II MS4 Permit. BART is a non-traditional permittee under the Small MS4 Permit; thus, the Proposed Project, DMU Alternative, and potentially the Express Bus/BRT Alternative would be considered regulated projects. Regulated projects must implement both construction and post-construction stormwater management measures, including but not limited to source control measures, LID design standards, hydromodification measures, and BMP condition assessments. Provisions in the order are enforceable and contain reporting requirements.

The RWQCBs are responsible for overseeing compliance with this order. Oversight may include but is not limited to reviewing reports, requiring modification to stormwater program components and various submissions, imposing region-specific monitoring requirements, conducting inspections and program evaluations (audits), and taking enforcement actions against violators of the order. Permittees shall modify and implement their stormwater management programs and monitoring as required by the RWQCB Executive Officer.

### (g) 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 exceeds 10,000 gallons per day. If a project involves substantial construction or operational dewatering, an individual WDR permit could 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 must be filed with the RWQCB to obtain WDRs. Discharge of small amounts of water from construction dewatering is permitted under the CGP.

### (h) Permanent Treated Groundwater Dewatering Waste Discharge Requirements

If a project requires substantial (more than 10,000 gallons per day) permanent groundwater dewatering and the groundwater must be treated prior to discharge, the

discharge requires 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).[65] 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 that causes erosion 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), and toxicity (rainbow trout survival in 96-hour static renewal bioassays). This NPDES permit includes reclamation and land discharge specifications, receiving water limitations, groundwater limitations, and monitoring and reporting requirements. To obtain coverage under this CGP, the discharger must submit a Notice of Intent application package documenting the proposed treatment system and associated operation, maintenance, and monitoring plans. The Notice of Intent must include analytical results for influent as identified in the CGP and documentation supporting selection of proposed treatment system(s) effectiveness at meeting effluent and receiving water limitations.

### (4) California Department of Fish and Wildlife Streambed Alteration Agreements

Under Sections 1601–1603 of the Fish and Game Code, agencies are required to notify the California Department of Fish and Wildlife 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. The Fish and Game Code gives the California Department of Fish and Wildlife jurisdiction over any activity in a creek or river that contains a fish or wildlife resource (or from which such a resource derives benefit). Projects affecting or potentially affecting such resources must obtain an agreement from California Department of Fish and Wildlife, which usually imposes conditions to protect the environment. Refer to Section 3.I, Biological Resources, for further discussion.

### (5) Caltrans Location Hydraulic Study and Flood Plain Study

A policy of the Federal Highway Administration (FHWA)[66] serves as a basis for the Caltrans requirements regarding encroachment on floodplains. The provisions of this policy apply

[65] San Francisco Bay Regional Water Quality Control Board, 2012. 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. R2-2012-0060, NPDES No. CAG912004). Effective from August 8, 2012 through August 9, 2017.

[66] 23 CFR 650, Subpart A – Location and Hydraulic Design of Encroachments on Flood Plains.

to all encroachments and to all actions that affect base floodplains, except for repairs made with emergency funds (23 CFR 668) during or immediately following a disaster.[67]

As part of the work plan for a project, Caltrans guidance requires the preparation of a location hydraulic study (which includes structures hydraulics) and a flood plain study.[68] These studies are usually combined into one document as they largely address the same issues. The location hydraulic study is a specific FHWA requirement when a project will encroach on a flood plain. The flood plain study may consider a broader range of topics than required for the location hydraulic study and is usually part of the information required to deal with the USACE 404 permit process. Any analyses completed for proposed encroachment within a regulatory floodway (above) would likely satisfy the requirements of the Caltrans flood plain study.

#### (6) Division of Safety of Dams

Existing dams under DWR Division of Safety of Dams jurisdiction are periodically inspected to ensure adequate maintenance and correction of any noted deficiencies by the dam owner. To comply with the California Water Code and the California Code of Regulations, the 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 the DWR to retain a board of three consultants to meet at least once every 5 years to review the operational performance of DWR owned dams, and more frequently when reviewing newly constructed dams. The board of consultants independently reviews and assesses safety conditions of State Water Project dams. Regular inspections and required maintenance of the dams substantially reduce the potential for catastrophic failure.

### c. Local Regulations

#### (1) Flood Control Facilities Encroachment Permit

Development or encroachment within floodplains and floodways is subject to FEMA requirements for maintenance of flood flow conveyance and/or floodplain storage. The Alameda County Flood Control and Water Conservation District consists of 10 zones; Zone 7 covers the eastern portion of Alameda County, and includes the cities of Dublin, Pleasanton, and Livermore. Zone 7 manages stormwater conveyances and flood channels within the region and requires that activities within these channels, including discharges

[67] Federal Emergency Management Agency (FEMA), 2013. National Flood Insurance Program Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. Available at: www.fema.gov/media-library-data/20130726-1539-20490-9157/nfip_sg_full.pdf.

[68] California Department of Transportation, 2014. Workplan Standards Guide, Release 11.0.

of stormwater, obtain an encroachment permit. In some cases, Zone 7 may defer authority for floodplain and floodway encroachment review to the cities (e.g., the City of 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 encroachment permit must be obtained before any non-Zone 7 work is conducted on or within a facility or ROW that is owned or maintained by Zone 7.

As described above, Zone 7 Water is the primary entity responsible for overseeing the various water supply and flood control operations within the study area. Zone 7 was established in 1957 by the voters of the Livermore-Amador Valley to place water management, including flood control, under local control through a locally elected Board of Directors.[69] Since the 1960s, Zone 7 has imported water from the State Water Project to artificially recharge the local groundwater basin.[70] Zone 7 provides potable water to the municipalities of Dublin, Pleasanton, and Livermore, among others, and is also responsible for sustainably managing the groundwater basin of the Livermore-Amador Valley. Within the Livermore-Amador Valley, there is no direct diversion of untreated surface water for municipal potable supply. Surface water recharge into the groundwater aquifer (described in more detail below) provides a major source of municipal and private potable supply. Zone 7 also provides for the management of flood and stormwaters to protect life, property, and habitat within a 430-square-mile area that includes the cities of Dublin, Pleasanton, and Livermore.[71]

Zone 7 developed the 2006 Stream Management Master Plan to target and manage improvements within the drainage system for flood control, as well as for other beneficial properties. As the Master Plan and other flood control projects are implemented, conveyance capacity of the local drainage system would be improved.

### (2) Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program was initiated with the intention of forming consistent, effective countywide strategies to control sources of stormwater pollution; it complies with the RWQCB's Basin Plan and requirements of the federal CWA and other federal regulatory programs discussed above. The Alameda Countywide Clean Water Program is a consortium of the following local agencies in Alameda County: Alameda County (unincorporated area); Alameda County Flood Control and Water Conservation District; Zone 7; and the cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, Union City, and San Leandro. The Alameda County Flood Control and Water Conservation District is

[69] Zone 7 Water Agency, 2016b. Flood Protection Program 2015 Annual Report. April.
[70] Ibid.
[71] Ibid.

responsible for administering the overall program. Its participants worked jointly to prepare the Stormwater Quality Management Plan.[72] The goal of the Alameda Countywide Clean Water Program, as outlined in the SWMP, is to help local residents, businesses, and municipalities meet the stormwater quality goals of the CWA.

#### (3) Alameda County Watercourse Protection Ordinance

For unincorporated areas within Alameda County, the Watercourse Protection Ordinance restricts the discharge of pollutants to watercourses and the encroachment of new development into watercourses without first obtaining a permit from the County. In addition to prohibiting discharges into watercourses, the ordinance establishes a 20-foot building setback from the top of the bank to contain flows from the 100-year flood event. Implementation of this ordinance serves to protect surface water and groundwater recharge areas from erosion, sedimentation, and sources of pollution. The Proposed Project and Build Alternatives would be required to comply with the requirements of this ordinance.

#### (4) Zone 7 Encroachment Permits

As discussed previously, Zone 7 requires an encroachment permit prior to activities or construction that will be conducted within the agency's property, easements, or ROWs. These permits help protect the region's water supply and flood control facilities, ensure the safety of nearby residents and passers-by, and ensure that Zone 7's facilities are restored to their original condition. Zone 7's encroachment permit is separate from other city or public agency permits.[73]

## 4. Impacts and Mitigation Measures

This subsection lists the standards of significance used to determine impacts, discusses the methodology used in the analysis, summarizes the impacts, and then provides an in-depth analysis of the impacts with mitigation measures identified as appropriate.

### a. Standards of Significance

For the purposes of this EIR, impacts on hydrology and water quality are considered significant if the Proposed Project or one of the Alternatives would result in any of the following:

[72] Alameda Countywide Clean Water Program, 2003. Storm Water Quality Management Plan, July 2001 –June 2008. July.

[73] Zone 7 Water Agency, 2013. Encroachment Permit Guidelines. Available at http://www.zone7water.com/images/pdf_docs/permits/encroachment-permit-guide.pdf, accessed October 4, 2013.

- Violate any water quality standards or WDRs
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)
- Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or sedimentation on or off site
- Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff
- Substantially degrade water quality
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam
- Allow for inundation by seiche, tsunami, or mudflow

### b. Impact Methodology

The methodology used to evaluate the significance of hydrological and water quality impacts is described below under each respective impact analysis. The EMU Option would result in the same impacts as the DMU Alternative; therefore, the analysis and conclusions for the DMU Alternative also apply to the EMU Option.

The analysis of the Enhanced Bus Alternative, which addresses the potential impacts of construction of the bus infrastructure improvements and operation of the bus routes at a programmatic level, would also apply to the bus improvements and feeder bus service under the Proposed Project and other Build Alternatives. Therefore, the analyses and conclusions for the Enhanced Bus Alternative also apply to the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, and are not repeated in the analysis of the Proposed Project and other Build Alternatives.

### c. Summary of Impacts

Table 3.H-5 summarizes the impacts of the Proposed Project and Alternatives described in the analysis below.

**TABLE 3.H-5 SUMMARY OF HYDROLOGY AND WATER QUALITY IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| **Construction** | | | | | |
| **Project Analysis** | | | | | |
| Impact HYD-1: Violate water quality standards, discharge requirements, or alter drainage during construction | NI | LS | LS | LS | LS |
| **Cumulative Analysis** | | | | | |
| Impact HYD-2(CU): Violate water quality standards, discharge requirements, or alter drainage during construction Cumulative Conditions | NI | LS | LS | LS | LS |
| **Operational** | | | | | |
| **Project Analysis** | | | | | |
| Impact HYD-3: Violate water quality standards or waste discharge requirements | NI | LS | LS | LS | LS |
| Impact HYD-4: Substantially deplete groundwater | NI | LS | LS | LS | NI |
| Impact HYD-5: Substantially alter drainage patterns – erosion, sedimentation, flooding | NI | LSM | LSM | LSM | NI |
| Impact HYD-6: Exceed the capacity of stormwater drainage systems or provide substantial additional sources of polluted runoff | NI | NI | NI | NI | NI |
| Impact HYD-7: Substantially degrade water quality | NI | NI | NI | NI | NI |
| Impact HYD-8: Place housing within a 100-year flood hazard | NI | NI | NI | NI | NI |

**TABLE 3.H-5 SUMMARY OF HYDROLOGY AND WATER QUALITY IMPACTS**

| | Significance Determinations[a] | | | | |
|---|---|---|---|---|---|
| **Impacts** | **No Project Alternative** | **Conventional BART Project[b]** | **DMU Alternative (with EMU Option)[b]** | **Express Bus/BRT Alternative[b]** | **Enhanced Bus Alternative** |
| Impact HYD-9: Impede or redirect flood flows within a 100-year flood hazard area | NI | LSM | LSM | LSM | NI |
| Impact HYD-10: Create flooding and inundation risk as a result of the failure of a levee or dam | NI | LS | LS | LS | LS |
| Impact HYD-11: Allow for inundation by seiche, tsunami, or mudflow | NI | NI | NI | NI | NI |
| **Cumulative Analysis** | | | | | |
| Impact HYD-12(CU): Violate water quality standards, discharge requirements, or substantially alter drainage patterns under Cumulative Conditions | NI | LS | LS | LS | LS |
| Impact HYD-13(CU): Substantially deplete groundwater under Cumulative Conditions | NI | LS | LS | LS | NI |
| Impact HYD-14(CU): Impede or redirect flood flows within a 100-year flood hazard area under Cumulative Conditions | NI | LS | LS | LS | NI |
| Impact HYD-15(CU): Create flooding and inundation risk as a result of the failure of a levee or dam under Cumulative Conditions | NI | LS | LS | LS | LS |

Notes: NI=No impact; LS=Less-than-Significant impact, no mitigation required; LSM=Less-than-Significant impact with mitigation; DMU = diesel multiple unit; EMU = electrical multiple unit; BRT = bus rapid transit.
[a] All significance determinations listed in the table assume incorporation of applicable mitigation measures.
[b] The analysis of the Enhanced Bus Alternative also applies to the feeder bus service and bus improvements under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative, as described in the Impact Methodology subsection above.

### d. Environmental Analysis

Impacts pertaining to project construction are described below, followed by operations-related impacts.

#### (1) Construction Impacts

Potential impacts related to project construction are described below, followed by cumulative construction impacts.

Based on project characteristics and existing conditions, and due to the temporary nature of construction activities, the analysis of construction impacts is limited to evaluating the potential to violate water quality standards or WDRs. Construction activities represent the period of the greatest disturbance of site soils from removal of vegetation, structures, and asphaltic and/or concrete surfaces. Once constructed, these previously exposed soils would either be covered by new pervious or impervious surfaces, or revegetated.

#### (a) Construction – Project Analysis

***Impact HYD-1: Violate any water quality standards or waste discharge requirements, including through the alteration of an existing drainage pattern or the course of a stream or river, in a manner that would result in substantial erosion or sedimentation on or off site during construction.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with construction of the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements for segments of I-580, local roadways and intersections, and core transit service improvements for BART, Altamont Corridor Express, and the Livermore Amador Valley Transit Authority would be constructed. In addition, population and employment increases throughout Alameda County would result in continued land use development, including both residential and commercial. Construction of these improvements and development projects could violate water quality standards or WDRs. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to result in substantial erosion or sedimentation during construction. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** Construction of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would involve localized ground disturbance activities (e.g., grading, excavation, drilling, and erection of structures) associated with the construction of buildings and project infrastructure. These activities could result in soil erosion and downslope or downstream sediment delivery by stormwater runoff if not managed appropriately. Aside from the proposed tail tracks and storage and maintenance facility in the Cayetano Creek Area, the majority of the project facilities would be constructed in relatively flat areas with little topographic relief. The gentle topographic relief would minimize the potential for soil erosion during construction.

Further, as discussed in Chapter 2, Project Description, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would each disturb more than 1 acre of ground surface. Projects that result in construction disturbance of more than 1 acre are required to comply with the CGP. This requirement was developed to ensure that stormwater is managed and erosion is controlled on construction sites. The CGP requires preparation and implementation of a SWPPP, which mandates BMPs to control run-on and runoff from construction work sites. The BMPs include, but are not limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of bioinfiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. BART would also be subject to the Construction Site Stormwater Runoff Control Program of the Small MS4 Permit. The Small MS4 Permit requires BART to develop, implement, and enforce a program to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. Further, as required by the Small MS4 Permit program, BART has developed contract language ensuring that its construction contractors comply with the CGP.

Project construction could require temporary dewatering depending on the depth to groundwater at the time of construction. Dewatering could introduce pollutants into nearby receiving waters. Further, pollutants associated with construction equipment and vehicles, such as fuels and oils, could be entrained in storm runoff and delivered to a local surface channel or creek. Dewatering activities are covered under the CGP or general WDR permit for low-threat discharges to land.[74] Project-related dewatering is likely to be limited based on the proposed activities, which generally entail excavation up to 4 feet below grade, as described in Chapter 2, Project Description, and thus would not involve substantive below-ground improvements. These activities would be covered under the CGP or a general WDR permit.

[74] California State Water Resources Control Board Water Quality Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality.

Temporary dewatering may be required for the I-580 relocation at creek crossings where new bridge piers would be installed. In addition, temporary dewatering may be required for the few areas with substantive below-ground excavation, ranging from 10 to 25 feet below grade—for the DMU transfer platform or the bus transfer platforms (for the DMU Alternative and Express Bus/BRT Alternative, respectively), as well as the Isabel Station and the underpass under westbound I-580 (for both the Proposed Project and DMU Alternative). Additionally, for the Proposed Project and DMU Alternative, construction activities in the Cayetano Creek Area—for the tail tracks and storage and maintenance facility—would require excavation ranging up to 70 feet for the hillside tunnel. However, based on Zone 7's delineation of the groundwater management zones, the Cayetano Creek Area is an upland area and large volumes of groundwater are unlikely to be encountered during construction in this area. Dewatering activities (if necessary) at these locations (above) would likely still be covered under the CGP or general WDR permit for low threat discharges to land, depending on the volume of dewatering required. If large amounts of dewatering are necessary for these construction activities, appropriate individual WDRs would be obtained as described below.

Any large amounts of dewatering, particularly over lengthy periods of time, or dewatering discharges to surface waters, would necessitate obtaining individual WDRs from the San Francisco Bay RWQCB. If substantial (more than 10,000 gallons per day) groundwater dewatering is required and the groundwater must be treated prior to discharge, the 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 (RWQCB Order No. R2-2007-0033, NPDES No. CAG912004). However, as stated above, project-related dewatering is likely to be limited and covered under the CGP or a general WDR permit.

As described above, construction of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would be subject to existing regulations and requirements concerning construction activities (erosion and runoff and dewatering) and the protection of water quality; required permits would include the CGP, the Small MS4 Permit, and the Treated Groundwater Dewatering General Waste Discharge Requirements. These permits require implementation of water quality BMPs and discharge volume and rate controls. Therefore, construction-related impacts to water quality under the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be located along existing street ROWs. If implementation of the Enhanced Bus Alternative would collectively disturb more than 1 acre of ground surface, it would need to comply with the CGP. Otherwise,

construction of this alternative would entail very limited ground disturbance in an already urbanized environment. Construction of the Enhanced Bus Alternative would result in less-than-significant impacts to water quality, and no mitigation measures are required. **(LS)**

**Mitigation Measures**. As described above, the Proposed Project and Alternatives would not result in significant construction-related water quality impacts during construction, and no mitigation measures are required.

### (b) Construction – Cumulative Analysis

The geographic study area for cumulative impacts during construction is the Arroyo de la Laguna watershed.

***Impact HYD-2(CU): Violate any water quality standards or waste discharge requirements, including through the alteration of an existing drainage pattern or the course of a stream or river, in a manner that would result in substantial erosion or sedimentation on or off site during construction, under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact HYD-1** above, the No Project Alternative would have no impacts resulting in violation of water quality standards, WDRs, or substantial erosion or sedimentation during construction. Therefore, the No Project Alternative would not contribute to cumulative impacts during construction. **(NI)**

**Conventional BART Project and Build Alternatives.** Several of the cumulative projects construction areas and timing could overlap with areas and timing of construction associated with the Proposed Project and Build, resulting in combined erosion effects. For example, cumulative projects that would have relatively large construction footprints include the Dublin Crossing Specific Plan and the Isabel Neighborhood Plan (INP). As described in **Impact HYD-1** above, construction activities associated with the Proposed Project and Build Alternatives have the potential to cause soil erosion.

However, the State CGP would require the preparation and implementation of a SWPPP for each of these cumulative projects. The SWPPPs would include BMPs to control runoff and prevent erosion. The CGP has been developed to address cumulative conditions arising from construction throughout California, and is intended to maintain cumulative effects of projects below levels that would be considered significant. For example, under the CGP, two adjacent construction sites would both be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving each respective site. The runoff water from both sites would be required to achieve the same

action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff. Thus, even if the waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels.

Therefore, cumulative impacts on water quality from the Proposed Project and Build Alternatives, in combination with past, present, or probable future projects, would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures**. As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts to water quality during construction, and no mitigation measures are required.

### (2) Operational Impacts

Potential impacts related to project operations are described below, followed by cumulative operations impacts.

#### (a) Operations – Project Analysis

***Impact HYD-3: Violate any water quality standards or waste discharge requirements, including through the alteration of an existing drainage pattern or the course of a stream or river, or in a manner that would result in substantial erosion or sedimentation on or off site.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

The Proposed Project and Build Alternatives include the installation and operation of facilities that, in some cases, would result in modification of existing stream channel crossings, realignment, and/or modification of existing channels, and an increase in the amount of impervious surfaces within the Proposed Project and Build Alternatives footprints. Table 3.H-6 presents estimates of existing and proposed impervious surface areas for the Proposed Project and Build Alternatives. This table shows the total acreages of the Proposed Project and Build Alternatives footprints, the amount of impervious surfaces under existing conditions, and the change in impervious surface acreages that would occur with the Proposed Project and Build Alternatives.

**TABLE 3.H-6 EXISTING AND PROPOSED IMPERVIOUS SURFACE WITHIN THE PROPOSED PROJECT AND BUILD ALTERNATIVES FOOTPRINTS**

| | Total Permanent Footprint (Acres) | Existing Impervious Area (Acres) | Proposed Additional Impervious Area (Acres) | Added Impervious Area As Percent of Total Footprint (Percent) |
|---|---|---|---|---|
| Conventional BART Project | 411 | 206 | 32 | 8% |
| DMU Alternative | 405 | 235 | 38 | 9% |
| Express Bus/BRT Alternative | 77 | 62 | 6 | 8% |

Notes: Temporary construction staging areas are not included in this table, as they would be returned to prior condition following construction. The bus routes and bus infrastructure improvements for the Enhanced Bus Alternative, as well as for the Proposed Project and other Build Alternatives, are anticipated to be constructed within existing street ROWs and would not change the amount of existing impervious surfaces.
Source: Arup, 2017b.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, operation of the planned and programmed transportation improvements and continued land use development, including residential and commercial uses under the No Project Alternative, could violate water quality standards or WDRs. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to violation of water quality standards. **(NI)**

**Conventional BART Project.** As described in the Surface Water Quality subsection above, several of the water bodies that drain the study area are listed as impaired. Incremental increases in certain pollutants to these water bodies, as a result of operation of the Proposed Project and Build Alternatives, could result in impacts to water quality conditions and violation of water quality standards as these water bodies essentially have no capacity to assimilate any increase in pollutant delivery (i.e., the water bodies are impaired for a particular pollutant(s) and cannot take on any additional loading). It should be noted that sediment is considered a pollutant.[75] An increase in stormwater runoff, from the proposed increase in impervious surface area, could increase pollutant entrainment and delivery (to receiving waters) as well as induce erosion and sediment production within surface

[75] Regional Water Quality Control Board, 2015. San Francisco Bay Basin Water Quality Control Plan. RWQCB San Francisco Bay Region. March.

channels, thereby potentially violating water quality standards or inducing localized flooding. New or increased pollutants in surface runoff could also eventually infiltrate and affect water quality within the groundwater aquifer(s).

As shown in Table 3.H-6, implementation of the Proposed Project could result in an increase in impervious surfaces by approximately 32 acres. New impervious areas could result in violations of water quality standards. However, as summarized in the Regulatory Framework subsection above, the NPDES Program and related regulations would require implementation of stormwater treatment and runoff volume control measures into the designs of the Proposed Project. For areas outside of an existing or proposed Caltrans ROW, such as the storage and maintenance facility, the Proposed Project would be regulated under the Small MS4 Permit (SWRCB Order Number 2013-0001-DWQ), and all provisions therein would apply, including stormwater design requirements.

The Small MS4 Permit implements a number of provisions aimed at protecting water quality. BART would be required to develop and implement SWPPPs for pollutant hotspots at high priority sites.[76] The SWPPP would identify a set of stormwater BMPs to be installed, implemented, and maintained to minimize the discharge of pollutants in stormwater. Further, the Small MS4 Permit requires proper management of stormwater quality through implementation of site design measures and LID design standards, as well as planning for operation and maintenance for post-construction stormwater management. As part of stormwater management, BART would be required to develop a map or diagram dividing the developed portions of the Proposed Project site into discrete drainage management areas. After implementation of site design measures, runoff from remaining impervious drainage management areas must be directed to one or more facilities designed to infiltrate, evapotranspire, and/or biotreat stormwater runoff as specified in the Small MS4 Permit. BART would also be required to develop an operations and maintenance verification program, one element of which would require BART to ensure that systems and hydromodification controls installed are properly operated and maintained for the life of the Proposed Project. BART would be required to document compliance with the Small MS4 Permit through required periodic reports to the SWRCB.

For areas within an existing or proposed Caltrans ROW, such as within the I-580 freeway, the Proposed Project would be regulated under the Caltrans statewide stormwater permit (SWRCB Order No. 2012-0011-DWQ) and all the provisions therein would apply. The Caltrans statewide permit regulates stormwater and non-stormwater discharges from Caltrans' properties and facilities (including all ROWs owned by Caltrans), and discharges associated with operation and maintenance of the State of California highway system.

[76] If a permittee has an existing or equivalent document, such as a Hazardous Materials Business Plan or Spill Prevention Plan, that contains the required information, development of a SWPPP is not required.

Both of these orders have been issued pursuant to Section 402(p) of the CWA (as amended by the Water Quality Act of 1987). CWA section 402(p) establishes performance standards and mandates that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." These orders prohibit stormwater discharges that do not comply with the maximum extent practicable standard. Further, stormwater runoff regulated under these orders would have no subsequent potential impact upon groundwater quality.

A preliminary water quality and hydromodification analysis has been completed for the Proposed Project and Build Alternatives.[77] The analysis presents preliminary design recommendations, applicable to all relevant areas of the Proposed Project (i.e., outside and inside of existing and proposed Caltrans ROWs), for the required treatment areas and storage volumes. The analysis summarized the sizing requirements and generalized locations of water quality and hydromodification BMPs (or treatment measures) needed to meet or exceed the requirements of the Small MS4 Permit. At each specific treatment site, natural at-grade treatment facilities would be utilized wherever available.[78] The preliminary analysis indicates that meeting the Small MS4 Permit site design and stormwater treatment requirements would be feasible for the Proposed Project. The specific design for each treatment measure and location would require further detailed analysis based on available space, land type, and treatment measures design hierarchy.

The San Francisco Bay RWQCB is responsible for overseeing compliance with the Small MS4 Permit, Caltrans permit, and Section 402(p) of the CWA (and for requiring amendments or revisions, as necessary). Oversight may include, but is not limited to, reviewing reports, requiring modification to stormwater program components and various submissions, imposing region-specific monitoring requirements, conducting inspections and program evaluations (audits), and taking enforcement actions. BART's obligations as a permittee under the Small MS4 Permit and under the Caltrans permit would be adequate to ensure that operations-related impacts under the Proposed Project related to violation of water quality standards, including those as a result of erosion or sedimentation, would be less than significant and no mitigation measures are required. **(LS)**

**DMU Alternative.** The DMU Alternative would generally have a similar footprint to the Proposed Project, with the addition of improvements in the Dublin/Pleasanton Station Area, and a different footprint for the storage and maintenance facility in the Cayetano Creek Area. As shown in Table 3.H-6, the DMU Alternative would result in approximately

[77] Arup, 2016. BART Livermore Extension, Water Quality and Hydromodification Study: Technical Memorandum. April 5.
[78] Ibid.

38 acres of new impervious surface area; this would be a slightly greater amount of new impervious surface area than under the Proposed Project (approximately 6 acres more). New impervious areas could result in violations of water quality standards. Impacts related to water quality under the DMU Alternative would not be substantially different from those under the Proposed Project. However, the same regulatory requirements, programs, and standards would apply with respect to stormwater treatment and hydromodification measures for project operation. Therefore, impacts under the DMU Alternative related to violation of water quality standards, including those as a result of erosion or sedimentation, would be less than significant, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area, a portion of the I-580 Corridor Area, and the Laughlin Road Area. As shown in Table 3.H-6, the Express Bus/BRT Alternative would result in approximately 6 acres of new impervious surface area. New impervious areas could result in violations of water quality standards. In addition, this alternative would involve modification (fill and relocation) of Line G-2, a tributary to Chabot Canal, which extends immediately south of I-580 in the vicinity of the Dublin/Pleasanton Station. Specifically, the relocation of the I-580 median to accommodate the bus transfer platform would require the relocation of approximately 1,400 feet of Line G-2; the channel would be relocated approximately 50 to 70 feet to the south of its existing location. See Section 3.I, Biological Resources**, Impact BIO-11** and **Impact BIO-12,** for discussion of jurisdictional waters and riparian habitat impacts**.**

Although the Express Bus/BRT Alternative would result in considerably less new impervious area than the Proposed Project, the nature of potential impacts related to water quality under the Express Bus/BRT Alternative would be similar to those under the Proposed Project. The same regulatory requirements, programs, and standards (e.g., the MRP) would apply with respect to stormwater treatment and hydromodification measures for project operation under this alternative.

Therefore, impacts under the Express Bus/BRT Alternative related to violation of water quality standards, including those as a result of erosion or sedimentation, would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be located along existing street ROWs east of the Dublin/Pleasanton Station. Stormwater runoff from these areas is currently regulated under either the Caltrans permit or the MRP. The bus infrastructure improvements must be consistent with the requirements of one or both of these permits, which include performance standards and requirements for complying with water quality standards and controlling erosion or sedimentation. Therefore, impacts under the

Enhanced Bus Alternative related to violation of water quality standards, including those as a result of erosion or sedimentation, would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not result in significant impacts related to violation of water quality standards, and no mitigation measures are required.

***Impact HYD-4: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

As noted in the Existing Conditions subsection above, the Main Basin (the primary groundwater supply and storage basin) encompasses an area of approximately 17,000 acres and recharge is primarily from stream recharge via Arroyo Mocho and Arroyo del Valle, as well as recharge from the Chain of Lakes. Normal year groundwater recharge of the Main Basin by direct precipitation is only about 3,700 acre-feet per year, or about 18.7 percent of total recharge. Though the overall extent of the Fringe Basin is much greater (approximately 45,000 acres), it is far less important with respect to its capacity for groundwater storage. Inflows from the Fringe sub-basins are only about 1,000 acre-feet per year (5 percent). An increase in the amount of impervious surface area with implementation of the Proposed Project and Build Alternatives could reduce the recharge potential within the Livermore-Amador Valley Groundwater Basin, and consequently reduce groundwater supplies. The potential for reductions in groundwater recharge during operation primarily depends on the amount of new impervious surface area created.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, operation of the planned and programmed transportation improvements and continued land use development, including residential and commercial uses under the No Project Alternative, could substantially deplete groundwater supplies or interfere substantially with groundwater recharge. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of

Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to aquifer volume or a lowering of the local groundwater table level. **(NI)**

**Conventional BART Project.** The net increase in impervious surfaces under the Proposed Project would be approximately 32 acres, which would represent approximately 8 percent of the total footprint of the Proposed Project, as shown in Table 3.H-6. Overall, the total footprint area (pervious and impervious areas) is much less than 1 percent of the combined area of both the Main and Fringe basins. Thus, even under worst-case assumptions (i.e., assuming that all precipitation on the Proposed Project footprint is impeded from infiltration), the potential recharge impedance by the Proposed Project would be extremely limited. Further, most of the Proposed Project footprint would overlie the Fringe Basin, as shown in Figure 3.H-5, which is not as important for groundwater storage as the Main Basin.

As noted in **Impact HYD-3**, the Proposed Project would be required to include treatment measures and design approaches consistent with LID, which provide flow magnitude and duration control and hydromodification measures that typically include features to encourage on-site infiltration of stormwater runoff such as vegetated swales, pervious paving, and landscaping. Precipitation that falls on new impervious areas created by the Proposed Project (approximately 32 acres),[79] even with implementation of LID and stormwater management features, would still include runoff that would ultimately be discharged to local streams and creeks (e.g., Arroyo las Positas). However, the net increase in impervious surfaces in relation to the basin area is relatively small. Therefore, impacts under the Proposed Project related to groundwater supplies or interfering substantially with groundwater recharge would be less than significant, and no mitigation measures are required. **(LS)**

**DMU Alternative.** As described above in **Impact HYD-3**, the DMU Alternative would result in approximately 38 acres of new impervious surface area; this would be slightly greater new impervious surface area than the Proposed Project (approximately 6 acres more). As shown in Table 3.H-6, this would represent approximately 9 percent of the total footprint of the DMU Alternative. However, similar to the Proposed Project, the net new impervious surfaces under the DMU Alternative represents much less than 1 percent of the Main Basin and Fringe Basin areas. Therefore, the DMU Alternative's impact to groundwater supplies or recharge would be less than significant, similar to the Proposed Project, and no mitigation measures are required. **(LS)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would result in approximately 6 acres of new impervious surfaces, which would represent approximately

[79] Ibid.

8 percent of the total Express Bus/BRT footprint area. This increase in impervious surfaces represents an even smaller percentage of the Main Basin and Fringe Basin surface areas combined when compared to the Proposed Project. Therefore, impacts related to groundwater supplies or interfering substantially with groundwater recharge under the Express Bus/BRT Alternative would be similar to, though less than, the Proposed Project and would be less than significant; no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be along existing street ROWs. These improvements would not be anticipated to create new impervious areas that would affect groundwater recharge. Therefore, there would be no impacts related to groundwater supplies or interfering substantially with groundwater recharge under the Enhanced Bus Alternative, and no mitigation measures are required**. (NI)**

**Mitigation Measures**. As described above, the Proposed Project and Alternatives would not result in significant impacts related to groundwater supplies and recharge, and no mitigation measures are required.

***Impact HYD-5: Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or sedimentation on or off site or result in flooding on or off site.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: NI)***

As described in Chapter 2, Project Description, or discussed above (**Impact HYD-3**), implementation of the Proposed Project and Build Alternatives would create new impervious surfaces (except in the case of the Enhanced Bus Alternative) as well as result in new or modified structures that span channels in the study area (Figure 3.H-2), and would cross or encroach into floodplains and floodways. The potential water quality impacts of increased impervious surfaces arise from the potential increase in runoff rates or volumes induced by such surfaces; thus, the potential for flooding impacts from impervious surface creation is concurrently addressed above (**Impact HYD-3**) via water quality. With respect to spanning structures, installation or modification of such structures could alter the hydraulic capacity of and/or velocities within channels, which could result in increased erosion and scour and/or localized flooding, as described below. See **Impact HYD-9** for potential impacts related specifically to the FEMA 100-year flood zones and/or regulatory floodways.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives.

However, the planned and programmed transportation improvements and continued land use development under the No Project Alternative could substantially alter the existing drainage pattern of a site or area. The effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to erosion, sedimentation, or flooding. **(NI)**

**Conventional BART Project.** The Proposed Project would construct new or modified structures along water features in the study area, requiring new or modified channel crossings at the following locations:

- **Tassajara Creek.** The existing I-580 overcrossing would be widened (extended upstream and downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the upstream and downstream side of the existing span. The existing channel undercrossing and support structures are within a Regulatory Floodway.
- **Cottonwood Creek.** The existing I-580 overcrossing would be widened (extended upstream and downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, concrete embankments) would be constructed on the upstream and downstream side of the existing span.
- **Arroyo las Positas (at the proposed Isabel Station).** A new bridge (and supporting structures) for the tail tracks would be constructed across Arroyo las Positas. This location is within a FEMA special flood hazard area (the 0.2 percent chance, or 500-year, floodplain).
- **Arroyo las Positas (just north of the proposed Isabel Station).** The existing I-580 overcrossing would be widened (extended upstream and downstream) and, concurrently, new sections of the existing undercrossing and support structures (e.g., piers) would be constructed on the upstream and downstream side of the existing span.
- **Arroyo las Positas (east of Portola Avenue).** A new bridge (and supporting structures) for the tail tracks would be constructed across Arroyo las Positas.
- **Cayetano Creek.** A new bridge (and supporting structures) for the tail tracks would be constructed across Cayetano Creek.
- **Isabel Creek.** A new access road (leading to the proposed storage and maintenance facility) would be constructed across Isabel Creek.

A hydraulics study was completed by Arup at the request of BART to assess the potential impacts of the Proposed Project on Arroyo las Positas (including the locations just north of

the proposed Isabel Station and east of Portola Avenue) and Cayetano Creek with respect to localized flooding.[80] The study used the USACE Hydraulic Engineering Center-River Analysis System (HEC-RAS) model to analyze potential flooding impacts in these areas due to implementation of the Proposed Project. Based on recent, existing information, a contemporary estimate of the 100-year, 24-hour flow was used as the basis for analysis in the model. The existing conditions assessment showed out-of-bank flooding at a number of locations during the modeled event, including over I-580 and in areas of developed land around Isabel Avenue and East Airway Boulevard.

Zone 7 bases flood analysis and planning within their jurisdictional area on a revised, planning-level HEC-RAS hydraulic model, which is similar to, although slightly different from, the model used in the Arup hydraulics study. The Zone 7 revised model predicts a different extent of the existing 100-year flood than does the Arup model, particularly with respect to Arroyo las Positas at the I-580 bridge (westernmost crossing, adjacent to the Isabel North Area). The differing results may be accounted for by small differences in the resolution of the topographic survey used for the two models, in addition to modifications made in the Arup hydraulics study model to the existing I-580 highway bridge over Arroyo las Positas.[81] As a result of these differences, the Arup model predicts greater flooding under existing conditions than does the Zone 7 model.

Nevertheless, the Arup hydraulics study showed that implementation of the Proposed Project would result in minor increases in the spatial extent of flooding, mainly on the upstream and downstream side of the I-580 bridge at the Arroyo las Positas crossing between Isabel Avenue and Portola Avenue. The minor impacts in the spatial extent of flooding are a result of a reduction in flood flows over I-580 due to the inclusion of a retaining wall around the entrance to the proposed tail track tunnel, modifications associated with the surface parking lots at the proposed Isabel Station, and proposed earthwork at the Isabel Avenue/I-580 intersection.[82] Further, the Arup hydraulics study showed that there would be no impacts to Cayetano Creek with respect to the extent of flooding. However, due to the discrepancy between the Zone 7 model and the Arup model, further refining of the hydraulics study is considered necessary. Coordination with Zone 7 is ongoing to resolve differences in model predictions of the 100-year flood extent, particularly in the vicinity of Arroyo las Positas.[83] Thus, project-induced flooding on Arroyo las Positas upstream of I-580 is considered a potentially significant impact.

In general, the new or extended channel sections and associated structures (e.g., abutments, piers) would be aligned with the existing structures; thus, there would likely

[80] Arup, 2017a. BART Livermore Extension, Hydraulic Analysis of Las Positas Creek, Draft 5. July 6.
[81] Ibid.
[82] Ibid.
[83] Ibid.

be little-to-no effect on hydraulic capacity or flow velocities. However, the exact design and layout of the proposed structures and/or modifications at these locations may change slightly and, ultimately, could alter or reduce the hydraulic capacity of and/or velocities within the channels, thereby causing increased erosion and scour and/or localized flooding in cases where no special flood hazard area is currently defined. This would be a potentially significant impact (for the channel sections listed above other than Cayetano Creek). See **Impact HYD-9** for a discussion of potential impacts within flood hazard areas and floodways.

The impacts described above would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-5**, which includes provisions for maintaining the existing hydraulic capacity and velocities for storm flows at channel crossing locations. Despite the ongoing consultation with Zone 7 and efforts to refine the hydraulic model described above, the performance standard of maintaining the existing hydraulic capacity required by **Mitigation Measure HYD-5** addresses the existing uncertainty and can feasibly reduce this potential impact to less than significant. **(LSM)**

**DMU Alternative.** The DMU Alternative would require two channel crossings in the Dublin/Pleasanton Station Area, in addition to the channel crossings described above for the Proposed Project. The DMU Alternative would construct new or modified structures at the additional water features below:

- **Line G-1-1.** The existing I-580 and frontage road (Johnson Drive) overcrossing would be widened (extended downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the downstream side of the existing span.
- **Chabot Canal.** The existing I-580 and frontage road (Scarlett Court) overcrossing would be widened (extended upstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, culvert walls) would be constructed on the upstream side of the existing span.

Thus, the DMU Alternative's potential impact to erosion, sedimentation, and/or flooding, through alteration of the existing drainage pattern of the project site, would be similar to that of the Proposed Project, although it would entail additional channel crossings. The hydraulics study of Arroyo las Positas and Cayetano Creek for the Proposed Project (described above) is also applicable to the DMU Alternative; thus, project-induced flooding on Arroyo las Positas upstream of I-580 is considered a potentially significant impact. Installation or modification of structures associated with the crossings could alter the hydraulic capacity of and/or velocities within the channels, thereby causing increased erosion and scour and/or localized flooding, which could result in a potentially significant impact. These impacts would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-5**, which includes provisions for maintaining

the existing hydraulic capacity and velocities for storm flows at channel crossing locations. **(LSM)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail relatively minor improvements at the Dublin/Pleasanton Station Area, as well as at the Laughlin Road Area**.** The Express Bus/BRT Alternative would construct new or modified structures, requiring new or modified channel crossings, at the following water features in the study area:

- **Line G-1-1.** The existing I-580 and frontage road (Johnson Drive) overcrossing would be widened (extended downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the downstream side of the existing span.
- **Chabot Canal.** The existing I-580 and frontage road (Scarlett Court) overcrossing would be widened (extended upstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, culvert walls) would be constructed on the upstream side of the existing span.
- **Tassajara Creek.** The existing I-580 overcrossing would be widened (extended upstream and downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the upstream and downstream side of the existing span. The existing channel undercrossing and support structures are within a Regulatory Floodway.

Thus, the Express Bus/BRT Alternative's potential impact to erosion, sedimentation, and/or flooding, through alteration of the existing drainage pattern of the project site, would be similar to, though somewhat less than, that of the Proposed Project. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-5**, which includes provisions for maintaining the existing hydraulic capacity and velocities for storm flows at channel crossing locations. **(LSM)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be located along existing street ROWs. Therefore, there would be no impacts related to altering existing drainage patterns and no mitigation measures are required. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant impacts to erosion, sedimentation, and/or flooding, through alteration of existing drainage patterns. However, with implementation of **Mitigation Measure HYD-5**, which would require hydraulic capacity at all channel crossings to be maintained at no less than the existing capacity and average velocities be maintained at no more than existing conditions, potential impacts would be reduced to a less-than-significant level.

**Mitigation Measure HYD-5: Hydraulic Capacity for Non-Flood Hazard Area Crossings. (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative)**

At all channel crossings, the hydraulic capacity and average channel velocities for storm flows shall be maintained at no less than and no more than, respectively, the existing condition. For the annual flood (or the flow associated with ordinary high water, whichever is greater) and the 100-year flood, BART shall, as part of the project design process, calculate the pre- and post-project hydraulic capacity and average channel velocity following standard engineering practices and methodology. Prior to completion of final design, these calculations shall be submitted to Zone 7 and the RWQCB for review and approval in compliance with floodplain management obligations as well as water quality certification requirements under CWA Section 401.

***Impact HYD-6: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. The planned and programmed transportation improvements and continued land use development under the No Project Alternative could create runoff water. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to runoff water. **(NI)**

**Conventional BART Project and Build Alternatives.** All potential impacts concerning excess runoff, polluted runoff, and/or degradation of water quality are discussed and addressed under other significance criteria (see **Impact HYD-3** and **Impact HYD-5**). No additional potential impacts from runoff water, other than those addressed under other significance criteria, would occur as a result of the Proposed Project and Build Alternatives. Therefore, the Proposed Project and Build Alternatives would have no impact related to runoff water. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts related to runoff water; therefore, no mitigation measures are required.

***Impact HYD-7: Substantially degrade water quality.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. The planned and programmed transportation improvements and continued land use development under the No Project Alternative could substantially degrade water quality. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to water quality. **(NI)**

**Conventional BART Project and Build Alternatives.** All potential impacts concerning degradation of water quality are discussed and addressed under other significance criteria (see **Impact HYD-3** and **Impact HYD-5**). Further, potential impacts related to hazardous materials (e.g., accidental release of fuels or oils) are addressed in Section 3.N, Public Health and Safety. No additional potential impacts, other than those addressed under the other significance criteria, would occur as a result of the Proposed Project and Build Alternatives. Therefore, the Proposed Project and Build Alternatives would have no impact associated with the substantial degradation of water quality. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts related to degradation of water quality; therefore, no mitigation measures are required.

***Impact HYD-8: Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. The planned and programmed transportation improvements and continued land use development under the No Project Alternative could place housing within a 100-year flood hazard area. However, the effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for

those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to housing within a 100-year flood hazard area. **(NI)**

**Conventional BART Project and Build Alternatives.** Although portions of the Proposed Project and Build Alternatives footprints would be located in a 100-year floodplain (see Figures 3.H-3a and 3.H-3b), the BART to Livermore Extension Project would not entail the construction of housing and would not place housing within a 100-year floodplain. Therefore, the Proposed Project or Alternatives would have no impacts associated with placing housing within a 100-year floodplain. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts associated with placing housing within a 100-year floodplain; therefore, no mitigation measures are required.

***Impact HYD-9: Place within a 100-year flood hazard area structures that would impede or redirect flood flows.***

***(No Project Alternative: NI; Conventional BART Project: LSM; DMU Alternative: LSM; Express Bus/BRT Alternative: LSM; Enhanced Bus Alternative: NI)***

Within the study area, FEMA is the primary agency responsible for floodplain management within flood hazard areas. Local agencies and entities, such as Zone 7 and the Cities of Livermore and Pleasanton, are also responsible for floodplain management and review of projects that encroach into the floodplain. For areas that are particularly important with respect to flood conveyance, FEMA in some cases divides the 100-year flood hazard area into a Regulatory Floodway (floodway) and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment from anything that might impede flows so that the 100-year flood can be carried without substantial increases in flood heights. The flood fringe is the area beyond the floodway but still within the 100-year flood hazard area (e.g., flood depths within the floodway fringe are expected to be relatively shallow).

Encroachment on floodplains by structures and fill can reduce flood-carrying capacity, increase flood heights and velocities, and increase flood hazards in areas beyond the encroachment itself. According to 44 CFR 60.3(d)(3), floodway encroachments—including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway—are prohibited, unless it has been demonstrated through hydrologic and hydraulic analyses that they would not result in an increase in existing flood levels. All projects in the floodway must undergo an encroachment review to determine their effect on flood flows and ensure that they do not limit the capacity of the floodway to ameliorate flooding. However, projects in the flood fringe are not required to

undergo encroachment reviews as they would not increase flood heights above the allowable level.

Proposed encroachments within 100-year flood hazard areas that are also within a Caltrans ROW must comply with Caltrans-specific requirements, which are based on those of the FHWA.[84] Typically, a singular study that provides an assessment of project hydraulics and the associated flood plain is used to satisfy both federal and State requirements and procedures. [85]

As shown in Figures 3.H-3a and 3.H-3b, implementation of the Proposed Project and Build Alternatives would result in new or modified structures within a FEMA 100-year flood hazard area and, in some cases, within a floodway. Installation or modification of such structures could alter the hydraulic capacity of and/or velocities within a channel at a particular location, which could result in increased erosion, scouring, and/or flooding, similar to the potential impacts discussed in **Impact HYD-5** above related to hydraulic capacity and velocities in non-flood hazard areas. This impact analysis focuses on modifications that would be the located within a Regulatory Floodway as designated on a FEMA Flood Insurance Rate Map.

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, the planned and programmed transportation improvements and continued land use development, including under the No Project Alternative, could place structures within a floodway or floodplain area. The effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to the impediment or redirection of flood flows. **(NI)**

**Conventional BART Project.** The Proposed Project would result in new or modified structures and/or fill that would be within a 100-year (non-floodway or floodway fringe) flood hazard area such as the Arroyo Mocho 100-year flood hazard area that extends to the north between Tassajara Road and El Charro Road. The main features of the Proposed Project (e.g., railway alignment and I-580 relocation) would be consistent with existing grades and would not impede or redirect flows within a 100-year (non-floodway or floodway fringe) flood hazard area. However, the Proposed Project would result in new or

[84] 23 CFR 650, Subpart A – Location and Hydraulic Design of Encroachments on Flood Plains.
[85] California Department of Transportation, 2014. Workplan Standards Guide, Release 11.0.

modified structures and/or fill that could encroach on designated floodways at the following locations:

- **Tassajara Creek.** The existing I-580 overcrossing would be widened (extended upstream and downstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the upstream and downstream side of the existing span. The existing channel undercrossing and support structures are within a Regulatory Floodway.
- **Arroyo las Positas (at the proposed Isabel Station).** The footprint and fill for the Isabel Station surface parking would encroach within the Regulatory Floodway for Arroyo las Positas in the Isabel South Area. Also, a new pedestrian overcrossings and supporting structures (e.g., piers) would be constructed across Arroyo las Positas. The new pedestrian overcrossing would span across a Regulatory Floodway, though no structural components of the walkway are proposed to encroach, or be located within, the floodway.

The modifications at Isabel Station (surface parking lot) and for the highway widening at Tassajara Creek would have a potentially significant impact on flood conveyance capacity and water surface elevations within the floodways. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-9**, which includes provisions for maintaining existing conveyance capacities through implementation of and adherence to existing floodplain management guidelines and requirements. **(LSM)**

**DMU Alternative.** As described above in **Impact HYD-3**, the DMU Alternative would generally have a similar footprint to the Proposed Project, with the addition of improvements in the Dublin/Pleasanton Station Area and a different footprint for the storage and maintenance facility in the Cayetano Creek Area. Some components of the DMU Alternative would be within the 100-year (non-floodway or floodway fringe) flood hazard area to the north of the Dublin/Pleasanton Station. However, the main features of the DMU Alternative in this area (e.g., railway alignment, I-580 relocation, Dublin/Pleasanton Station Area improvements) would be consistent with existing grades or otherwise would not impede or redirect flows within a 100-year (non-floodway or floodway fringe) flood hazard area. The DMU Alternative would also result in new or modified structures and/or fill that could encroach on designated floodways at the same locations described for the Proposed Project above (Tassajara Creek and Arroyo las Positas at the proposed Isabel Station).

Thus, the DMU Alternative would have potentially significant impacts associated with the impedance or redirection of flood flows. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-9**, which includes provisions for maintaining existing conveyance capacities through

implementation of and adherence to existing floodplain management guidelines and requirements. **(LSM)**

**Express Bus/BRT Alternative.** The Express Bus/BRT Alternative would entail improvements at the Dublin/Pleasanton Station Area as well as at the Laughlin Road Area. Similar to the Proposed Project, components of the Express Bus/BRT Alternative would be within the 100-year (non-floodway or floodway fringe) flood hazard area that extends north of the Dublin/Pleasanton Station, although the respective components of the Express/Bus Alternative would either be consistent with existing grades or would otherwise not impede or redirect flows within a 100-year (non-floodway or floodway fringe) flood hazard area. The Laughlin Road Area is not within a 100-year flood hazard area, and thus would have no potential impacts associated with this location. New or modified structures and/or fill that could encroach on designated floodways at the following locations:

- **Line G-2.** The relocation of the I-580 median to accommodate the bus transfer platform would require the relocation of approximately 1,400 feet of the existing Line G-2 (a tributary to Chabot Canal) that extends along the southern edge of I-580 in the vicinity of Dublin/Pleasanton Station. The channel would be relocated approximately 50 to 70 feet to the south to accommodate the relocation of the freeway lanes. This section of Line G-2 is a Regulatory Floodway.
- **Tassajara Creek.** The existing I-580 overcrossing would be widened (extended upstream) and, concurrently, new sections of the existing channel undercrossing and support structures (e.g., abutments, piers) would be constructed on the upstream side of the existing span. The existing channel undercrossing and support structures are within a Regulatory Floodway.

Therefore, under the Express Bus/BRT Alternative, impacts related to the impedance or redirection of flood flows would be potentially significant. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure HYD-9**, which includes provisions for maintaining existing conveyance capacities through implementation of and adherence to existing floodplain management guidelines and requirements. **(LSM)**

**Enhanced Bus Alternative.** The bus infrastructure improvements that would be constructed under the Enhanced Bus Alternative would be along existing street ROWs. Therefore, there would be no impacts related to impeding or redirecting flood flows under the Enhanced Bus Alternative. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would have potentially significant impacts related to placing structures within a 100-year flood hazard area. However, with implementation of

**Mitigation Measure HYD-9**, which requires existing conveyance capacities to be maintained through implementation of and adherence to existing floodplain management guidelines and requirements, potential impacts would be reduced to a less-than-significant level.

As described above, the Enhanced Bus Alternative would not result in significant impacts related to placing structures within a 100-year flood hazard area, and no mitigation measures are required for this alternative.

**Mitigation Measure HYD-9: Floodway Hydraulic Analysis (Conventional BART Project, DMU Alternative/EMU Option, and Express Bus/BRT Alternative).**

As part of the design process, for all proposed locations of potential regulatory floodway modification and/or encroachment (Line G-2 at the Dublin/Pleasanton Station, Tassajara Creek along the I-580 Corridor Area, and Arroyo las Positas at the Isabel South Area), BART shall demonstrate through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed modification and/or encroachment would not result in an increase in flood levels during the occurrence of the base flood discharge. Further, for the relocation of Line G-2, and per Title 44 of the CFR 60.3(b)(6), BART would notify the adjacent communities (cities of Dublin and Pleasanton) of the planned relocation, and copies of the notification would be provided to FEMA.

For locations that are also within a Caltrans ROW, the analysis shall concurrently satisfy the requirements of a location hydraulic and floodplain study report, consistent with the current version of the Caltrans Workplan Standards Guide. For all locations, BART shall submit a copy of the floodway hydraulics report to Zone 7 and, as applicable, to Caltrans.

For the Line G-2 relocation under the Express Bus/BRT Alternative, in addition to implementing the measures summarized above, and per Title 44 of the CFR 60.3(b)(6), BART will notify the adjacent communities (cities of Dublin and Pleasanton) of the planned relocation, and copies of the notification will be provided to FEMA. Further, BART (in cooperation with the cities of Dublin and Pleasanton) shall submit a letter of map revision to FEMA documenting the changes in location and extent of the regulatory floodway and, as applicable, the 100-year and 500-year flood hazard areas.

***Impact HYD-10: Expose people or structures to a significant risk of loss, injury, or death in the event of flooding, including flooding as a result of the failure of a levee or dam.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. However, planned and programmed transportation improvements and continued land use development under the No Project Alternative could expose people or structures to flooding. The effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to the exposure of people or structures to flooding. **(NI)**

**Conventional BART Project and Build Alternatives.** As shown in Figure 3.H-4, the Dublin/Pleasanton Station Area and the portion of I-580 Corridor Area through Airway Boulevard are located within the estimated inundation area from a catastrophic failure of the Del Valle Dam at Lake Del Valle. The dam is approximately 7 miles south of the study area. In 1974, the California Division of Safety of Dams conducted a failure inundation study to assess the safety of the Del Valle Dam. The study assessed the worst-case failure scenario, a situation in which the dam failed from top to bottom when the reservoir was at full capacity. For Lake Del Valle, full capacity is projected to occur only during a 500-year storm event. The Del Valle Dam is a relatively newly constructed dam, has never been spilled from exceedance of storage capacity, and is routinely inspected and monitored by the Division of Safety of Dams for structural integrity, which includes the ability to withstand a substantial earthquake. Additionally, Del Valle was designed with a wider than average base for a dam of its size as a conservative measure to improve structural integrity.[86] For these reasons, the likelihood of total failure is considered extremely remote.

Also to the south of the Proposed Project and Build Alternatives footprints, there are levees along the Arroyo Mocho and Arroyo las Positas.[87] However, these levees are not recognized by FEMA as providing protection from the 100-year flood, and the probability of failure for these levees has not been assessed.[88, 89] However, the Proposed Project and Build Alternatives would not affect these levees in any manner. All other relevant potential impacts with respect to flooding are discussed above (see **Impact HYD-5** and **Impact HYD-9**). Therefore, potential impacts under the Proposed Project and Build Alternatives

[86] Jon H. Wright, Area 2 Engineer, Division of Safety of Dams, 2008. Personal Communication with PBS&J, January 23.
[87] Federal Emergency Management Agency (FEMA), 2016. National Flood Hazard Layer. Available at: https://hazards.fema.gov/femaportal/kmz/FEMA_NFHL_v3.0.1.kmz.
[88] Ibid.
[89] Federal Emergency Management Agency (FEMA), 2009b. Flood Insurance Study, Alameda County, California, and Incorporated Areas, Volume 1 of 3. August 3.

related to dam and levee failure would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts related to flooding involving dam failure, and no mitigation measures are required.

***Impact HYD-11: Allow for inundation by seiche, tsunami, or mudflow.***

***(No Project Alternative: NI; Conventional BART Project: NI; DMU Alternative: NI; Express Bus/BRT Alternative: NI; Enhanced Bus Alternative: NI)***

**No Project Alternative.** Under the No Project Alternative, the BART to Livermore Extension Project would not be implemented and there would be no physical changes in the environment associated with the Proposed Project or any of the Build Alternatives. Any effects of the other projects associated with the No Project Alternative have been or will be addressed in environmental documents prepared for those projects before they are implemented, and the No Project Alternative would not result in new impacts as a consequence of the BART Board of Directors' decision not to adopt a project. Therefore, the No Project Alternative is considered to have no impacts related to inundation by seiche, tsunami, or mudflow. **(NI)**

**Conventional BART Project and Build Alternatives.** The study area is not located in areas that are subject to inundation by seiche, tsunami, or mudflow. In addition, the Proposed Project or Build Alternatives would not result in changes related to inundation by seiche, tsunami, or mudflow. Therefore, the Proposed Project and Build Alternatives would have no impacts related to inundation by seiche, tsunami, or mudflow. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives would not have significant impacts related to seiches, tsunamis, or mudflows; therefore, no mitigation measures are required.

### (b) Operations – Cumulative Analysis

The geographic study area for cumulative water quality and hydrology impacts related to surface water is the Arroyo de la Laguna Watershed, which is the watershed downstream of the study area, and for groundwater it is the Livermore-Amador Valley Groundwater Basin.

As described in **Impacts HYD-6**, **HYD-7**, **HYD-8**, and **HYD-11** above, the Proposed Project and Build Alternatives would have no impacts related to runoff water, water quality, placement of housing within a 100-year flood hazard area, and seiche, tsunami, or

mudflow. Therefore, the Proposed Project and Build Alternatives would not contribute to these cumulative impacts during operations.

***Impact HYD-12(CU): Violate any water quality standards or waste discharge requirements, including through the alteration of an existing drainage pattern or the course of a stream or river, in a manner that would result in substantial erosion or sedimentation on or off site, or substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, in a manner that would result in flooding on or off site under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact HYD-3** and **Impact HYD-5** above, the No Project Alternative would have no physical impacts associated with the violation of water quality and discharge standards. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** The cumulative projects—as described in Section 3.A, Introduction to Environmental Analysis and Appendix E (which includes the INP)—would be developed within the Arroyo de la Laguna watershed and would alter the existing land cover by increasing the extent of impervious surfaces; consequently, the rate and volume of runoff produced during storm events could increase. For example, implementation of the INP would create approximately 103 acres of new impervious surface.[90] These activities could represent potential sources of additional pollutants, erosion, sediment transport to and siltation of surface waters, and/or increased potential for on- or off-site flooding. As noted in the Existing Conditions subsection above, surface waters within the Arroyo de la Laguna watershed have been identified as having impaired water quality.

All existing and future cumulative development projects within the Arroyo de la Laguna watershed would require adherence to existing regulatory requirements implemented by the RWQCB or the SWRCB. These orders and regulations require the implementation of stormwater treatment and runoff volume control measures. The regulations typically require minimizing the introduction of new impervious surfaces and encouraging on-site infiltration. These features include LID stormwater measures such as vegetated swales, pervious paving, and detention basins, which have proven effective in controlling stormwater pollutants and minimizing increases in runoff volumes.

[90] Dyett & Bhatia, 2017. Communication with Urban Planning Partners, Inc. regarding INP impervious surface estimate.

Similar to the Small MS4 Permit requirements described for the Proposed Project in **Impact HYD-3** above, cumulative projects would be a regulated project under the MRP (RWQCB Order No. R2-2015-0049) and all the provisions therein would apply. Therefore, cumulative water quality and increased runoff impacts from the Proposed Project or Alternatives, in combination with past, present, or probable future projects, would be less than significant, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts relative related to water quality standards or increased storm runoff, and no mitigation measures are required.

***Impact HYD-13(CU): Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted) under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact HYD-4** above, the No Project Alternative would have no physical impacts associated with aquifer volume or a lowering of the local groundwater table level. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** The potential for reductions in groundwater recharge during project operation is primarily related to the creation of new impervious surfaces. An increase in the amount of impervious surface area with implementation of the Proposed Project or one of the Build Alternatives, in combination with other cumulative projects, could reduce the recharge potential within the Livermore-Amador Valley Groundwater Basin, and consequently reduce groundwater supplies. Cumulative projects that would have comparatively large impervious footprints include the Dublin Crossing Specific Plan and the INP, which would primarily overlie the Main Basin.

However, similar to the Proposed Project and Build Alternatives, the cumulative projects would be subject to the applicable urban water management plan for water supplies, and major developments 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, to keep groundwater elevations at or above historic low levels through annual conjunctive use

practices would ensure that groundwater supplies are not substantially depleted and that the local groundwater table is not substantially lowered. Additionally, the recently adopted SGMA provides a framework for sustainable management of groundwater resources and created a new regulatory mechanism for avoiding substantial depletion of groundwater resources.

Further, all the cumulative projects would be required to comply with the MRP (RWQCB Order No. R2-2015-0049), the requirements of which help to promote groundwater recharge. Among other things, the MRP requires regulated projects to treat 100 percent of project site runoff with LID measures. LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment. Thus, precipitation and stormwater would likely be used on site or infiltrated, or otherwise treated prior to being released to existing stream channels where most of the natural recharge with the Livermore-Amador Valley occurs.

Therefore, as described above, cumulative impacts on groundwater recharge, groundwater supplies, and a lowering of the groundwater table from the Proposed Project and Build Alternatives, in combination with past, present, or probable future projects, would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** As described in **Impact HYD-4** above, the Enhanced Bus Alternative would have no impact related to physical impacts associated with aquifer volume or a lowering of the local groundwater table level. Therefore, the Enhanced Bus Alternative would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts related to groundwater, and no mitigation measures are required.

***Impact HYD-14(CU): Impede or redirect flood flows within a 100-year flood hazard area under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: NI)***

**No Project Alternative.** As described in **Impact HYD-9** above, the No Project Alternative would have no physical impacts associated with the impediment or redirection of flood flows within a 100-year flood hazard area. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project, DMU Alternative, and Express Bus/BRT Alternative.** As stated above in **Impact HYD-9**, the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative would result in new or modified structures and/or fill that would be

within a 100-year flood hazard areas. The main features of the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative (e.g., railway alignment and I-580 widening) would generally be consistent with existing grades and would not impede or redirect flows within a 100-year flood hazard area (non-floodway). However, some project components would result in new or modified structures and/or fill that could encroach on the designated floodways of Line G-2, Tassajara Creek, and Arroyo las Positas. The addition of cumulative development projects in these areas could increase the risk of flood conveyance capacity loss in conjunction with the Proposed Project, DMU Alternative, and Express Bus/BRT Alternative.

All floodplain and floodway development within the Arroyo de la Laguna watershed is regulated by FEMA and local cities with requirements for maintenance of flood flow conveyance and floodplain storage. According to 44 CFR 60.3(d)(3), floodway encroachments—including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway—are prohibited, unless it has been demonstrated through hydrologic and hydraulic analyses that they would not result in an increase in existing flood levels. All cumulative projects in a floodway would undergo an encroachment review to determine their effect on flood flows and ensure that they do not limit the capacity of the floodway to ameliorate flooding.

Also, proposed encroachments within 100-year flood hazard areas that are also within a Caltrans ROW must comply with Caltrans-specific requirements, which are based on those of the FHWA.[91] Typically, a singular study that provides an assessment of project hydraulics and the associated flood plain is used to satisfy both federal and State requirements and procedures. [92]

Further, Zone 7 manages and maintains most of the major stormwater and flood conveyance channels in the study area. The Zone 7 Stream Management Master Plan has been developed to target and manage improvements within the drainage system for flood control, as well as for other beneficial properties. As the Stream Management Master Plan and other flood control projects are implemented, conveyance capacity of the local drainage system would be improved.

In addition to the Zone 7 Stream Management Master Plan improvements and FEMA regulatory requirements, **Mitigation Measure HYD-9**, which would require floodway hydraulic analysis, would help reduce the impacts of flood flows to less-than-significant levels. Therefore, as described above, cumulative impacts on the impediment or redirection of flood flows from the Proposed Project, DMU Alternative, and Express

[91] 23 CFR 650, Subpart A – Location and Hydraulic Design of Encroachments on Flood Plains.
[92] California Department of Transportation, 2014. Workplan Standards Guide, Release 11.0.

Bus/BRT Alternative, in combination with past, present, or probable future projects, would be less than significant, and no mitigation measures are required. **(LS)**

**Enhanced Bus Alternative.** As described in **Impact HYD-9** above, the Enhanced Bus Alternative would have no physical impacts associated with the impediment or redirection of flood flows within a 100-year flood hazard area. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts related to impeding or redirecting flood flows within a 100-year flood hazard area, and no mitigation measures beyond those identified for the project are required.

***Impact HYD-15(CU): Expose people or structures to a significant risk of loss, injury, or death in the event of flooding, including flooding as a result of the failure of a levee or dam, under Cumulative Conditions.***

***(No Project Alternative: NI; Conventional BART Project: LS; DMU Alternative: LS; Express Bus/BRT Alternative: LS; Enhanced Bus Alternative: LS)***

**No Project Alternative.** As described in **Impact HYD-10** above, the No Project Alternative would have no new physical impacts associated with exposing people or structures to flooding. Therefore, the No Project Alternative would not contribute to cumulative impacts. **(NI)**

**Conventional BART Project and Build Alternatives.** Based on project characteristics and existing conditions, exposure to flood hazards and dam inundation typically occurs due to a project's location within a flood hazard zone or dam inundation zone; therefore, such impact is generally site specific, limited to the immediate vicinity of the site, and independent of cumulative project activities. Because operation of the Proposed Project and Build Alternatives would be localized, the past, current, and reasonably foreseeable future projects would not combine with those of the Proposed Project or Build Alternatives to cause or contribute to potential cumulative impacts associated with flood inundation or dam inundation. Therefore, the Proposed Project and Build Alternatives, in combination with past, present, or probable future projects, would have less-than-significant impacts related to flooding as a result of failure of a levee or dam, and no mitigation measures are required. **(LS)**

**Mitigation Measures.** As described above, the Proposed Project and Alternatives in combination with past, present, or probable future projects would not result in significant cumulative impacts relative related to flooding as a result of failure of a levee or dam, and no mitigation measures are required.