

5.1 Introduction

The Authority considered a wide range of alternatives identified during the public scoping process and then conducted a three-part screening evaluation to select the alternatives to be analyzed in this Draft EIR. Based on the screening process results, the following categories of alternatives were identified and included in this chapter:

- **Proposed Project.** The Proposed Project includes the Tri-Valley Alignment, the Altamont Alignment (including two track variants), the Tracy to Lathrop Alignment (including two track variants), the Dublin/Pleasanton Station, the Isabel Station, the Greenville Station, the Mountain House Station, the Downtown Tracy Station, the River Islands Station, the North Lathrop Station, the interim OMF, and the Tracy OMF. The Proposed Project includes initial operating segments (IOS) to Greenville and/or to Mountain House as potential phasing. The Proposed Project includes four technology variants: the diesel multiple unit (DMU) variant, the hybrid multiple unit (HBMU) variant, the battery-electric multiple unit (BEMU) variant, and the diesel locomotive haul (DLH) variant. The BEMU variant includes an overhead catenary system (OCS) over the Altamont.
- **Alternatives Analyzed at the Same Level of Detail as Proposed Project:** These alternatives include the Southfront Road Station Alternative (including a potential IOS to Southfront), the Stone Cut Alignment Alternative, the Mountain House Station Alternative (including a potential IOS to the Mountain House Station Alternative), the West Tracy OMF Alternative, and Downtown Tracy Parking Alternatives 1 and 2. These alternatives are identified in Chapter 2 and fully evaluated in Chapters 3 and 4 of the Draft EIR.
- **Alternatives Analyzed at a Lesser Level of Detail:** These alternatives include: the No Project Alternative; the Bus/BRT Alternative with Managed Lanes; and the Electric Multiple Unit/Overhead Catenary System (EMU/OCS) Alternative. The potential environmental impacts and capital costs of these alternatives are evaluated in this chapter and compared to the Proposed Project and alternatives analyzed at same level of detail.
- **Alternatives Considered but Withdrawn:** These alternatives include operating technologies, modal alternatives, and alternative alignment and station alternatives that were not carried forward for analysis in Chapters 3 and 4 (at an equal level of detail) or in this chapter (at a lesser level of detail). A review of these alternatives, the screening process, and why they were dismissed from further analysis is also included.
- **Environmentally Superior Alternative:** Per CEQA requirements, an environmentally superior alternative among the alternatives to the Proposed Project is identified as a result of the comparison of alternatives analyzed.

This chapter:

- summarizes CEQA requirements (Section 5.2);

- summarizes the proposed project and alternatives analyzed at the same level of detail (Section 5.3);
- describes and analyzes alternatives analyzed at a lesser level of detail (Section 5.4);
- compares alternatives analyzed in terms of environmental impact and cost (Section 5.5);
- compares alternatives analyzed and identifies the environmentally superior alternative among the alternatives analyzed to the Proposed Project (Section 5.6);
- presents information on station options at Grant Line Road and Ellis and an extension to Stockton described in the original Notice of Preparation (NOP) as being analyzed at a programmatic level of detail that the Authority has decided will be considered separately from the Proposed Project as potential future additions to the project at a later date (Section 5.7)¹;
- identifies alternatives considered but withdrawn (Section 5.8);
- presents the three-tier screening process (Section 5.9); and
- presents references cited in this chapter (Section 5.10).

5.2 CEQA Requirements

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) describe a range of reasonable alternatives to the project or to the location of the project that could feasibly avoid or lessen any significant environmental impacts while substantially attaining the project's basic objectives. An EIR should also evaluate the comparative merits of the alternatives.

Key provisions of the State CEQA Guidelines Section 15126.6 pertaining to the analysis of alternatives to a project are summarized below.

- The discussion of alternatives will focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if those alternatives would impede, to some, degree, the attainment of the project objectives or be more costly.
- The No Project Alternative will be evaluated along with its impacts. The No Project analysis will discuss the existing conditions at the time the NOP was published (October 2018) as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved based on current plans and consistent with available infrastructure and community services. The No Project Alternative is neither required nor expected to meet the project's goals and objectives or avoid or reduce any of the significant impacts associated with the project.
- The range of alternatives required in an EIR is governed by a "rule of reason;" therefore, the EIR must evaluate only those alternatives necessary to permit a reasoned choice. Alternatives will be limited to those that would avoid or substantially lessen any of the significant effects of the project.

¹ As discussed in Section 5.7, the Authority decided to focus on near-term alignments and stations in this EIR. As a result, the programmatic alignment and stations are not analyzed in this EIR but if advanced in the future would be analyzed separately by the Authority.

- An EIR need not consider an alternative with effects that cannot be reasonably ascertained, when implementation is remote and speculative, and if its selection would not achieve the basic project objectives.
- The range of feasible alternatives is selected and discussed in a manner to foster meaningful public participation and informed decision-making. Among the factors that may be taken into account when addressing the feasibility of alternatives, as described in CEQA Guidelines Section 15126.6(f)(1), are environmental impacts, site suitability, economic viability, social and political acceptability, technological capacity, availability of infrastructure, general plan consistency, regulatory limitations, jurisdictional boundaries, and whether the proponent could reasonably acquire, control, or otherwise have access to the alternative site.

The Authority considered a range of alternatives before selecting the alternatives to be analyzed in this EIR. Alternatives were identified through input from the public, agencies, and stakeholders during scoping (in 2018). Appendix A, *Valley Link Scoping Memorandum*, contains the scoping report detailing the scoping process, including the notification and scoping activities undertaken.

As required by CEQA, this chapter describes the No Project Alternative and several alternatives analyzed at a lesser level of detail and compares their impacts with those of the Proposed Project. The alternatives analyzed at a lesser level of detail are in addition to the several station and maintenance facility site alternatives which were described in Chapter 2 and which have been analyzed at a level equal to that of the Proposed Project within Chapters 3 and 4 of this EIR.

5.3 Proposed Project and Alternatives Analyzed at the Same Level of Detail

As discussed in Chapter 2, the Proposed Project includes the following elements:

- **Alignments:** The Proposed Project includes Tri-Valley Alignment, the Altamont Pass Alignment (including a one-track and a two-track variant), and the Tracy to Lathrop Alignment (including a one-track and two-track variant).
- **Stations:** The Proposed Project includes stations at Dublin/Pleasanton, Isabel, Greenville, the Mountain House, Downtown Tracy, River Islands, and North Lathrop
- **Operations and Maintenance Facilities (OMF):** The Proposed Project includes an interim OMF in the Altamont Pass (if there is an IOS to Greenville) and the Tracy OMF.
- **Initial Operating Segments (IOS):** The Proposed Project includes potential phasing in the form of initial operating segment (IOS) to Greenville and/or IOS to Mountain House.
- **Technology Variants:** The Proposed Project includes four technology variants: the DMU variant, the HBMU variant, the BEMU variant, and the DLH variant. The BEMU variant includes an Altamont OCS.

As discussed in Section 5.9 below, the Authority considered a wide range of alternatives suggested during the scoping process and then conducted a three-part screening evaluation to select the alternatives to be analyzed in this EIR. Alternatives determined to be infeasible, to not avoid or substantially reduce one or more significant impacts of the Proposed Project, or to not meet all or most of the project's goals and objectives were dismissed from further analysis.

This EIR analyzes the following alternatives at a level of detail equal to the Proposed Project with detailed description of these alternatives in Chapter 2, *Project Description*, and environmental analysis in Chapter 3, *Environmental Impact Analysis*, as well as in Chapter 4, *Other CEQA-Required Analysis*:

- Stone Cut Alignment Alternative
- Southfront Road Station Alternative
- Mountain House Station Alternative
- West Tracy OMF Alternative
- Downtown Tracy Parking Alternatives 1 and 2

5.4 Description and Analysis of Alternatives Analyzed at a Lesser Level of Detail

This section describes four alternatives that were analyzed at a lesser level of detail than the Proposed Project and provides that environmental analysis:

- No Project Alternative
- Bus/Bus Rapid Transit (BRT) with Managed Lanes Alternative
- Electric multiple unit (EMU) with overhead catenary system (OCS)

5.4.1 No Project Alternative

5.4.1.1 CEQA Requirements

CEQA Guidelines Section 15126.6(e) requires the analysis of a No Project Alternative. The No Project Alternative analysis must discuss the existing conditions as well as what would reasonably be expected to occur in the foreseeable future if the project were not approved.

The No Project Alternative would result in no new rail transit or other transit connection being established between the Central Valley and Bay Area. Existing transit services between the Central Valley and Bay Area would continue, including Altamont Corridor Express (ACE) between Stockton and San Jose, Bay Area Rapid Transit (BART), and the various existing bus connections to BART. The No Project Alternative assumes that Phase I of the ACE Extension, which would extend ACE service to Ceres, would be operational by 2023.

In addition, the No Project Alternative assumes the continuation of public commuter bus services operated by the San Joaquin Regional Transit District (San Joaquin RTD).² The No Project Alternative also assumes that the existing roadway system connecting the Central Valley and Bay

² RTD Route 150 provides 5 westbound buses each weekday morning and 4 eastbound buses each evening between Stockton and Dublin/Pleasanton BART. Stops include the Stockton Park and Ride, Lathrop, and the Tracy Transit Station. Route 150 provides one weekday westbound and two weekday eastbound trips between Stockton and the Lawrence Livermore National Laboratory, with a stop in Lathrop. RTD also offers commuter bus service from Stockton to major employment centers in Sunnyvale, with intermediate stops in Manteca, Tracy, and the Johnson Road Park and Ride in Pleasanton (at the I-580/I-680 interchange).

Area (the central artery being Interstate [I-]580) will undergo maintenance but no capacity expansion projects.

5.4.1.2 Environmental Impacts

Aesthetics

The No Project Alternative would result in no permanent change to visual character, views, nighttime lighting, and daytime glare. This alternative would not involve the construction of stations, vegetation removal, tree trimming, intersection and driveway modifications, new or modified culverts, and new or modified structures. Current railroad right-of-way (ROW) maintenance of vegetation would continue as at present.

Construction and operation of the Proposed Project would have significant, but mitigable, aesthetic impacts at all locations. In comparison, the No Project Alternative would have no new impacts on aesthetics because it would make no changes to the existing transportation network. The impacts of the No Project Alternative would thus be less than the impacts of the Proposed Project

Agricultural Resources

The No Project Alternative would include neither temporary use nor direct conversion of Important Farmland to nonagricultural use. Therefore, this alternative would have no impact on agricultural resources, and its impacts would be less than the impacts of the Proposed Project.

Air Quality

The No Project Alternative would avoid all construction emissions associated with the Proposed Project. As described in Section 3.3, *Air Quality*, the construction emissions of the Proposed Project would be significant before mitigation but can be mitigated below air district thresholds. Because the No Project Alternative does not include any construction, no such impacts would occur with this alternative.

Proposed Project operations, including train idling at stations, are not expected to result in localized significant health hazards associated with CO or PM_{2.5} emissions near sensitive receptors, though cumulative PM_{2.5} emissions, in conjunction with existing nearby emissions sources such as train and vehicle operation, would exceed BAAQMD levels in the Tri-Valley segment.

The Proposed Project overall would result in a reduction of ROG, NO_x, CO, PM_{2.5}, and PM₁₀ emissions in the BAAQMD and SJVAPCD. The No Project Alternative would not result in a reduction of criteria pollutant emissions and thus would result in future higher air quality impacts than are anticipated with the Proposed Project.

Table 5-5 below shows the reductions of criteria pollutant emissions with the Proposed Project and the other build alternatives compared to the No Project Alternative.

Biological Resources

The No Project Alternative would avoid new construction or operational impacts on biological resources, including in areas of biological sensitivity, such as the Altamont area, Paradise Cut, and the San Joaquin River. Proposed Project construction activities that would occur in these areas, as well as operation of Project elements, would impact sensitive natural communities and habitat for

special status species, and could affect these species by general operational disturbance. Additionally, while the No Project alternative would maintain vehicle use along major roadways, which currently act as barriers to wildlife movement, the Proposed Project would increase train operations along generally infrequently used railway ROWs in certain biologically sensitive areas, increasing the potential for disturbance and train-wildlife collisions.

Overall, the Proposed Project would have higher impacts on biological resources than the No Project Alternative, due to Project construction and operations activities in biologically sensitive areas. However, the No Project Alternative would not reduce automobile usage through offering a transportation alternative and thus would not reduce any existing/ongoing biological resource impacts associated with automobile operations.

Cultural Resources

The No Project Alternative would not have construction- or operation-related effects on cultural resources. Construction of the Proposed Project, in comparison, would result in significant but mitigatable impacts on certain cultural resources.

Energy

The No Project Alternative would not require any construction fuels and, therefore, would have no impact on energy usage because there would be no construction phase. However, because the operational Valley Link Project would provide an alternative to driving and would divert travelers from personal vehicles to passenger rail, the related decrease in energy consumption anticipated by the project would offset the construction-phase Proposed Project energy demands in about two years. The Proposed Project will also include a solar installation at the Tracy OMF. The No Project Alternative would not divert any travelers from personal vehicles; therefore, continued personal vehicle use is anticipated. Thus, operational energy impacts would be greater with the No Project Alternative than they would be with the Proposed Project.

Table 5-6 below shows the reductions in energy use for the Proposed Project and other build alternatives compared to the No Project Alternative.

Geology and Soils

The No Project Alternative would not result in any new exposure of structures and people to adverse geology, soil, and seismic conditions. The Proposed Project would construct a new railway and ancillary facilities that would cross certain seismically active areas. However, as described in Section 3.7, *Geology, and Soils*, the Proposed Project would not result in significant impacts related to geology, soils, or seismicity. Therefore, while the No Project Alternative's impacts associated with adverse geology, soil, and seismic conditions would be less than with the Proposed Project, this difference is not material as the Proposed Project will not have significant impacts related to these subject areas.

Additionally, the No Project Alternative would not have construction- or operation-related effects on paleontological resources or unique geological features. Construction of the Proposed Project, in comparison, would result in significant impacts before mitigation on certain paleontological resources or unique geological features, but no significant and unavoidable impacts with mitigation.

Greenhouse Gas Emissions

As described in Section 3.8, *Greenhouse Gas Emissions*, the IOS and the full build scenarios (Dublin/Pleasanton to North Lathrop) with any of the technology variants (DMU, HBMU, BEMU, or DLH) would result in construction GHG emissions that would be more than offset by net reduction in GHG emissions during operations. The reduction of vehicle-related emissions far outweighs the increased diesel train operational emissions and the Proposed Project would result in a substantial reduction in GHG emissions. The No Project Alternative would avoid construction and operational train emissions but would also not lower emissions related to personal vehicle use and thus would result in higher future GHG emissions than the Proposed Project.

Table 5-7 below shows the reductions of GHG emissions with the Proposed Project and the other build alternatives compared to the No Project Alternative.

Hazards and Hazardous Materials

Construction of the Proposed Project would require regular handling of hazardous materials such as fuels, concrete, paint, and other materials. Because the No Project Alternative would not include construction of any facilities, construction-related impacts associated with hazardous materials would not be expected.

However, the No Project Alternative would result in higher overall operational diesel and gasoline use compared to the Proposed Project because it would require more handling of fuel for operation of personal vehicles that would be offset by Proposed Project implementation.

While fuels would be required for train operation, it is not expected that the Proposed Project would substantially increase hazards to workers, passengers, or adjacent human and environmental receptors along rail routes due to design features because rail systems must comply with Federal Railroad Administration (FRA) and California Public Utilities Commission requirements for tracks, equipment, railroad operating rules, and practices.

The No Project Alternative would not facilitate a mode shift from automobile to passenger rail and thus would result in greater potential for highway accidents than the Proposed Project some of which may involve hazardous materials. In addition, the No Project Alternative would overall require more fuel handling and use in the form of personal vehicle fueling that would be lessened with Proposed Project implementation.

Therefore, the No Project Alternative is considered to have a greater operational impact associated with the release and exposure of hazardous materials than the Proposed Project.

Hydrology and Water Quality

With the No Project Alternative, the impervious surface area in the study area and drainage would remain the same as at present. Operation of the Proposed Project would include an increase in impervious surfaces at proposed stations, OMFs, and platforms, but these facilities are not expected to increase stormwater runoff that could substantially degrade water quality.

As noted in the discussion above of *Hazards and Hazardous Materials*, the Proposed Project is considered overall to have less potential for spills and runoff in relation to fuel handling and use because it would result in an overall reduction in the handling of transportation fuel for personal vehicle use (with the reduction in VMT and automobile fuel consumption). Subsequently, the

Proposed Project would have a reduced potential for personal vehicle fuels to enter waterbodies and degrade water quality, when compared to the No Project Alternative. Because the potential operational impact of the Proposed Project on water quality could be addressed through applying existing regulations, the No Project Alternative is considered to have a higher risk of operational spills and water quality effects.

The Proposed Project would include the construction of ancillary features adjacent to, within, or crossing over surface waters, drainage courses, and flood zones (State of California Department of Water Resources, No Date). Installation of these features would increase the potential for runoff and erosion during construction and could potentially impede or redirect flood flows during operation; however, these impacts are expected to be less than significant with mitigation. Therefore, the No Project Alternative is considered to have less potential impact than the Proposed Project during the construction phase because it would not entail any construction-related ground disturbance near waterbodies.

Land Use and Planning

With the No Project Alternative, no new facilities or Project elements would be constructed within I-580 or inside the Alameda County Transportation Corridor or UPRR ROW to connect passenger rail from Lathrop to Tracy to Livermore and Dublin/Pleasanton. The No Project Alternative would also not physically divide an existing community and would create no new conflicts with land use policies, plans, or tree ordinances.

The No Project Alternative would not increase connectivity and transportation options and would not support the ability of cities to pursue transit-oriented development. The No Project Alternative would not improve mobility and circulation, and would not provide an alternative to automobile travel, which would not be beneficial for regional planning agencies in meeting their responsibilities under Senate Bill 375 to promote and implement sustainable community strategies, or in meeting regional transportation goals. As a result, the No Project Alternative would neither complement nor help fulfill local plans concerning land use patterns and intensities throughout the Tri-Valley, Altamont, and Tracy to Lathrop Alignments.

However, as described in greater detail in Section 3.11, *Land Use* and Section 3.13, *Population and Housing*, the Proposed Project has the potential to induce localized development near new transit stations, including the Mountain House Station and the Greenville Station. While these proposed stations themselves are not inconsistent with local land use policies, the potential subsequent residential development that could reasonably follow station development would be inconsistent with current local planning policies.

Overall, because the No Project Alternative would include no construction activities, it would have a lesser impact on land use than would the Proposed Project. While the No Project Alternative would not help jurisdictions fulfill mobility goals within the planned transportation corridor, the Proposed Project could potentially induce unplanned localized development near new stations, which would be inconsistent with local policies.

Noise and Vibration

Compared to the Proposed Project, the No Project Alternative would not result in any construction noise. The No Project Alternative would also result in less noise from passenger rail operations along the extension corridor because no new rail service would be provided. However, the No

Project Alternative would not facilitate any mode shift from automobile to passenger rail use in the project corridor, so the No Project Alternative would have similar or greater operational highway noise than the Proposed Project.

Population and Housing

As stated in Section 3.13, the Proposed Project is primarily intended to serve existing populations as well as future populations associated with planned and approved but not yet constructed residential development in San Joaquin County by providing an alternative to automobile transportation in accessing the San Francisco Bay Area. The Proposed Project has the potential to induce unplanned localized growth around the Mountain House Station and Greenville Station. The No Project Alternative would not have the potential to attract new growth or accelerate population growth or displace existing housing units but would also make no change in the anticipated future population growth associated with planned and approved but not yet constructed residential development. In sum, the No Project Alternative would have lower impacts on population and housing than are expected with implementation of the Proposed Project.

Public Services

Proposed Project construction activities would increase the potential for emergency service response needs due to the potential for construction accidents. This potential would be reduced with the No Project Alternative because no construction is proposed.

Additionally, while the No Project Alternative would perpetuate the existing potential for traffic accidents and vehicle collisions which would require emergency public service responses, implementation of the Proposed Project would initiate train operations, a generally safer mode of travel relative to automobile use. The Proposed Project could also increase the risk of crime occurring on and off trains, such as vehicle break-ins at parking lots. Both would require public services such as police and emergency services, though no new facilities for such services are anticipated as part of the Proposed Project. While construction and operations of the Proposed Project could result in a greater demand for police and emergency services related to stations or train accidents, the Proposed Project would reduce accidents associated with vehicular travel (which are more common), it would result in less demand for public and emergency services than the No Project Alternative.

Recreation

The No Project Alternative would not require the construction of Project elements near recreational facilities, and would therefore avoid the temporary noise and air quality impacts that are anticipated from Proposed Project construction activities adjacent to recreational resources (including the Iron Horse Regional Trail, San Joaquin River, and Mossdale Crossing Regional Park). In operation, the installation of Project facilities could affect the visual setting of these resources and result in increased train noise levels and criteria pollutant emissions near these recreational facilities but operational impacts including visual, noise, and air quality to existing park resources would be less than significant. Therefore, while the Proposed Project would have a less than significant impact on recreational facilities with the implementation of mitigation, these impacts would remain greater than those anticipated with implementation of the No Project Alternative.

Safety and Security

As described above in *Hydrology and Water Quality*, implementation of the Proposed Project would introduce new structures adjacent to, within, or crossing over surface waters, drainage courses, and flood zones, which introduces a potential flooding safety hazard at these locations. Additionally, because portions of the Proposed Project would be constructed within High Fire Hazard Severity Zones, both construction and operation of these facilities slightly elevates the potential for wildfires in these areas beyond current conditions, though Project-related impacts are expected to be less than significant and vegetation clearing strategies would minimize this operational risk. However, Proposed Project construction activities, which would utilize combustible fuels, would present a slightly elevated, though less than significant, fire hazard.

As shown in Table 5-1, compared to rail and bus modes of transportation, personal passenger/light duty vehicle travel is the most used and most dangerous mode of transportation. Traveling by train is safer than by highway and the Proposed Project would provide a safer railway transportation alternative to highway driving. The Proposed Project would result in less fatalities on a passenger mile basis compared to on-road personal vehicle use.

Table 5-1. Passenger Fatalities in the United States by Mode, 2009-2018

	Fatalities	Billion Passenger Miles	Rate per billion Passenger Miles
Passenger vehicle and light trucks	223,543	45,808	4.9
Railroad	58	200	0.29
Bus	296	630	0.47

Source: National Safety Council 2020

Therefore, maintaining current and growing personal vehicle highway travel with the No Project Alternative presents elevated transportation risks when compared to offsetting some personal vehicle travel with Proposed Project train transportation. Furthermore, as described above in *Hazardous Materials*, the No Project alternative would not result in a reduction in personal vehicle fuel use.

Thus, the Proposed Project would result in slightly greater potential flooding and wildfire risk than the No Project Alternative, but lower transportation hazard risk than the No Project Alternative. Therefore, the Proposed Project would overall result in a slightly higher potential for safety and security impacts during construction, and a lower potential for impacts during the Proposed Project operation phase, when compared to the Proposed Project. Overall, however, operational impacts are expected to be relatively similar, with respect to Safety and Security.

Transportation and Traffic

Because the No Project Alternative would not include any construction activities, no construction-related impacts to transportation and traffic would occur. However, the No Project Alternative would not divert any personal vehicles from roadways, while the Proposed Project would divert personal vehicle trips from roadways onto rail transportation systems. While the Proposed Project would result in train stations where individuals would park personal vehicles to use the proposed passenger rail system, these stations would substantially reduce VMT when compared to current conditions, because users would drive to stations rather than to final destinations. Therefore, the No

Project Alternative would have a significantly greater impact on transportation and traffic than the Proposed Project.

Table 5-2 shows the reductions in VMT with the Proposed Project and the other build alternatives compared to the No Project Alternative.

Table 5-2. Weekday Daily VMT Reduction by Alternative vs. No Project Alternative

Alternative	2025 IOS to Mountain House	2025 Full Build	2040 Full Build
Proposed Project	(85,100)	(202,300)	(556,500)
Southfront Road Station Alternative	(90,300)	(206,100)	(578,500)
Bus/BRT Alternative	Not Analyzed	(35,200)	(157,600)
EMU Alternative	Same as Proposed Project		

Source: Appendix F, *Valley Link Ridership Technical Memorandum – Revised*; Project Ridership modelling, comparison is to the No Project Alternative.

Utilities and Service Systems

Construction of the Proposed Project would require the relocation of some existing utility facilities and the installation of some new utility facilities to support new project elements and facilitate communications between OMFs, stations, and train operators. The No Project Alternative would not require the relocation of existing, or installation of new, utility facilities. Therefore, the No Project Alternative would have less impact on utilities than the Proposed Project.

Operation of the Proposed Project is intended to serve existing populations as well as future populations associated with approved but not yet constructed residential development in San Joaquin County. However, the Proposed Project would also have the potential to facilitate localized unplanned growth in selected areas near two stations, but is not expected to result in overall higher growth than currently planned, so overall utility demand effects would be less than significant. It is uncertain whether the No Project Alternative would support as much planned growth as the Proposed Project especially in San Joaquin County. However, given the housing price differentials between San Joaquin County and the San Francisco Bay Area, planned growth in San Joaquin County may not be substantially different overall with or without the Proposed Project. As such, overall, the Proposed Project and the No Project Alternative are likely to result in similar overall utility growth demands, although the Proposed Project may result in localized higher demands around Valley Link Stations.

5.4.2 Bus/BRT Alternative with Managed Lanes

5.4.2.1 Alternative Description

The Authority received comments during scoping suggesting the consideration of a non-rail alternative to the Proposed Project, namely a bus-based alternative that would make use of existing highway facilities. Prior CEQA documents prepared for the BART Extension to Livermore also considered bus-based alternatives. The prior concepts were adapted for use in developing a bus-based alternative to the proposed Valley Link project.

A Bus/Bus Rapid Transit (BRT) Alternative would require less new infrastructure than a rail project since it would use existing roadways to a large extent. Also, a Bus/BRT Alternative would have

substantially lower upfront capital costs than a rail project. For these reasons, the Authority investigated an alternative that would provide express bus service instead of rail service to connect the Central Valley to the BART system.

Alternative Concept

As shown in Figure 5-1 below, starting in the east, the Bus/BRT Alternative would have express buses originate in Manteca, near State Route 120 and Airport Way, and then travel along local streets to the (planned) North Lathrop ACE Station, and then have bus stations at the River Islands community, the Tracy Transit Center, West Tracy, Mountain House, Greenville Road, Vasco Road, Isabel Avenue, and the BART Dublin/Pleasanton Station.

Dublin/Pleasanton bound buses would travel along portions of I-5, I-205, and I-580, operating on the right-side shoulders during heavy traffic conditions (when traffic speeds fall below 35 mph) at a maximum speed of 35 mph. To accommodate bus operations, stretches of the shoulder would need to be widened by either restriping the highway lanes or expanding the shoulder itself to ensure at least 12 feet of width required for bus-on-shoulder operations.

Between Greenville Road and Dublin/Pleasanton BART Station, buses would operate in the existing I-580 Express Lanes. Passenger platforms at Dublin/Pleasanton BART Station and at Isabel Avenue would be in the median of I-580, adjacent to the existing Express Lanes. Figure 5-2 shows a conceptual design for a platform connection at the Dublin/Pleasanton BART Station. A pedestrian bridge over eastbound and westbound lanes of I-580 would provide access for riders between eastbound and westbound bus stops and a parking lot on the north side of I-580.

As shown in the summary below, the Bus/BRT Alternative's proposed stops would generally mirror the stops of the Proposed Project after Manteca:

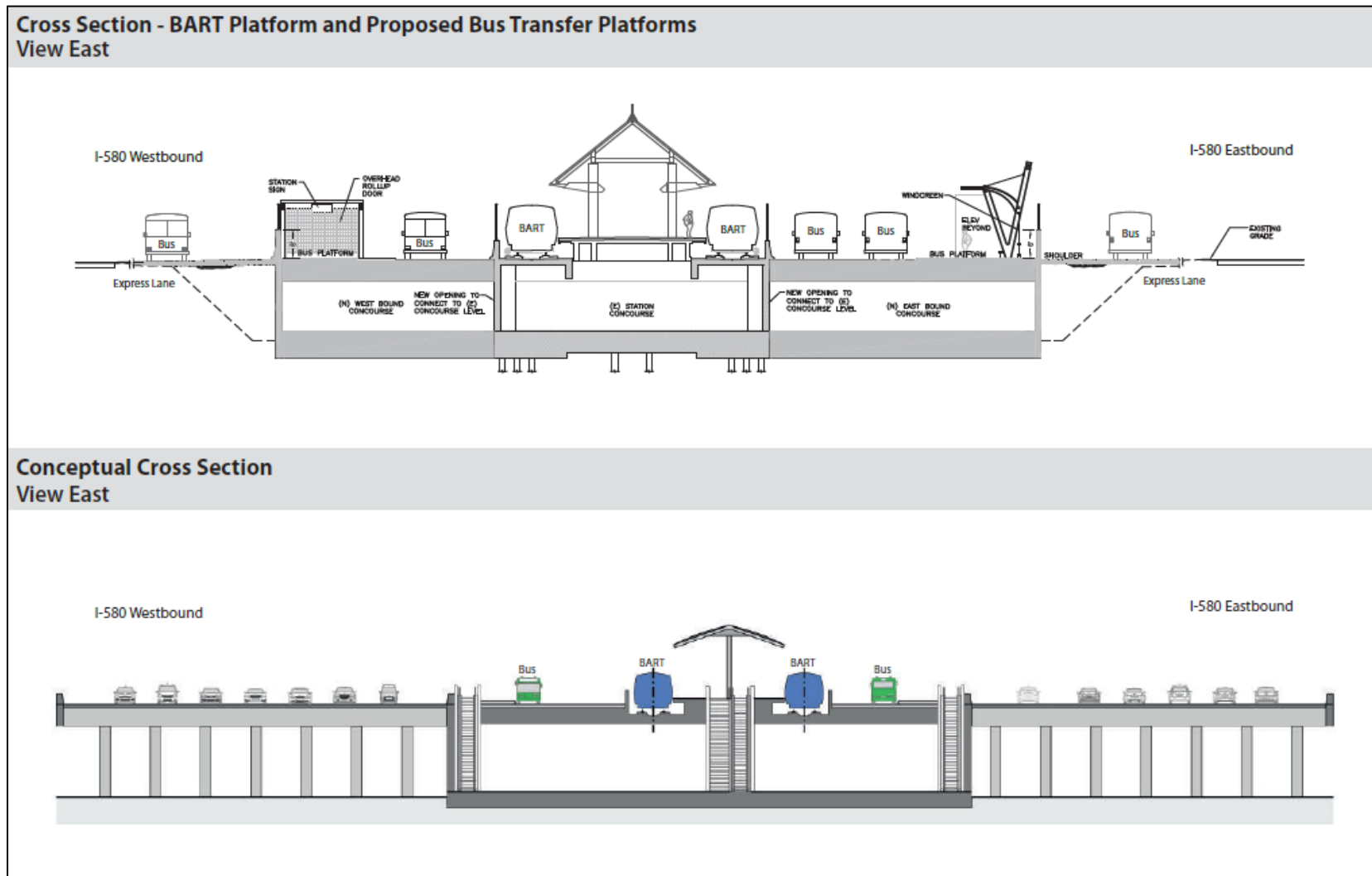
- Manteca Family Entertainment Zone: location dependent on future development plans
- North Lathrop: West Lathrop Road and McKinley Avenue (ACE Connection at planned station)
- River Islands: East Louise Avenue and Manthey Road
- Tracy Transit Center (North Central Avenue at East Sixth Street)
- West Tracy: South Lammers Road and West 11th Street
- Mountain House: Mountain House Parkway and Central Parkway (future)
- Greenville: Greenville Road I-580 exit (ACE Connect at existing Vasco Road ACE Station)
- Isabel Avenue: median of I-580 at Isabel Avenue (via I-580 Express Lanes)
- Dublin/Pleasanton BART Station (via I-580 Express Lanes)

Figure 5-1. Bus/BRT Alternative Route



Source: AECOM 2019

Figure 5-2. Bus/BRT Alternative Dublin/Pleasanton BART Platform Connection Conceptual Cross-Sections



Source: BART, 2017, BART to Livermore Extension Project EIR.

Construction

The Bus/BRT alternative would require construction of widened shoulder lanes, parking areas, and bus stations. Overall, this alternative would require less construction than the Proposed Project.

The Bus/BRT alternative would include major modifications to the Dublin/Pleasanton BART Station to provide for bus access from the I-580 Express Lanes including modifications to I-580, the BART Station, and adjacent areas. Based on the design for the Bus/BRT in the BART to Livermore EIR, to accommodate bus movement at the Dublin/Pleasanton BART station, approximately 210 surface parking spaces would need to be relocated, either to a garage or another surface parking area.

This alternative would also include construction of an Isabel Avenue bus facility in the median of I-580, accessed from the I-580 Express Lanes including a parking lot to the south side of the freeway and a pedestrian bridge linking the bus facility to the parking lot. The Bus/BRT alternative would include construction of a reduced version of the rail Tracy OMF, assuming the lesser space will be required handling and storage of buses versus DMUs.

Shoulder improvements would include restriping and resurfacing to provide 12 feet of width required for reduced speed bus-on-shoulder operations. For about a half mile past Carroll Road along eastbound I-580, a retaining wall would need to be built further into the hillside to provide the required bus-on-shoulder width. No modifications are assumed for short structures, i.e., I-205 crossings over the Mendota Canal and the California Aqueduct and for the UP viaduct over eastbound I-580. In such locations, the buses would merge from the right-side shoulder into the freeway's slow lane and then retake the shoulder on the far side of the structure. The merging into congested traffic conditions for short distances will not affect end-to-end run time to a meaningful degree.

Improvements for bus stops (i.e., boarding and alighting platforms, shelters, ticket vending machines, and signage) will be installed at Manteca Family Entertainment Zone, North Lathrop, River Islands, West Tracy, Mountain House, and Greenville Road.

The operations and maintenance facility (OMF) for the Bus/BRT Alternative would be located at the same site as the Proposed Project (Tracy OMF) but would be smaller than the OMF considered for the Proposed Project.

Operations

For 2025, the Bus/BRT Alternative would operate from 5 a.m. to 8 p.m. on weekdays and 8 a.m. to 8 p.m. on weekends and holidays. Weekday peak period service (5 to 8 a.m. and 4 to 7 p.m.) would be every 12 minutes between Greenville and the Dublin/Pleasanton BART Station and every 24 minutes between North Lathrop and Dublin/Pleasanton BART. Weekday off peak period service would be 30 minutes between Greenville and the Dublin/Pleasanton BART Station and every 60 minutes between North Lathrop and Dublin/Pleasanton BART. Weekend/holiday service would be 30 minutes between Greenville and the Dublin/Pleasanton BART Station and every 60 minutes between North Lathrop and Dublin/Pleasanton BART. During the week, four westbound buses in the a.m. peak period and four eastbound buses in the p.m. peak period would divert 8 miles from I-580 to serve the Vasco Road ACE station on weekdays, facilitating timed transfers with ACE trains. By 2040, weekday service would be expanded until 1 a.m. daily; on weekdays, service would begin at about 4 a.m., Saturday service at 6 a.m., and Sunday service at 8 a.m.

As shown in Table 5-3 below, runtimes for the Bus/BRT Alternative are projected to be 1 hour and 32 minutes during the peak period from North Lathrop to Dublin/Pleasanton, assuming use of highway shoulders when necessary as well as existing I-580 express lanes. Runtime between Greenville Road and Dublin/Pleasanton BART is projected at 15 minutes (using Express Lanes). Runtimes for the BUS/BRT Alternative would be considerably longer without bus operations along shoulders during heavy traffic periods. Table 5-3 also shows times for selected buses to connect with the Vasco Road ACE Station.

Table 5-3. Bus/BRT Alternative – Estimated Travel Times

	Bus/I-580 Express Lanes	Bus on Shoulder and I-580 Express Lanes	Diesel Multiple Unit (DMU)
North Lathrop – Dublin/Pleasanton BART	2:06 (no Vasco Station stop) 2:27 (Vasco Station stop)	1:32 (no Vasco Station stop) 1:53 (Vasco Station stop)	1:11
Greenville Road – Dublin/Pleasanton BART	0:15	0:15	0:20

Source: AECOM, 2019

The Bus/BRT Alternative would provide parking at proposed stops to accommodate projected ridership, which is expected to originate largely from the Central Valley. Accordingly, the Bus/BRT Alternative would not create new parking at the Dublin/Pleasanton stop, since that is considered a transfer station.

The Bus/BRT Alternative would utilize an initial 2025 fleet of 24 buses, with 6 additional buses needed by 2040. The proposed vehicle would be a New Flyer Xcelsior CHARGE 60-foot fully battery-electric bus or a comparable vehicle. The New Flyer vehicle has a maximum capacity of 123 riders (64 standing and 59 seated). Based on the anticipated vehicle fleet (and the capacity of individual vehicles) and the service plan, the Bus/BRT Alternative is projected to attract an annual weekday ridership of 1 million passengers in 2025, which is approximately 30 percent of the estimated 3.2 million weekday passengers for the Proposed Project in 2025.

Depending on the battery capacity purchased, the Xcelsior CHARGE has a range of up to 260 miles. Both plug-in charging and on-route charging options are available. However, due to the length of the route (44.3 miles one way), on-route charging is assumed to not be feasible.

OMF operations would include charging (fueling), cleaning, inspections, regular maintenance, and dispatching.

Costs

As shown in Table 5-4, the capital cost of the Bus/BRT Alternative would be approximately \$479 million (of which approximately \$195 million would be for the Dublin/Pleasanton BART Bus Facility in the median of I-580) compared to approximately \$2.3 billion to \$2.9 billion for the Proposed Project assuming the DMU variant and the single-track variants.

Table 5-4. Bus/BRT Alternative Capital Cost Estimate (\$2018 million)

	Construction	Contingency	Markups	TOTAL
Shoulder Improvements/Restriping	\$31.7	\$9.5	\$13.1	\$54.3
Roadway Structures Modification	\$23.8	\$8.3	\$10.2	\$42.3
Bus Stops	\$31.0	\$9.0	\$12.7	\$52.7
Parking Lots	\$17.2	\$4.3	\$6.8	\$28.3
Dublin/Pleasanton BART Bus Facility	\$147.9	-	\$47.0	\$194.9
Operations and Maintenance Facility	\$40.0	\$10.0	\$15.9	\$65.9
Vehicles (24)				\$31.2
Total	\$291.6	\$41.1	\$105.7	\$469.7
Additional Buses for Expanded Service (6)				\$7.8

Source: AECOM 2019.

Operations and maintenance costs for 2040 for the Bus/BRT Alternative would be approximately \$10.5 million compared to \$55 million (for a 12/24 peak hour schedule) up to \$86 million (for the 12/12 peak hour schedule) for the Proposed Project.

5.4.2.2 Environmental Impact Analysis

Aesthetics

The Bus/BRT Alternative would require road widening on the right shoulder in certain locations along I-205, I-5, and I-580, but would not include construction of new facilities in the Altamont Hills. Conversely, the Proposed Project would involve the construction of the interim OMF along Altamont Pass Road, track upgrades crossing Midway Road, and the Mountain House Station along Patterson Pass Road. While aesthetic impacts associated with construction of the Interim OMF and the Mountain House Station under the Proposed Project would be less than significant with mitigation, such impacts would not occur with implementation of the Bus/BRT Alternative because comparable facilities are not proposed at these locations. In addition, the Bus/BRT Alternative would not include the potential for an OCS over the Altamont

Because implementation of the Bus/BRT Alternative would operate fully within existing roadways along I-5, I-205, and I-580; would not require construction of new facilities along scenic roadways, aesthetic impacts would be less than those anticipated with the Proposed Project.

Agricultural Resources

In multiple locations along I-205 and I-5, as well as within the City of Manteca, the Bus/BRT Alternative would be constructed adjacent to Prime Farmland, Prime Farmland of Local Importance, and Prime Farmland of Statewide Importance (California Department of Conservation, 2016). In some locations, this alternative may require expansion of right-side highway shoulders to accommodate a bus-only lane during heavy traffic conditions. At locations subject to roadway widening that are also surrounded by Prime Farmland and/or Prime Farmland of Local or Statewide Importance, the Bus/BRT alternative could impact such resources. However, these impacts are reasonably expected to be similar in nature to impacts anticipated with implementation of the Proposed Project's double track variants (Altamont Alignment Variant 2, Double Track and Tracy to Lathrop Alignment Variant 2, Double Track), which would require widening of the existing railroad

ROW, in some places expanding into Prime Farmland, Prime Farmland of Local Importance, and Prime Farmland of Statewide Importance. However, because the Proposed Project would be constructed primarily along the I-580 corridor and the existing UPRR ROW and the Bus/BRT Alternative would be constructed along the I-580, I-205, and I-5 highways, impacts to agricultural resources would be localized in different areas. Furthermore, while the Mountain House Station and the Mountain House Station Alternative would be constructed in different locations for the Proposed Project and the Bus/BRT Alternative, each would generally be located in agricultural land use areas; therefore, construction and operations of these facilities with implementation of either the Proposed Project or the Bus/BRT Alternative would likely result in similar impacts to agricultural resources.

As with the Proposed Project, farmland conversion associated with the expansion of existing ROW (UPRR ROW with implementation of the Proposed Project or freeway ROW with implementation of the Bus/BRT Alternative) into Prime Farmland, Prime Farmland of Local Importance, and Prime Farmland of Statewide Importance would be significant, and impacts would be similar under either the Proposed Project or the Bus/BRT Alternative.

Air Quality

Construction of the Bus/BRT Alternative would require the right-shoulder widening of some areas along existing highways (I-5, I-205, and I-580). Construction activities such as grading, digging, and the operation of gasoline-powered construction equipment have the potential to degrade air quality. However, because construction activities are expected to be less extensive with the Bus/BRT Alternative (no track improvements required and fewer stations and OMFs to be constructed), construction air quality impacts are expected to be less with implementation of the Bus/BRT Alternative than with implementation of the Proposed Project, although Proposed Project construction emissions can be mitigated to a less than significant level.

The Bus/BRT Alternative would operate on a lithium-ion battery system, which would not emit mobile source air pollutants but would require energy from the power grid.³ Such energy is derived from multiple sources, including those that generate air pollutants. The Bus/BRT Alternative would capture/divert fewer automobile trips than the Proposed Project (see Table 5-2 re: VMT reduction comparisons).

Table 5-5 shows a comparison of operational emissions for the Proposed Project variants vs. the Bus/BRT Alternative and other build alternatives. As shown, the Proposed Project DMU variant would have greater reductions of ROG, NO_x, CO, PM₁₀, and PM_{2.5}, compared to the Bus/BRT Alternative. The HBMU and BEMU variants would have greater reductions overall than the DMU variant. The EMU/OCS Alternative would have greater reductions than all other alternatives. Based on this comparison, overall air quality impacts would remain greater over time with implementation of the Bus/BRT Alternative than with the Proposed Project (regardless of variant) due to the Bus/BRT Alternative's lower anticipated offset in personal vehicle use.

³ The Bus/BRT OMF could contain an on-site solar facility like the Proposed Project to help offset some of the electricity demand, but for this analysis, grid power is assumed. This is the same assumption used to evaluate the BEMU variant for the Proposed Project and to evaluate the EMU/OCS Alternative

Table 5-5. Net Criteria Pollutant Emissions from Project Operations, 2040

Location/Scenario	Net pounds per day				
	ROG	NO _x	CO	PM10	PM2.5
Bay Area Air Quality Management District					
DMU Variant (1)	(23)	(51)	(230)	(101)	(25)
HBMU Variant (2)	(23)	(61)	(243)	(102)	(26)
BEMU Variant (3)	(26)	(135)	(336)	(101)	(26)
2040 DLH Variant (4)	(22)	(27)	(200)	(101)	(25)
2040 Express Bus/BRT Alternative (5)	(5)	(23)	(57)	(17)	(4)
2040 EMU/OCS Alternative (6)	(26)	(136)	(337)	(101)	(26)
2040 Stone Cut Alignment Alternative, DMU Variant	(23)	(52)	(231)	(101)	(25)
2040 Southfront Road Station Alternative, DMU Variant	(24)	(56)	(243)	(105)	(26)
<i>BAAQMD Threshold</i>	<i>54</i>	<i>54</i>	<i>-</i>	<i>82</i>	<i>54</i>
San Joaquin Valley Air Pollution Control District					
DMU Variant (1)	(12)	(29)	(142)	(62)	(16)
HBMU Variant (2)	(12)	(36)	(150)	(62)	(16)
BEMU Variant (3)	(14)	(83)	(209)	(62)	(16)
DLH Variant (4)	(11)	(7)	(113)	(62)	(15)
Express Bus/BRT Alternative (5)	(0)	(12)	(34)	(9)	(2)
EMU/OCS Alternative (6)	(14)	(84)	(210)	(62)	(16)
2040 Stone Cut Alignment Alternative, DMU Variant	(12)	(29)	(142)	(62)	(16)
2040 Southfront Road Station Alternative, DMU Variant	(13)	(33)	(151)	(64)	(16)
<i>SJVAPCD Threshold</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

Notes:

1. Includes net emissions of DMU engines, stations, OMF activities, and VMT reduction.
2. Includes net emissions of HBMU engines, stations, OMF activities, and VMT reduction. HBMU engine emissions estimated based on presumed 11.4% fuel efficiency improvement compared to DMU variant.
3. Includes emissions associated with electricity used for charging, stations, OMF activities and VMT reduction.
4. Includes emissions associated with locomotive engines, stations, OMF activities, and VMT reduction.
5. Includes emissions associated with bus charging, stations, OMF activities, and VMT reduction.
6. Includes emissions associated with electricity used for charging, stations, OMF activities, and VMT reduction. Exceedances of air district thresholds are shown in underline (comparison is only made versus the No Project Alternative, which is used as the basis for the impact determination).

ROG = reactive organic gases NO_x = nitrogen oxide

CO = carbon monoxide SO_x = sulfur oxide

PM10 = particulate matter <=10 microns in diameter PM2.5 = particulate matter <=2.5 microns diameter

BAAQMD = Bay Area Air Quality Management District

SJVAPCD = San Joaquin Valley Air Pollution Control District

Biological Resources

The Proposed Project would involve construction of railway facilities, bridges, and OMFs in certain biologically sensitive areas, including the Altamont Pass, Paradise Cut, and across the San Joaquin River; construction of facilities in these areas has the potential to impact habitat resources for special status species and sensitive wetland and riparian natural communities. The Bus/BRT Alternative would require some roadway widening on the right shoulder of portions of I-5, I-206, and I-580 to accommodate a bus-only lane for heavy-traffic conditions. Roadway widening may be required along I-5, including where it crosses the San Joaquin River and Paradise Cut, which may

require widening existing bridges and could affect riparian habitat at these waterway crossings. Roadway Widening of I-205 and I-580 west of Mountain House Parkway may also disturb habitat for sensitive species in undeveloped areas (including in the Altamont Pass) as well as drainages that cross under the roadways. Relative to the Altamont Pass, the widening of shoulders of an existing highly travelled freeway is likely to be less consequential to biological resources than rehabilitation of the former railroad ROW (the Alameda County Transportation Corridor ROW) over the Altamont Pass with the Proposed Project because the Alameda County Transportation Corridor ROW passes through intact habitat areas for common and rare species and has not been used for approximately two decades. There is also a potential for sensitive species habitat on the west side of West Tracy Station location (South Lammers Road at W. 11th St.), the west side of the Mountain House Station location (Mountain House Parkway at future Central Parkway connection), adjacent to the Greenville Station (if north of I-580). The OMF for the Bus/BRT Alternative would be at the same location as the Proposed Project but would be smaller and thus would have less effect on biological resources.

Operation of the Bus/BRT Alternative would result in the addition of periodic vehicles (buses) along roadways, the roadways that would be used under this alternative currently exist, and already significantly inhibit wildlife movement; it is not expected that the addition of up to 30 BRT buses on existing freeways by 2040 would substantially inhibit wildlife movement beyond current conditions. Conversely for the Proposed Project, ACE trains currently operate eight daily one-way trains within the Altamont Alignment, and UPRR only operates infrequent freight trains along the UPRR ROW; these activities would continue and the Proposed Project would add up to 65 daily trains crossing the Altamont Pass by 2040. Because disturbance near existing train tracks in the Altamont Alignment is currently infrequent and the surrounding area provides substantial habitat resources, it is likely that a substantial increase in train traffic along these tracks would have a greater effect on biological resources than increased use of a shoulder lane for the Bus/BRT Alternative.

For these reasons, the Bus/BRT Alternative would result in lesser impacts to biological resources relative to the Proposed Project.

Cultural Resources

Ground disturbance in any location has the potential to result in unanticipated discoveries of artifacts, archaeological resources, or human remains. Potential impacts to cultural resources anticipated with implementation of the Bus/BRT alternative could include unanticipated discoveries in locations along I-5, I-205, and I-580, where roadway expansion would be necessary to accommodate a bus-only lane on the right shoulder for heavy traffic conditions and/or at station or OMF locations. While bus station construction has the potential to result in impacts to cultural resources, these impacts would be similar to the impacts anticipated at stations and other supporting facilities that would be constructed for the Proposed Project.

Roadway widening associated with the Bus/BRT alternative would not be expected to degrade the historical context of built historical resources, because the historical context along the freeways would be consistent with the proposed roadway widening. However, because some proposed Bus/BRT facilities such as stations, platforms, and charging stations would be located in different locations to those that would be constructed for the Proposed Project, these facilities have the potential to adversely change the significance of a built historical resource, if such resources are identified to be present within the proposed facility vicinity. Mitigation would reduce potential Proposed Project impacts to built historical resources to less than significant levels.

While ground disturbance associated with both the Proposed Project and the Bus/BRT Alternative has the potential to impact cultural resources, the potential for impacts would be less with the Bus/BRT Alternative because overall ground disturbance would be less than that required for the Proposed Project, and Bus/BRT Alternative ground disturbance. Therefore, the decreased ground disturbance required to construct the Bus/BRT Alternative would result in a decreased potential to impact cultural resource. The exact cultural resources that may be subject to impacts with the Bus/BRT Alternative would be site-specific and would not be identical to the resources evaluated in Section 3.5, *Cultural Resources* where the Bus/BRT Alternative diverges from the Proposed Project corridor. Cultural resources effects are generally expected to occur with construction. Operationally, the Proposed Project and the Bus/BRT Alternative would have similar impacts to cultural resources.

Energy

Table 5-6 shows the Net Energy use from project operations for the Proposed Project and for different alternatives.

Because Bus/BRT Alternative construction is expected to be less intensive than Proposed Project construction, construction-phase fuel energy needs for the Bus/BRT Alternative would be less than that required for Proposed Project construction. However, because the operational Proposed Project would have a significantly greater transportation capacity than is expected with the Bus/BRT Alternative, the Proposed Project would divert more travelers from personal vehicles (to passenger rail) than would be diverted to buses with the Bus/BRT Alternative. Therefore, because the related net decrease in vehicle fuel consumption anticipated with full Proposed Project operation is greater than the net decrease anticipated with the Bus/BRT Alternative, the Bus/BRT Alternative would overall have a higher operational energy use than the Proposed Project.

Table 5-6. Net Energy Use from Project Operations, 2040

Alternative	MMBTU/year
DMU Variant (1)	(454,775)
HBMU Variant (2)	(469,079)
BEMU Variant (3)	(526,267)
DLH Variant (4)	(422,516)
Express Bus/BRT Alternative (5)	(146,489)
EMU/OCS Alternative (6)	(537,597)
Stone Cut Alignment Alternative, DMU Variant	(456,132)
Southfront Road Station Alternative, DMU Variant	(477,894)

Notes:

1. Includes net energy use of DMU engines (regular diesel), stations, OMF activities, and reduction of VMT.
2. Includes net energy use of HBMU engines (regular diesel), stations, OMF activities, and reduction of VMT.
3. Includes net energy use associated with electricity used for charging, stations, OMF activities and VMT reduction.
4. Includes net energy use of locomotive engines (regular diesel), stations, OMF activities, and VMT reduction.
5. Includes net energy use associated with electricity used for charging, stations, OMF activities and VMT reduction.
6. Includes net energy use associated with electricity used for charging, stations, OMF activities and VMT reduction.

Geology and Soils

Potential impacts to geology and soils anticipated with implementation of the Bus/BRT Alternative include impacts associated with the alternative's siting in a seismically active location, which presents geologic hazards such as landslides and liquefaction. Additionally, ground disturbance of

any kind, including ground disturbance required to construct Bus/BRT alternative facilities such as stations and OMFs and to expand existing roadways where necessary to accommodate bus lanes, could encounter paleontological resources in areas with such potential.

While the Bus/BRT Alternative and the Proposed Project do diverge at some locations, they are located within generally the same area, and the overall seismic hazards associated with the Bus/BRT Alternative improvements in general and in particular related to the Greenville Fault are similar to those described in Section 3.8, *Geology, Soils and Seismicity* for the proposed Project. The Bus/BRT Alternative would not include a fixed guideway and would instead use existing roadways, so there would be less overall infrastructure at risk of disturbance due to seismic effects.⁴ However, while the Proposed Project would include some ground disturbance along track alignments and the Bus/BRT Alternative would require some ground disturbance were roadway widening would be required, the Proposed Project would include more built facilities (stations, OMFs) than are proposed under the Bus/BRT Alternative. Therefore, the construction of these facilities would result in increased soil disturbance and presents a greater potential for impacts such as erosion, sedimentation, and destruction of paleontological resources.

While exact geologic, soil, and paleontological resource impacts would be site-specific and soils and geologic formations underlying the Bus/BRT Alternative may not be identical to those evaluated in Section 3.7, *Geology and Soils* where the Bus/BRT Alternative diverges from the Proposed Project alignment, it is expected that the Proposed Project would have a greater construction impact on such resources than would the Bus/BRT Alternative, because the Proposed Project would involve increased ground disturbance overall. Operationally, both the Proposed Project and the Bus/BRT Alternative would have similar impacts to geology, soils, and paleontological resources.

Greenhouse Gas Emissions

Activities anticipated for Bus/BRT Alternative construction would include right-shoulder widening of some areas along existing highways (I-5, I-205, and I-580) as well as station and OMF facilities. Because these activities are generally more limited in scope to those that would be required with the Proposed Project, it is anticipated that the Bus/BRT Alternative will require less combustion engine construction equipment than would be required with the Proposed Project. Therefore, construction-phase greenhouse gas emissions are expected to be less with implementation of the Bus/BRT Alternative than with implementation of the Proposed Project.

The Bus/BRT Alternative would operate on a lithium-ion battery system, which would not emit GHG emissions directly but would require energy from the power grid; such energy is derived from multiple sources, including those that generate GHG emissions. The Bus/BRT Alternative would capture/divert fewer automobile trips than the Proposed Project (see Table 5-2).

As shown in Table 5-7, the Proposed Project DMU variant would have greater GHG emissions reductions than the Bus/BRT Alternative. The HBMU and BEMU variants would have greater reductions overall than the DMU variant. The Proposed Project's operational GHG emissions would offset construction emissions within several years. Based on this comparison, overall GHG emissions would be greater over time with implementation of the Bus/BRT Alternative than with the Proposed

⁴ Note that seismic impacts on a project are not considered CEQA impacts as they are impacts of the "environment on a project" instead of impacts of a "project on the environment" per the California Supreme Court ruling in the 2015 *CBIA vs. BAAQMD* case.

Project (regardless of variant) due to the Bus/BRT Alternative’s lower anticipated offset in personal vehicle use.

Table 5-7. Net Greenhouse Gas Emissions from Project/Alternative Operations, 2040

Alternative	GHG Emissions (MT CO2e/year)
Proposed Project DMU Variant (1)	(32,220)
Proposed Project, HBMU Variant (2)	(33,291)
Proposed Project, BEMU Variant (3)	(40,990)
Proposed Project, DLH Variant (4)	(29,776)
Southfront Road Station Alternative DMU Variant (1)	(33,880)
Southfront Road Station Alternative, HBMU Variant (2)	(34,951)
Southfront Road Station Alternative, BEMU Variant (3)	(42,650)
Southfront Road Station Alternative, DLH Variant (4)	(31,436)
Express Bus/BRT Alternative (5)	(11,529)
EMU/OCS Alternative with Proposed Project Stations (6)	(41,123)
EMU/OCS Alternative with Southfront Road Station (6)	(42,784)
Stone Cut Alignment Alternative DMU Variant (1)	(32,314)
Stone Cut Alignment Alternative, HBMU Variant (2)	(33,374)
Stone Cut Alignment Alternative, BEMU Variant (3)	(40,997)
Stone Cut Alignment Alternative, DLH Variant (4)	(29,894)
Southfront Road Station / Stone Cut Alignment Alternative DMU Variant (1)	(33,979)
Southfront Road Station / Stone Cut Alignment Alternative, HBMU Variant (2)	(35,038)
Southfront Road Station / Stone Cut Alignment Alternative, BEMU Variant (3)	(42,657)
Southfront Road Station / Stone Cut Alignment Alternative, DLH Variant (4)	(31,561)

Notes:

1. Includes net emissions of DMU engines, stations, OMF activities, and VMT reduction.
2. Includes net emissions of HBMU engines, stations, OMF activities, and VMT reduction. HBMU engine emissions estimated based on presumed 11.4% fuel efficiency improvement compared to DMU variant.
3. Includes emissions associated with electricity used for charging, stations, OMF activities and VMT reduction.
4. Includes emissions associated with locomotive engines, stations, OMF activities, and VMT reduction.
5. Includes emissions associated with Bus charging, stations, OMF activities, and VMT reduction.
6. Includes emissions associated with electricity used for charging, stations, OMF activities, and VMT reduction.

Hazards and Hazardous Materials

Hazardous materials impacts associated with implementation of the Bus/BRT Alternative would include impacts associated with construction equipment and materials utilized for activities such as roadway widening, including concrete, fuels, paint, and other materials. However, such materials would also be required for Proposed Project construction at stations, platforms, and other facilities. Because the Proposed Project would involve the construction of more supplemental facilities than are proposed under the Bus/BRT Alternative, construction-related hazardous materials use would be higher with the Proposed Project. Additionally, while fuels would also be utilized for train operation with implementation of the Proposed Project, expected use is lesser with implementation of the Bus/BRT Alternative, because buses would not be powered by fossil fuels. In operation, the New Flyer Xcelior CHARGE buses proposed under Bus/BRT Alternative would be powered by rechargeable Xalt Energy lithium-ion batteries (Xalt Energy, 2019). While specific hazards

associated with battery powered vehicles depend heavily on vehicle design and charging facility plans, lithium-ion batteries do present significant hazards including chemical fires and corrosivity (Fire Protection Research Foundation, 2011).

However, while project vehicles (trains for the Proposed Project and buses for the Bus/BRT Alternative) would differ in their fuel use, overall system capacity is expected to be lower with the Bus/BRT Alternative than it would be for the Proposed Project (1.6 million annual riders for the Bus/BRT Alternative compared to 2.8 million annual riders for the Proposed Project). Because the Bus/BRT Alternative would have a lower capacity, fewer personal vehicles would be removed from the road with implementation of the Bus/BRT Alternative. While the Flyer Xcelsior CHARGE buses would not include petroleum fuel use, the substantially lower displacement of VMT compared to the Proposed Project means that this alternative would result in more petroleum use than the Proposed Project and the associated potential for spills or accidents related to petroleum use.

Overall, while hazardous materials risks associated with Proposed Project construction would be slightly higher with implementation of the Proposed Project when compared to the Bus/BRT Alternative, operational hazardous materials risks would be greater with the Bus/BRT Alternative due to lithium-ion battery use, which would not occur with implementation of the Proposed Project, and because fuel use would decrease less under the Bus/BRT Alternative than under the Proposed Project.

Hydrology and Water Quality

Implementation of the Bus/BRT Alternative would overall require less ground disturbance and the construction of fewer facilities than would be required for the Proposed Project. Because construction equipment generally operates on diesel-fueled or gasoline-fueled combustion engines, it is anticipated that the Bus/BRT Alternative would overall require less fuel use during construction. Because petroleum and gasoline fuels when released have potential to degrade water quality, construction of the Bus/BRT Alternative has a lower potential for these chemicals to impact water quality during construction.

The Bus/BRT Alternative would require widening the right shoulder in certain locations along existing roadways (I-5, I-205, and I-580) to accommodate a bus-only lane for heavy traffic conditions. This would result in a significant increase in impervious surfaces when compared to the Proposed Project and current conditions. This increase in impervious surfaces could alter existing drainage patterns and, subsequently, interfere with groundwater recharge and/or contribute to erosion. Additionally, because the impervious surfaces would be expanded on an existing highway, it is reasonably foreseeable that the runoff redirected by this increase in impervious surfaces could contain common freeway surface pollutants such as oil, gasoline, and litter, leading to water quality degradation. While the New Flyer Xcelsior CHARGE buses proposed under Bus/BRT Alternative would be powered by rechargeable lithium-ion batteries and not diesel fuel, implementation of this alternative would remove fewer gasoline-powered vehicles from the road than would be removed with Proposed Project implementation. The proposed Project would utilize petroleum products such as oil, grease, and diesel for train and facility maintenance, which could pollute nearby waterbodies, but these impacts would be reduced with mitigation and stormwater treatment requirements. Because fuel use would decrease less with implementation of the Bus/BRT Alternative than the Proposed Project and the potential for fuel spills that could degrade water quality would be higher with the Bus/BRT Alternative.

Proposed Project construction would overall result in greater impacts to hydrological resources than would the Bus/BRT Alternative because construction ground disturbance would be more extensive with the Proposed Project, resulting in a greater potential to degrade water quality.

However, because the Bus/BRT Alternative would likely result in an increase in impervious surfaces, and because overall fuel use would decrease less with implementation of the Bus/BRT Alternative, operational impacts are anticipated to be higher with the Bus/BRT Alternative.

Land Use and Planning

Construction associated with the Bus/BRT Alternative would primarily occur in areas along existing highways (I-5, I-205, I-580), and therefore would not be expected to substantially conflict with nearby sensitive land uses. For work in freeway rights-of-way, coordination with Caltrans would be required to maintain traffic flow. However, because construction land use impacts are not expected to be significant with the Proposed Project, such impacts anticipated with implementation of the Bus/BRT Alternative would be similar.

In operation, the Proposed Project would potentially have significant and unavoidable localized land use impacts at Mountain House Station and Greenville Station. While these proposed stations themselves are not inconsistent with local land use policies, the potential subsequent residential development that could reasonably follow station development would be inconsistent with current local planning policies in their respective jurisdictions. The proposed Bus/BRT Alternative Mountain House Station would be located closer to areas of existing and planned/approved development than the Proposed Project's Mountain House Station. Therefore, land use impacts would be less with the Bus/BRT Alternative than with the Proposed Project because unplanned development is not anticipated.

Noise and Vibration

Construction noise is expected as part of the Bus/BRT Alternative in locations where the existing freeway shoulders would need expanding (as well as at station and parking areas). This construction noise would not contribute substantially beyond noise levels generally expected from current freeway operational noise. Given that the construction effort for the Bus/BRT alternative is expected to be less than the Proposed Project, construction noise and vibration effects would be less than the Proposed Project.

Proposed Project operations would include operational train noise, which would be located within range of sensitive receptors within the Tracy to Lathrop Alignment. The Bus/BRT Alternative would result in lower operational noise levels compared to diesel buses (Xcelsior, 2017). Bus/BRT operational noise effects would occur along freeways and along certain local roadways in the Tri-Valley and between Tracy and Lathrop. The relative noise of the electric buses would be quieter than the Proposed Project under all variants (even with the BEMU there is wheel noise and the noise of train horns at the at-grade crossings).

Therefore, noise and vibrational impacts associated with the Bus/BRT Alternative would be less than those anticipated with implementation of the Proposed Project.

Population and Housing

While construction activities would be more limited with the Bus/BRT Alternative and, therefore, would require fewer construction workers, neither the Proposed Project nor the Bus/BRT Alternative are expected to substantially impact population and housing during the construction phase.

As stated in Section 3.13, the Proposed Project is primarily intended to serve existing populations as well as future populations associated with planned and approved, but not yet constructed, residential development in San Joaquin County. The Proposed Project will provide an alternative to automobile transportation to access the San Francisco Bay Area. The Proposed Project has the potential to induce localized unplanned growth around the Mountain House and Greenville Stations but is not expected to induce overall regional growth more than is currently planned. The Bus/BRT Alternative would, like the Proposed Project, serve existing and future populations (associated with approved but not yet constructed residential project). Similarly, the Bus/BRT Alternative also has the potential to induce such growth at Greenville Station. However, the Bus/BRT Alternative proposes a Mountain House Station near areas of planned development. Therefore, operational population and housing impacts would be less with the Bus/BRT Alternative than with the Proposed Project because less unplanned development is anticipated. Regionally, levels of growth are not expected to exceed planned growth levels under either the Bus/BRT Alternative or the Proposed Project.

Public Services

Bus/BRT Alternative construction would have similar but slightly less impacts to public services when compared to the Proposed Project due to less construction and a smaller construction workforce. As noted above, regional levels of growth are not expected to exceed planned growth levels under either the Bus/BRT Alternative or the Proposed Project, and thus neither the Proposed Project nor the Bus/BRT Alternative are anticipated to require the construction of any new or expanded public services facilities.

Recreation

Recreational impacts associated with both the Proposed Project and the Bus/BRT Alternative would be related to direct encroachments into park and recreation areas and indirect noise, air quality, or visual effects adjacent to park and recreation areas. As explained above, neither the Proposed Project nor the Bus/BRT Alternative are expected to induce substantial unplanned growth that might otherwise increase planned demand for park and recreation areas and result in degradation of such areas due to overuse.

Road widening would be required at some locations with implementation of the Bus/BRT Alternative; where widening is required that would extend outside of the existing road right of way, there could be encroachment into any adjacent park and recreation areas. For example, if I-5 at the San Joaquin River crossing would need to be expanded, construction could disrupt uses of the river temporarily (like the Proposed Project) or I-580 widening could affect Northfront Park or Las Positas golf course in Livermore. The Proposed Project would also require the construction of new facilities that could result in temporary noise, visual, and air quality impacts at recreational facilities, such as construction of a new UPRR bridge across the San Joaquin River, adjacent to Mossdale Regional Park, and construction activities within the Iron Horse Regional Trail footprint.

Construction activities required at all proposed stations and OMFs with the Bus/BRT Alternative have the potential to indirectly impact nearby recreational resources through temporary noise and dust emissions, as well as visual impacts, for both the Proposed Project and the Bus/BRT Alternative. Additionally, while the other stations included with the Proposed Project would be constructed, some would be constructed in generally different locations to follow the existing roadway networks. These stations include River Islands Station, West Tracy Station, and Mountain House Station. Like the Proposed Project, while some of these stations would be located near recreational facilities, none would be located adjacent to or overlap with the recreational resources.

Operationally, the Bus/BRT Alternative would have lower noise impacts and no emissions along the project route compared to the Proposed Project, so would have less indirect effects on adjacent park and recreational areas.

Overall, impacts to recreational resources are likely to be lesser with the Bus/BRT Alternative than the Proposed Project, because the Bus/BRT Alternative would require less construction activities within or adjacent to recreational resources and operational indirect noise and air quality emissions would be lower.

Safety and Security

Both the Proposed Project and the Bus/BRT Alternative would be located in Moderate- and High-Fire Hazard Severity Zones within the Altamont Pass area, along both Altamont Pass Road (for Proposed Project implementation), and the I-580 corridor (for Bus/BRT Alternative implementation). However, if construction activities are required for the Bus/BRT Alternative in this region, activities would be limited to isolated right-side road shoulder widening to accommodate bus-only lanes during high-traffic periods. Conversely, Proposed Project construction activities in this area would occur within relatively undisturbed rural grasslands, which present a higher fire risk, especially during dry periods. Because construction equipment generally operates with combustion engines powered by diesel or gasoline, the extensive ground disturbance associated with Proposed Project construction activities in this area presents a greater fire hazard, when compared to the Bus/BRT Alternative.

As described above under *Hazards and Hazardous Materials*, both trains and lithium-ion battery vehicles present unique fire hazards. Vegetation would be regularly cleared from train tracks to minimize the potential for fire risk with Proposed Project implementation, and lithium-ion battery fires are relatively uncommon. Additionally, stations and OMFs for both the Proposed Project and the Bus/BRT Alternative would be compliant with applicable building and fire code regulations. Furthermore, because Bus/BRT Alternative station locations would generally mirror those of the Proposed Project, unique geographic hazards such as flooding hazards are not anticipated to vary between the Proposed Project and the Bus/BRT alternative. However, while the Flyer Xcelsior CHARGE buses would not require gasoline or diesel fuel use, implementation of this alternative would remove fewer gasoline-powered vehicles from the road than would be removed with Proposed Project implementation. Therefore, the potential for spills of combustible gasoline resulting from personal vehicle use on highways would be slightly higher with implementation of the Bus/BRT Alternative than the Proposed Project. Subsequently, this would slightly elevate wildfire risks in hazard areas.

Compared to air and rail modes of transportation, highway travel is the most used and the most dangerous mode of transportation (United States Department of Transportation, 2018). Therefore, the Bus/BRT Alternative would not improve rider safety as much as the Proposed Project because

the Bus/BRT Alternative would divert fewer riders from personal vehicles and because bus riders would continue to utilize highway transportation, whereas the Proposed Project would convert riders from highway travel to safer rail travel.

Overall, while construction-related safety and security impacts would be higher with implementation of the Proposed Project, operational safety and security impacts would be slightly higher with implementation of the Bus/BRT Alternative.

Transportation and Traffic

Both the Proposed Project and the Bus/BRT Alternative would require construction, which could disrupt traffic. The Bus/BRT Alternative would require a less extensive construction phase than would be required for the Proposed Project, but most construction activities would involve right-shoulder roadway widening along the I-5, I-205, and I-580 corridors. Construction disruptions to these major highway corridors could substantially affect traffic patterns. Conversely, while some Proposed Project construction would be required within the I-580 median, construction activities would otherwise be located away from major highways. Therefore, construction-related traffic and transportation impacts for the Bus/BRT Alternative would be greater than those anticipated for the Proposed Project.

Furthermore, while both the Bus/BRT Alternative and the Proposed Project would divert personal vehicles from roadways and onto alternate transportation systems (bus service and train service, respectively), the Proposed Project would have a greater service capacity than the Bus/BRT Alternative. Therefore, it is expected that the Proposed Project would divert a greater number of drivers from roads, subsequently resulting in a larger VMT reduction that is expected with the Bus/BRT Alternative. Therefore, the Bus/BRT Alternative would have a greater impact on transportation and traffic than the Proposed Project.

Utilities and Service Systems

Because construction of both the Proposed Project and the Bus/BRT Alternative would be expected to rely on temporary energy sources (fuels, generators, etc.) to power construction equipment, utilities impacts are not expected for the construction phase of either the Proposed Project or the Bus/BRT Alternative; utilities-related impacts would thus be expected to be similar. However, Proposed Project operations would require the expansion of some utility lines, and new telecommunications lines would need to be constructed to support communication with trains, train operators, and OMFs. Additionally, the Proposed Project would require construction of a septic tank at the Interim OMF because no wastewater infrastructure is present in that area. The Bus/BRT Alternative would not include construction of the Interim OMF and therefore would not require installation of a septic tank at this location.

Overall, impacts associated with Utilities and Service Systems would be slightly lower with implementation of the Bus/BRT Alternative, when compared to the Proposed Project.

5.4.3 Electric Multiple Unit/Overhead Catenary System (EMU/OCS) Alternative

5.4.3.1 Alternative Description

The EMU/OCS Alternative would generally be the same as the Proposed Project in terms of alignment, stations, frequency, ridership, and general operations. However, instead of one of the four multiple unit technologies described in Chapter 2 and analyzed in Chapter 3 (DMU, HBMU, BEMU, and DLH), the EMU/OCS Alternative would employ EMU trainsets that would receive electric power from an overhead catenary system (OCS) consisting of wires running continuously above the alignment, supported by a series of poles placed immediately along the rail alignment (assumed to be within the same footprint as the Proposed Project).

While some EMU trains are powered by a third rail, a third-rail system requires a completely enclosed right-of-way. Tracks with a third rail are not safe to be crossed by pedestrians and must be sealed with fencing or other enclosures. As detailed further below in Section 5.7, an EMU powered by a third rail was considered but dismissed from further analysis due to such concerns.

Since EMU/OCS technology is in current use by other commuter rail systems in the U.S. (including the Long Island Rail Road (LIRR) and the Metro-North Railroad, both in the New York City area), this alternative is considered feasible.

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, but EMUs still have train wheel noise as well as train horn noise at any at-grade crossings.

The EMU/OCS Alternative would require unique supporting traction power facilities (TPFs), such as train control houses, traction power substations and paralleling stations, and a switching station. While preliminary engineering plans have not been developed for the EMU/OCS, the following elements are envisioned based on the spacing of supporting facilities for the Caltrain Electrification:

- Tri-Valley: one train control house, one traction power substation, and one to two paralleling stations would need to be constructed in the immediate vicinity of the proposed alignment, potentially collocated with stations and/or OMF options.
- Altamont: one to two paralleling stations in the immediate vicinity of the proposed alignment, potentially collocated with stations and/or OMF options.
- Tracy to Lathrop: one train control house, one traction power substations, and one to two paralleling stations would need to be constructed in the immediate vicinity of the proposed alignment, potentially collocated with stations and/or OMF options.

- A switching station would also likely to be required that could be at the eastern end of the Altamont segment or the western end of the Tracy to Lathrop segment in order to isolate separate portions of the system in the event of an outage on one segment.

In addition, this alternative could require additional grading beneath existing overpasses on I-580 in the Tri-Valley area to accommodate the height of catenary poles/wires.

5.4.3.2 Environmental Impact Analysis

Because the EMU/OCS Alternative would follow the same alignment and include the same stations and OMF facilities as the Proposed Project, all potential impacts to Agriculture and Farmland Resources, Cultural Resources, Geology and Soils, Land Use and Planning, Public Services, and Population and Housing would be similar for the EMU/OCS Alternative and the Proposed Project. Depending on whether they are collocated with OMFs or stations, the TPFs may result in some additional footprint impacts relative to important farmland and cultural resources. These resource areas are not further considered in this analysis.

Aesthetics

Overall, aesthetic impacts anticipated with the EMU/OCS Alternative would be greater than those anticipated with the Proposed Project because this Alternative would require the installation of OCS infrastructure (catenary poles and wires) along the proposed alignment that would alter the visual quality of existing views and result in greater aesthetic impacts than the Proposed Project. New TPFs, if not collocated with OMFs or stations, could also have additional aesthetic effects. The area of greatest visual effect for this alternative would be in the Altamont Pass, where overhead wires would become an observable part of views near the railroad alignment.

Air Quality/Greenhouse Gas Emissions

The additional TPF and OCS infrastructure would require additional truck haul trips for delivery and additional construction equipment activity beyond that required for the Proposed Project, and thus the EMU/OCS Alternative construction criteria pollutant and GHG emissions would be greater than those expected from Proposed Project implementation.

For operations, the trains used for the EMU/OCS Alternative would not directly emit criteria pollutants or GHGs, because they would operate fully on electricity supplied by the OCS system. The electricity to power the OCS would be obtained from the power grid, whose power sources include a mix of fossil fuels, hydroelectric, renewables, and other sources. The GHG intensity of the mix of electricity generation sources is lower than for fossil fuels only. Electric motors are also typically more efficient than diesel or diesel-hybrid engines. As shown in Tables 5-5 and 5-7, the EMU/OCS Alternative would have lower criteria pollutant and GHG emissions than the Proposed Project with the DMU and HBMU variants, but would only have slightly lower criteria pollutant and GHG emissions compared to the Proposed Project with the BEMU variant.

Therefore, while construction air quality and GHG emissions impacts are anticipated to be somewhat greater for the EMU/OCS Alternative compared to the Proposed Projects, operational criteria pollutant and GHG emissions would be lower with implementation and ongoing operations such that overall air quality emissions impacts would be lower overall with the EMU/OCS Alternative.

Biological Resources

Overall, impacts to biological resources anticipated with the EMU/OCS Alternative would be greater than those anticipated with the Proposed Project due to the introduction of charged electrical wires along the entirety of the alignment which would present an additional hazard to avian species (particularly in the Altamont Pass segment) that would not result from Proposed Project implementation. Avian collisions with these charged electrical lines could result in fatalities. The additional TPF facilities may also result in additional habitat conversion if not co-located with OMFs or stations. Therefore, the EMU/OCS Alternative would result in greater impacts to biological resources than the Proposed Project.

Energy

The equipment required to construct the additional OCS and TPF infrastructure to power the EMU/OCS Alternative would require truck haul trips for delivery and additional construction equipment. It is reasonably anticipated that these trucks and construction equipment would be powered by gasoline or diesel fuel and would require energy resources over time. While the Proposed Project would also require truck trips and construction equipment, the overall construction effort would be smaller; therefore, the EMU/OCS Alternative would have a greater energy impact than the Proposed Project during construction.

The Proposed Project would use diesel fuel for operation with the DMU or HBMU variant, which would require more energy input than the EMU/OCS Alternative, which would operate on a more energy-efficient electrical power system (United States Department of Transportation and Federal Railroad Administration, 2014). The Proposed Project with the BEMU variant would not use diesel fuel for train operations and would use electricity like the EMU/OCS Alternative. Table 5-6 shows that the EMU/OCS Alternative would have greater reductions in energy use compared to the Proposed Project (including all technology variants) and all other build alternatives evaluated

Therefore, while construction energy impacts of the EMU/OCS Alternative are anticipated to be somewhat greater for the EMU/OCS alternative compared to the Proposed Project, operational energy impacts would be lower and ongoing such that overall energy impacts would be lower overall.

Hazards and Hazardous Materials

Hazardous materials impacts associated with implementation of the both the Proposed Project and the EMU/OCS Alternative include the materials that would be used for construction of stations and OMFs, including concrete, gasoline and diesel fuel, paint, and other materials. The EMU/OCS Alternative would also utilize some of these materials along the extent of the alignment to support the electrified catenary system. Additional hazardous materials would be used for both construction of train control houses, traction power substations, a gap breaker, and a 34.5-kV switching station for the EMU/OCS Alternative.

The Proposed Project would utilize diesel for train operations under the DMU and HBMU variants, which could be emitted into the air and deposited along the alignment. Diesel fuel presents combustion and human and environmental health hazards. While some components of the EMU/OCS Alternative, such as proposed substations, would require limited operational use of hazardous materials such as transformer oil, the trains would be powered by electricity and not diesel fuel. Therefore, diesel fuel use associated with the EMU/OCS Alternative would be significantly

less than that required for Proposed Project implementation under the DMU or HBMU variants. However, the EMU/OCS Alternative would have similar fuel use at the Proposed Project with the BEMU variant. Furthermore, while the catenary system includes live, high-voltage wires which present an operational hazard, engineering and design will ensure that the catenary system fulfills all required safety standards, maximizing system safety.

Overall, construction impacts associated with hazards and hazardous materials would be greater for the EMU/OCS Alternative than the Proposed Project. Operational impacts would be less with the EMU/OCS Alternative compared to the Proposed Project with the DMU or HBMU variants, but similar to the Proposed Project with the BEMU variant. While the high-voltage wires associated with the catenary system present an electrocution hazard not present with the Proposed Project under the DMU or HBMU variant, design standards would minimize hazards associated with this system.

Hydrology and Water Quality

Both the Proposed Project and the EMU/OCS Alternative would include construction within waterways at Paradise Cut and the San Joaquin River, which presents an equal potential to impact hydrology and water quality.

As described above under *Hazardous Resources*, the Proposed Project would utilize diesel for train operations under the DMU or HBMU variant, which could be inadvertently deposited along the alignment by trains; if diesel fuel were to enter waterbodies, water quality could be significantly degraded. Comparatively, the EMU/OCS Alternative would not require the use of diesel for this purpose, because trains would be powered by electrification from the overhead catenary system. Some petroleum use would remain required at supporting facilities, such as transformer oil for the switching station and high-voltage substation, which would be installed at Isabel Station. While diesel fuel would not be expected to be deposited along tracks with implementation of the EMU/OCS Alternative, Isabel Station would be installed adjacent to Arroyo Las Positas, an impaired water body (see Section 3.10, *Hydrology and Water Quality* for additional details) (USFWS 2019). If transformer oil from supporting substation facilities at Isabel Station were to enter this water body, the water body could experience further water quality degradation. However, adherence to design requirements and stormwater treatment protocols at Isabel Station would ensure that in the event of a spill, it would do not directly enter this waterbody. Similar conclusions would apply to the other TPFs locations. The EMU/OCS Alternative would have similar effects as the Proposed Project with the BEMU Alternative.

The EMU/OCS Alternative would require installation of catenary poles along the entire alignment. These poles, though small, would collectively result a dispersed small increase in impervious surfaces along the alignment when compared to the Proposed Project, which would not require such poles. However, this increase in impervious surfaces is expected to be small and would be dispersed across the entire length of the EMU/OCS Alternative; therefore, it would not be expected to cause a substantial redirection of water flows or contribute substantially to erosion.

Overall, construction impacts associated with hydrology and water quality would be slightly higher for the EMU/OCS Alternative compared to the Proposed Project with the DMU or HBMU variants and would be similar to the Proposed Project with the BEMU variant. Operational impacts would be less with the EMU/OCS Alternative compared to the Proposed Project with the DMU or HBMU variants, because fuel use overall would be less but would be similar to the Proposed Project with the BEMU variant.

Noise and Vibration

Although the EMU/OCS Alternative would be constructed along the same alignment as the Proposed Project, noise and vibration construction impacts are expected to be greater with the EMU/OCS Alternative due to additional OCS and TPF construction. However, in operation, the EMU/OCS Alternative would operate slightly more quietly than the Proposed Project due to lesser engine noise with an EMU vs a DMU or HBMU (no difference is expected between the noise of the EMUs with OCS vs. the BEMU variant), and would present a lower noise impact near sensitive receptors.

Recreation

Because the EMU/OCS Alternative would involve the construction of the same facilities required for the Proposed Project, recreational facilities impacted by construction of these facilities would not differ between the projects. Since the EMU/OCS Alternative would include construction of the OCS and TPFs, it may have somewhat greater construction impacts in certain locations.

Because operational air quality and noise impacts would be lower under the EMU/OCS Alternative than they would be with the Proposed Project, such impacts would be expected to be reduced at recreational facilities. However, as also described above, the electrified OCS that would be located along the entire train alignment for this alternative would result in significant aesthetic impacts, which may degrade views from recreational facilities.

When compared to the Proposed Project, because implementation of the EMU/OCS Alternative would reduce noise and air quality impacts while increasing aesthetic impacts at recreational facilities, operational impacts to recreational resources under this alternative are considered similar to those that would occur with implementation of the Proposed Project.

Safety and Security

The Proposed Project and the EMU/OCS Alternative would be located along an identical alignment and, therefore, would be subject to similar safety and security concerns such as fire hazards, landslides, and general system geometric design. These potential impacts would be generally similar for both the EMU/OCS Alternative and the Proposed Project during construction. However, the Proposed Project would utilize diesel fuel for train operation under the DMU and HBMU variants, which can contribute to fire risk due to combustion potential while the EMU/OCS Alternative would include the electrified OCS which can also contribute to fire risk. Both risks can be managed to minimize the potential for fire. The EMU/OCS Alternative would utilize no operational diesel fuel for train operation. Separately, EMUs can stop slightly more rapidly than can DMUs or HBMs, which may result in a slightly lower risk in the event of obstacles, individuals, or wildlife on the tracks. Operational safety and security for the EMU/OCS Alternative would be similar to the Proposed Project with the BEMU variant.

Overall, since there are management practices readily available to manage fire and other risks, impacts associated with safety and security would be similar with the EMU/OCS Alternative compared to the Proposed Project.

Transportation and Traffic

Because EMU/OCS Alternative construction would require more ground disturbance, a more extensive construction phase, construction-related traffic and transportation impacts are expected to be somewhat greater with this alternative than they would be with the Proposed Project.

In operations, the EMU/OCS Alternative would divert a similar number of vehicles from roadways as would the Proposed Project and would follow an identical alignment. Both would result in a reduction of personal vehicles on roadways, and a subsequent VMT reduction. Therefore, operational transportation and traffic impacts associated with the EMU/OCS Alternative and the Proposed Project would be similar.

Utilities and Service Systems

Because construction of both the Proposed Project and the EMU/OCS Alternative would occur along the same alignment, construction impacts to utilities and service systems would be similar. However, implementation of the EMU/OCS Alternative would require the installation of a high-voltage electrified OCS along the entire project alignment, as well as TPFs. Because Proposed Project and the EMU/OCS Alternative would be located along an identical alignment, additional utility services required for the Proposed Project, including telecommunications lines and septic tanks, would also need to be installed under the EMU/OCS Alternative. The EMU/OCS Alternative would have a substantially higher demand for electricity than the Proposed Project, will require high voltage connections to the power grid, and may require some modifications of the immediately upstream power lines accordingly. The EMU/OCS Alternative would therefore have a higher impact than the Proposed Project, with respect to Utilities and Service Systems.

5.5 Comparison of Alternatives Analyzed

This section compares alternatives considered in this EIR in terms of environmental impact and cost. The alternatives considered include those analyzed in detail in Chapters 2, 3, and 4 and the additional alternatives introduced and analyzed in this chapter. Impacts of the alternatives are compared to the Proposed Project.

5.5.1 Comparison of Environmental Impacts

Table 5-8, below, compares the environmental impacts of the alternatives analyzed at a lesser level of detail in this chapter (No Project Alternative, Bus/BRT Alternative, and EMU/OCS Alternative) to all four Proposed Project technology variants (DMU, HBMU, BEMU, and DLH) for all subject areas analyzed in this document.

Table 5-9, below, compares the key permanent environmental impact differences between the Stone Cut Alignment Alternative that was analyzed at an equal level of detail in Chapter 3 and the Proposed Project. A detailed comparison of the alternatives analyzed at an equal level of detail to the Proposed Project is presented in Chapters 3 and 4 on an impact by impact basis.

Table 5-10, below, compares the key permanent environmental impact differences between the different station alternatives that were analyzed at an equal level of detail in Chapter 3, including the proposed Greenville Station vs. the Southfront Road Station Alternative, the proposed Mountain House Station vs. the Mountain House Station Alternative, and the Downtown Tracy Station Parking

Alternatives 1 and 2 vs. the proposed Downtown Tracy Station Parking. A detailed comparison of the station alternatives analyzed at an equal level of detail to the Proposed Project is presented in Chapters 3 and 4 on an impact by impact basis.

Table 5-11, below, compares the key permanent environmental impact differences between the proposed Tracy OMF vs. the West Tracy OMF Alternative. A detailed comparison of the West Tracy OMF Alternative to the Proposed Project is presented in Chapters 3 and 4 on an impact by impact basis.

Table 5-12, below, compares the key permanent environmental impact differences of the different Alternatives analyzed overall including all four Proposed Project technology variants (DMU, HBMU, BEMU, and DLH), the Stone Cut Alignment Alternative, the Southfront Road Station Alternative combined with the Mountain House Station Alternative, the Bus/BRT Alternative, and the EMU/OCS Alternative. A detailed comparison of the alternatives analyzed at an equal level of detail to the Proposed Project is presented in Chapters 3 and 4 on an impact by impact basis.

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Table 5-8. Comparison of Project Alternatives Analyzed at a Lesser Level of Detail to the Proposed Project (including technology variants)

Environmental Topic Area	Level of Project Impact (Proposed Project)	No Project Alternative (Relative to Proposed Project)	Bus/BRT Alternative with Managed Lanes (Relative to Proposed Project)	Electric Multiple Unit/Overhead Catenary System Alternative (EMU/OCS) (Relative to Proposed Project)
Aesthetics	Construction: Less than Significant with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)	No impact (less than Proposed Project)	Construction: Less than Proposed Project	Construction: Same as Proposed Project
	Operations: Less than significant with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)		Operations: Less than Proposed Project	Operations: Greater than Proposed Project
Agricultural Resources	Construction: Significant and Unavoidable with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, and BEMU)	No impact (less than Proposed Project)	Construction: Similar to Proposed Project (exact location of temporary construction-phase highway widening areas unknown)	Construction: Same as Proposed Project
	Operations: Less than significant with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU and DLH)		Operations: Similar to Proposed Project (exact location of permanently converted highway widening areas in agricultural lands unknown)	Operations: Same as Proposed Project
Air Quality	Construction: Less than significant with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)	Construction: No impact (less than Proposed Project)	Construction: Less than Proposed Project	Construction: Somewhat greater than Proposed Project
	Operations: Less than significant DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU variant impacts, and HBMU impacts would be greater than BEMU variant impacts.	Operations: Greater than Proposed Project	Operations: Greater than the Proposed Project	Operations: Less than Proposed Project, particularly with the DMU/HBMU variants.
Biological Resources	Construction: Less than Significant after Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)	Construction: No impact (less than Proposed Project)	Construction: Less than Proposed Project	Construction: Greater than Proposed Project
	Operations: Significant and Unavoidable (with Mitigation) • Train operation could interfere with wildlife movement Less than Significant/Less than Significant with Mitigation – all other areas DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU variant impacts and HBMU variant impacts would be greater than BEMU variant impacts due to differences in diesel use, and subsequent differences in the potential for diesel fuels to degrade habitat areas.	Operations: Less than Significant impact (less than Proposed Project) The No Project Alternative would not reduce any personal vehicle fuel use which would continue to degrade nearby habitat areas	Operations: Less than Proposed Project	Operations: Greater than Proposed Project
Cultural Resources	Construction: Less than Significant after Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU,	No impact (less than Proposed Project)	Construction: Less than Proposed Project	Construction: Same as Proposed Project

Environmental Topic Area	Level of Project Impact (Proposed Project)	No Project Alternative (Relative to Proposed Project)	Bus/BRT Alternative with Managed Lanes (Relative to Proposed Project)	Electric Multiple Unit/Overhead Catenary System Alternative (EMU/OCS) (Relative to Proposed Project)
	BEMU, and DLH) Operations: No Impact Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)		Operations: Similar to Proposed Project	Operations: Same as Proposed Project
Energy	Construction: Less than Significant Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH) Operations: Less than Significant DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU variant impacts, and HBMU impacts would be greater than BEMU variant impacts, due to differences in energy efficiency.	Construction: No impact (less than Proposed Project) Operations: Greater than Proposed Project	Construction: Less than Proposed Project Operations: Greater than Proposed Project	Construction: Greater than Proposed Project Operations: Less than Proposed Project
Geology and Soils	Construction: Less than Significant with Mitigation Impacts would be equal across all Proposed Project variants (DMU, HBMU, and BEMU) Operations: No Impact Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)	No Impact (less than Proposed Project)	Construction: Less than Proposed Project Operations: Similar to Proposed Project	Construction: Same as Proposed Project Operations: Same as Proposed Project
Greenhouse Gas Emissions and Climate Change	Construction: Less than significant for full build for any of the technology variants. Less than Significant with Mitigation for interim operations (Dublin/Pleasanton to Greenville) for any of the technology variants Impacts would be equal across all Proposed Project technology variants (DMU, HBMU, BEMU, and DLH) Operations: Beneficial for IOS or full build operations for any of the technology variants. BEMU would have greatest reductions, followed by HBMU, DMU, and DLH due to the differences in train emissions.	Construction: No impact (less than Proposed Project) Operations: Greater than Proposed Project (full build scenario)	Construction: Less than Proposed Project Operations: Greater than Proposed Project	Construction: Somewhat greater than Proposed Project Operations: Less than Proposed Project
Hazardous Materials	Construction: Less than Significant with Mitigation Impacts would be equal across all Proposed Project technology variants (DMU, HBMU, BEMU, and DLH) Operations: Less than Significant with Mitigation DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU and BEMU variants due to differences in hazardous material (diesel fuel) use.	Construction: No impact (less than Proposed Project) Operations: Less than Significant impact (same as Proposed Project) While the Proposed Project would utilize diesel fuel for train operation (under the DMU, HBMU, and DLH variants), personal vehicle fuel use would decrease less with the No Project Alternative than it would with the Proposed Project.	Construction: Less than Proposed Project Operations: Greater than Proposed Project While the Bus/BRT Alternative would utilize battery powered buses, the overall system capacity would offset fewer VMT than would be offset by the Proposed Project. Therefore, the Bus/BRT Alternative would result in greater continued personal vehicle fuel use than is anticipated with implementation of the Proposed Project.	Construction: Same as Proposed Project Operations: Less than Proposed Project
Hydrology and	Construction: Less than Significant with Mitigation	Construction: No impact (less than	Construction: Less than Proposed Project	Construction: Same as Proposed Project

Environmental Topic Area	Level of Project Impact (Proposed Project)	No Project Alternative (Relative to Proposed Project)	Bus/BRT Alternative with Managed Lanes (Relative to Proposed Project)	Electric Multiple Unit/Overhead Catenary System Alternative (EMU/OCS) (Relative to Proposed Project)
Water Quality	<p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p> <p>Operations: Less than Significant with Mitigation</p> <p>DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU variant impacts, and HBMU variant impacts would be greater than BEMU variant impacts due to differences in pollutant (diesel fuel) use, which could potentially degrade water quality.</p>	<p>Proposed Project)</p> <p>Operations: Less than Significant impact (same as Proposed Project)</p> <p>While the Proposed Project would utilize diesel fuel for train operations under the DMU, HBMU, or DLH variants, the No Project Alternative would not reduce personal VMT, which would continue to pollute and degrade water quality at nearby water bodies.</p>	<p>Operations: Greater than Proposed Project</p> <p>While the Bus/BRT Alternative would utilize battery powered buses, the overall system capacity would offset fewer VMT than would be offset by the Proposed Project. Therefore, the Bus/BRT Alternative would result in higher continued fuel use than is anticipated with implementation of the Proposed Project, and therefore a higher potential of operational water quality degradation over time. Additionally, the Bus/BRT Alternative would require a substantial increase in impervious surfaces for highway shoulder widening.</p>	<p>Operations: Less than Proposed Project</p>
Land Use and Planning	<p>Construction: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p> <p>Operations: Significant and Unavoidable with Mitigation for Greenville Station and Mountain House Station</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p>	<p>Less than Significant impact (less than Proposed Project)</p> <p>The No Project Alternative would not help jurisdictions fulfill goals of promoting non-personal-vehicle transportation options along the corridor but could contribute unplanned development in areas near some proposed stations, which is inconsistent with current local zoning policies.</p>	<p>Construction: Less than Proposed Project</p> <p>Operations: Less than Proposed Project</p>	<p>Construction: Same as Proposed Project</p> <p>Operations: Same as Proposed Project</p>
Noise and Vibration	<p>Construction (noise): Significant and Unavoidable with Mitigation</p> <p>Construction (vibration): Less than Significant with Mitigation</p> <p>Construction noise and vibration impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p> <p>Operations (noise): Significant and Unavoidable with Mitigation</p> <p>Operations (vibration): Less than Significant with Mitigation</p> <p>DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than the HBMU variant, and HBMU variant impacts would be greater than the BEMU variant, due to different levels of noise generation.</p>	<p>No Impact (less than Proposed Project)</p>	<p>Construction: Less than Proposed Project</p> <p>Operations: Less than Proposed Project</p> <p>Construction: Less than Proposed Project</p> <p>Operations: Less than Proposed Project</p>	<p>Construction: Same as Proposed Project</p> <p>Operations: Less than Proposed Project</p> <p>Construction: Same as Proposed Project</p> <p>Operations: Less than Proposed Project</p>
Population and Housing	<p>Construction: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p> <p>Operations: Significant and Unavoidable with Mitigation for Greenville Station and Mountain House Station</p>	<p>No Impact (less than Proposed Project)</p>	<p>Construction: Same as Proposed Project</p> <p>Operations: Less than Proposed Project</p>	<p>Construction: Same as Proposed Project</p> <p>Operations: Same as Proposed Project</p>

Environmental Topic Area	Level of Project Impact (Proposed Project)	No Project Alternative (Relative to Proposed Project)	Bus/BRT Alternative with Managed Lanes (Relative to Proposed Project)	Electric Multiple Unit/Overhead Catenary System Alternative (EMU/OCS) (Relative to Proposed Project)
Public Services	Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)			
	<p>Construction: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, and BEMU)</p>	Ongoing demand for police and emergency services related to vehicular accidents (more than Proposed Project)	<p>Construction: Similar to Proposed Project</p>	<p>Construction: Same as Proposed Project</p>
	<p>Operations: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p>		<p>Operations: Greater than Proposed Project</p>	<p>Operations: Same as Proposed Project</p>
Recreation	<p>Construction: Less than Significant with Mitigation</p>		<p>Construction: Less than Proposed Project</p>	<p>Construction: Same as Proposed Project</p>
	Impacts would be equal across all Proposed Project variants (DMU, HBMU, and BEMU)	No Impact (less than Proposed Project)		
	<p>Construction: Less than Significant</p>		<p>Operations: Less than Proposed Project</p>	<p>Operations: Similar to Proposed Project (EMU/OCS Alternative would result in reduced noise and air quality impacts at nearby recreational resources, but increased visual degradation of recreational resources)</p>
Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)				
Safety and Security	<p>Construction: Less than Significant</p>	<p>Construction: No impact (less than Proposed Project)</p>	<p>Construction: Less than Proposed Project</p>	<p>Construction: Same as Proposed Project</p>
	Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)			
	<p>Operations: Less than Significant</p> <p>DLH variant impacts would be greater than DMU variant impacts, DMU variant impacts would be greater than HBMU variant impacts, and HBMU variant impacts would be greater than BEMU variant impacts due to differences in use of combustible diesel fuel use, which increases fire risk. Both the HBMU variant and the BEMU variant present additional hazards of battery fires, though such fires are rare, with a lower occurrence probability than the fire risk presented by diesel use.</p>	<p>Operations: Less than Significant impact (same/slightly greater than Proposed Project)</p> <p>While the Proposed Project would utilize combustible diesel fuel for train operations under the DMU, HBMU or DLH variant, project design would manage fuel use and handling and vegetation clearing to minimize wildfire risks. However, personal vehicle VMT would decrease less with the No Project Alternative than with the Proposed Project. Therefore, the No Project Alternative would maintain (rather than decrease) this risk.</p>	<p>Operations: Greater than Proposed Project</p> <p>The Bus/BRT Alternative would remove fewer gasoline-powered vehicles from the road than would be removed with Proposed Project implementation, resulting in an increased potential for spills of combustible fuels in High Fire Hazard Zone areas.</p>	<p>Operations: Less than Proposed Project</p>
Transportation and Traffic	<p>Construction: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p>	<p>Construction: No Impact</p>	<p>Construction: Greater than Proposed Project</p>	<p>Construction: Greater than Proposed Project</p>
	<p>Operations: Less than Significant</p> <p>Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)</p>	<p>Operations: Greater than Proposed Project</p>	<p>Operations: Greater than Proposed Project</p>	<p>Operations: Same as Proposed Project</p>
Utilities and Public Service	<p>Construction: Less than Significant with Mitigation</p>	No Impact (less than Proposed Project)	<p>Construction: Similar to the Proposed Project</p>	<p>Construction: Same as Proposed Project</p>

Environmental Topic Area	Level of Project Impact (Proposed Project)	No Project Alternative (Relative to Proposed Project)	Bus/BRT Alternative with Managed Lanes (Relative to Proposed Project)	Electric Multiple Unit/Overhead Catenary System Alternative (EMU/OCS) (Relative to Proposed Project)
Systems	Impacts would be equal across all Proposed Project variants (DMU, HBMU, BEMU, and DLH)			
	<p>Construction: Less than Significant with Mitigation</p> <p>Impacts would be similar across all Proposed Project variants (DMU, HBMU, BEMU, and DLH) but the BEMU would result in higher electricity system demands.</p>		<p>Operations: Less than the Proposed Project</p>	<p>Operations: Greater than Proposed Project</p>

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Table 5-9. Environmental Impact–Comparison of the Stone Cut Alignment Alternative to the Proposed Project

Impact Criteria	Impact Measure	Altamont Pass Alignment	
		Proposed Alignment	Stone Cut Alignment
Visual Aesthetics	Scale	4	5
Aquatic and Riparian habitat	Acres	0.21	0.10
California Annual Grassland (habitat for threatened and endangered species)	Acres	74.28	94.47
Wildlife Movement (operation)	Scale	5	5
Air quality/GHG/Energy (operational)	Scale	2	1

Source: Quantitative data from analysis in Chapter 3; relative ranking based on analysis in Chapter 3.

Notes:

Scale: 1 – High Positive Impact; 2 – Moderate Positive Impact; 3 – Little to No Impact; 4 – Moderate Negative Impact; 5 – High Negative Impact

Impact Colors: from relatively weak in comparison (red) to relatively strong in comparison (dark green): red-yellow-blue-light green-dark green. Grey means no significant difference. Alternatives with only a single option are not compared to anything else.

Table 5-10. Environmental Impact–Comparison of Station Alternatives Analyzed at an Equal Level of Detail

Impact Criteria	Impact Measure	Tri-Valley Stations		Altamont Stations		Downtown Tracy Stations		
		Greenville (proposed)	Southfront Road Alternative	Mountain House (proposed)	Mountain House Station Alternative	Proposed Project	Alternative 1 (South Garage)	Alternative 2 (North Garage)
Visual Aesthetics	Scale	5	3	5	4	4	4	4
Aquatic habitat	Acres	0.29	0	0	0.74	0	0	0
T&E wildlife species	# rare species that could occur	10	4	17	21	9	9	9
Wildlife Movement (operation)	Scale	5	3	4	3	3	3	3
Noise impacts (operation)	Scale	3	3	3	3	3	3	3
Important farmlands (permanent impacts)	Acres	0	0	30.4	0	0	0	0
Land use and planning	Scale	5	3	5	4	3	0	0
Air quality/GHG/Energy (operational)	Scale	All stations reduce emissions and energy use as part of overall service						

Source: Quantitative data from analysis in Chapter 3; relative ranking based on analysis in Chapter 3.

Notes:

Scale: 1 – High Positive Impact; 2 – Moderate Positive Impact; 3 – Little to No Impact; 4 – Moderate Negative Impact; 5 – High Negative Impact

Impact Colors: from relatively weak in comparison (red) to relatively strong in comparison (dark green): red-yellow-blue-light green-dark green. Grey means no significant difference. Alternatives with only a single option are not compared to anything else.

T&E = threatened and endangered

Table 5-11. Environmental Impact – Comparison of the Proposed Tracy OMF to the West Tracy OMF Alternative

Impact Criteria	Impact Measure	OMFs	
		Tracy OMF (proposed)	West Tracy OMF Alternative
Visual Aesthetics	Scale	4	5
Aquatic habitat	Acres	0.0	0.06
T&E wildlife species	Number of rare species that could potentially occur	13	17
Wildlife Movement (operation)	Scale	3	5
Operational noise impacts	Scale	3	3
Important farmlands (permanent impacts)	Acres	201.5	25.9
Land use and planning	Scale	4	5
Air quality/GHG/Energy (operational)	Scale	All OMFs reduce emissions and energy use as part of overall system	

Source: Quantitative data from analysis in Chapter 3; relative ranking based on analysis in Chapter 3.

Notes:

Scale: 1 – High Positive Impact; 2 – Moderate Positive Impact; 3 – Little to No Impact; 4 – Moderate Negative Impact; 5 – High Negative Impact

Impact Colors: from relatively weak in comparison (red) to relatively strong in comparison (dark green): red-yellow-blue-light green-dark green. Grey means no significant difference. Alternatives with only a single option are not compared to anything else.

T&E = threatened and endangered

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Table 5-12. Summary of Key Environmental Impact Differences—Comparison of the Proposed Project to Alternatives Analyzed in this EIR ⁽¹⁾

		Proposed Project w/ DMU	Proposed Project w/ HBMU	Proposed Project w/BEMU	Proposed Project w/ DLH	Stone Cut Alignment ⁽²⁾	Southfront Road/ Mountain House Station Alternatives ³	Downtown Tracy Alts. 1,2 ⁽⁴⁾	West Tracy OMF ⁽⁵⁾	Bus/ BRT	EMU/ OCS
Visual Aesthetics (operational)	Scale	4	4	4	4	5	3	4	5	3	5
Biological Resources (operational)	Scale	4.5	4.5	4.5	4.5	4.5	4	4.5	5	3	4.5
Noise impacts (operational)	Scale	5	5	4	5	5	4	5	4	3	4
Important Farmlands (permanent)	Scale	5	5	5	5	5	4	5	4	3	5
Land Use and Planning	Scale	4	4	4	4	4	3	4	4	3	4
Safety & Security (operational)	Scale	1	1	1	1	1	1	1	1	2	1
Hazardous Materials(operational)	Scale	2	2	1	3	2	1	2	1	2	1
Hydrology/Water Quality (operational)	Scale	2	2	1	3	2	1	2	1	2	1
Air Quality (operational)	Scale	2	2	1	3	2	1	2	1	2	1
GHG (operational)	Scale	2	2	1	2	2	1	2	1	2	1
Energy (operational)	Scale	2	2	1	2	2	1	2	1	2	1
Vehicle Miles Travelled (operational)	Scale	1	1	1	1	1	1	1	1	2	1

PP = Proposed Project

Source: Quantitative data from analysis in Chapter 3 and Chapter 5; relative ranking based on analysis in Chapter 3 and Chapter 5.

Notes:

(1) Where two scores are provided for an alternative, the first is for the alternative with the DMU or HBMU variant and the second is for the alternative with the BEMU variant

(1) Stone Cut Alignment Alternative is the same as the Proposed Project, except for the alignment at the top of the Altamont Pass

(2) Southfront Road Station Alternative/ House Station Alternative is the same as the Proposed Project, except for the two different station options.

(3) Downtown Tracy Parking Alternatives are the same as the Proposed Project, except for use of either a south garage (Alt. 1) or north garage (Alt. 2)

(4) West Tracy OMF Alternative is the same as the Proposed Project, except for the OMF location.

Scale: 1 – High Positive Impact; 2 – Moderate Positive Impact; 3 – Little to No Impact; 4 – Moderate Negative Impact; 5 – High Negative Impact

Impact Colors: from relatively weak in comparison (red) to relatively strong in comparison (dark green): red-yellow-blue-light green-dark green.

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5.5.2 Capital Costs

Based on 15% level engineering plans, capital costs for the Proposed Project (Phase 1 from Dublin/Pleasanton to North Lathrop, using DMU trainsets and the single-track variant from Mountain House to Downtown Tracy) were estimated at \$2.3 billion to \$2.9 billion (\$2018). The Proposed Project with the double-track variant would add an additional \$32 million. No estimates were prepared for the HBMU variant or DLH variant rolling costs. The BEMU variant would have approximately \$64 million in additional rolling stock costs (for 32 consists) and the Altamont OCS would add an additional \$185 million to \$232 million.

Capital costs were also estimated for the following alternatives (all in \$2018):

- Stone Cut Alignment Alternative (\$346 million) vs. Proposed Project (\$313 million) for the Altamont Pass Segment (Segment 2)
- Bus/BRT Alternative (\$479 million)
- Southfront Road Station Alternative (\$52 million) vs. Greenville Station (\$60 million)
- Mountain House Station Alternative (\$19 million) vs. proposed Mountain House Station (\$18 million)
- West Tracy OMF Alternative (\$145 million) vs. proposed Tracy OMF (\$146 million)
- Downtown Tracy Parking Alternative 1 (\$46 million) vs. Downtown Tracy Parking Alternative 2 (\$42 million) vs. proposed Downtown Tracy Alternative (\$16 million for 2025 surface parking plus additional cost for 2040 garage)

No capital cost estimates were developed for the EMU/OCS Alternative, but given the additional infrastructure, the capital cost estimate is assumed to be greater than that of the Proposed Project. In particular, the EMU/OCS Alternative would likely entail much greater construction costs owing to catenary poles and wires for the entire length of the route. Where the train would operate within the freeway median and traverse beneath existing overpasses, it may be necessary for trains to run within lowered trenches (or for overpasses to be raised) to accommodate catenary structures.

5.6 Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) states that if the environmentally superior alternative is the No Project Alternative, then the EIR must also identify an environmentally superior alternative among the other alternatives. As demonstrated in the preceding sections and summarized in Table 5-8, the No Project Alternative would avoid all of the identified construction impacts of the Proposed Project, but would have increased operational impacts in several critical resource areas, including air quality, greenhouse gases, energy, and transportation and traffic because it would perpetuate existing interregional transportation patterns and not provide new passenger rail service to reduce automobile use. While avoidance of the construction-related impacts is noteworthy, the No Project Alternative would have no ameliorative effect on vehicle miles travelled, criteria pollutant emissions, GHG emissions, and energy use compared to the other build alternatives, so the No Project Alternative would not be the environmentally superior alternative.

The Stone Cut Alignment Alternative is the only alignment alternative analyzed in detail in the EIR and thus is the environmentally superior alignment alternative among the alternatives. The Stone Cut Alignment Alternative would have slightly higher construction impacts than the Proposed Project due to a greater amount of earthworks. Operationally, the Stone Cut Alignment Alternative would result in lower train fuel use and greater ridership (due to shorter service times) and thus would have greater criteria pollutant, GHG emission, and energy use reductions. The Stone Cut Alignment Alternative would have greater visual effects because it would be more visible along eastbound I-580 at one location.

Of the station alternatives analyzed in this EIR, the Southfront Road Station and the Mountain House Station Alternatives are the only alternatives at their respective locations and thus would be environmentally superior station alternatives at their locations. As shown in Table 5-9, the Southfront Road Station Alternative would have a lower impact on wildlife movement than the proposed Greenville Station north of I-580. As shown in Table 5-9, the Mountain House Station Alternative would have lower impacts on biological resources and wildlife movement, important farmland, and land use and planning compared to the Mountain House Station included in the Proposed Project. The Southfront Road Station Alternative would also result in higher ridership than the Proposed Project, which would result in greater improvements in air quality, lower energy use, and greater reductions in GHG emissions than the Proposed Project.

The West Tracy OMF is the only OMF alternative considered. The proposed Tracy OMF would be environmentally superior to the West of Tracy OMF Alternative because it would result in lower impacts related to biological resources and wildlife movement, but it would result in higher impacts to Important Farmland as shown in Table 5-10.

Of the technology/modal alternatives analyzed in this EIR, there are notable tradeoffs between the Bus/BRT Alternative and the EMU/OCS Alternative.

The Bus/BRT Alternative would require substantially less construction and thus would have the lowest construction period environmental impacts among the technology/modal alternative for aesthetics, biological resources, cultural resources, geology and soils, noise, and recreation. The Bus/BRT Alternative would have the lowest operational impacts related to noise and land use and planning. The Bus/BRT Alternative would reduce operational criteria pollutant emissions, GHG emissions, and energy use compared to No Project conditions, but would not reduce criteria pollutant emissions, GHG emissions, and energy use as much as the other technology/modal alternatives. The Bus/BRT Alternative would also result in less reduction in operational risks of petroleum and hazardous material spills and water quality effects compared to the other technology/modal alternatives.

The EMU/OCS Alternative would have greater construction period criteria pollutant emissions, GHG emissions, and energy use than the Bus/BRT Alternative. The EMU/OCS Alternative would have greater operational visual aesthetic and biological resources impacts than the Bus/BRT Alternative. However, the EMU/OCS Alternative would reduce operational criteria pollutant emissions, GHG emissions, and energy use, and risks of petroleum and hazardous material spills and water quality effects greater than the Bus/BRT Alternative. The EMU/OCS Alternative would have higher operational noise impacts than the Bus/BRT Alternative.

The Bus/BRT Alternative and the EMU/OCS Alternative have different comparative environmental outcomes.

- The Bus/BRT Alternative would have lower impacts related to visual aesthetics, biological resource and wildlife movement, noise, and land use and planning (with regard to the Mountain House Station). This alternative would have less reductions of criteria pollutant emissions, GHG emissions, energy use, vehicle miles travelled and associated safety concerns, and potential for petroleum and hazardous material spills and water quality effects.
- The EMU/OCS Alternative would have greater reductions of operational criteria pollutant emissions, GHG emissions, energy use, vehicle miles travelled and associated safety concerns, as well as potential for petroleum and hazardous material spills and water quality effect. However, this alternative would have higher operational impacts related to visual aesthetics, biological resources and wildlife movement, and noise.

While there are tradeoffs in the different environmental impacts of these two technology/modal alternatives and individuals may assign different weights to different resource topics and choose different ways of balancing tradeoffs, the Authority has identified the EMU/OCS Alternative as the Environmentally Superior Alternative in regard to technology/mode choice among the alternatives to the Proposed Project. The long-term benefits of the EMU/OCS Alternative in terms of operational reductions in air pollution, GHG emissions, energy use, VMT and associated safety risks, and the reduced risk of petroleum and hazardous materials and water quality effects compared to the Bus/BRT Alternative are considered to outweigh the higher impacts to visual aesthetics, biological resources, noise and local land use/planning (specific to the Mountain House Station). This determination is based, in particular, on the importance in regional and state planning in addressing the current health effects of air pollution and the current and future effects of climate change which will require substantial reductions in transportation and other sources of emissions that cannot be achieved without shifting as many trips as possible from single-occupancy vehicles to more efficient means of travel, like electrically powered trains.

The overall environmentally superior alternative among the alternatives to the Proposed Project would be the combination of the Stone Cut Alignment Alternative, the Southfront Road Station Alternative, the Mountain House Station Alternative, the West Tracy OMF, and the EMU/OCS Alternative for the reasons discussed above. The Proposed Project, BEMU variant would have nearly the same air quality, GHG emissions reduction, and energy use benefits as this combined alternative but would require less construction of the OCS in areas outside the Altamont Pass.

The overall environmentally superior alternative including consideration of the Proposed Project would be the combination of the Stone Cut Alignment Alternative, the Southfront Road Station Alternative, the Mountain House Station Alternative, the Tracy OMF, and either the BEMU Variant or the EMU/OCS technology for the reasons discussed above. The BEMU variant would have nearly the same air quality, GHG emissions reduction, and energy use benefits as the EMU/OCS Alternative but would require less construction of the OCS in areas outside the Altamont Pass. In addition, if UPRR does not accept installation of an OCS in their ROW, then the EMU/OCS Alternative would be infeasible and the BEMU Variant would be environmentally superior.

5.7 Programmatic Alternatives Originally Included in the Notice of Preparation

The 2018 NOP described certain “Phase II improvements” including several “infill” station options (Southfront Road, Grant Line Road, and Ellis) and an extension to Stockton. The NOP described that

the Phase II improvements would be analyzed at a programmatic, more conceptual level of detail. As noted in the NOP, CEQA permits analysis of improvements at a programmatic level of detail provided that a fully detailed project-level of analysis is done before any final decisions or commitments are made.

Subsequent to the NOP, the Authority decided to focus only on project-level analysis in this EIR.

The Southfront Road Station option was originally described in the NOP as a potential future infill station to be analyzed programmatically. After identifying a number of challenges for implementation as well as the environmental effects of the proposed Greenville Station, the Authority decided instead to analyze the Southfront Road Station as an alternative to the Greenville Station and to analyze it at an equal project-level of detail as the Proposed Project.

The Authority also decided that the other programmatic station options (Grant Line Road and Ellis) and the programmatic extension to Stockton would not be the focus of this EIR and would instead be considered later separately as potential future additions to Valley Link. If the Authority advances these options, it will prepare a separate CEQA evaluation prior to making any decisions as to whether to add these improvements to the Valley Link system. The Grant Line Road and Ellis stations may be potential future infill station but are not located in areas where they would serve as alternatives to any proposed stations and thus can be considered separately in the future. The Proposed Project from Lathrop to Dublin/Pleasanton can operate independent of any potential future extension to Stockton. As such, the potential separate consideration of these station options and this extension is allowed under CEQA.

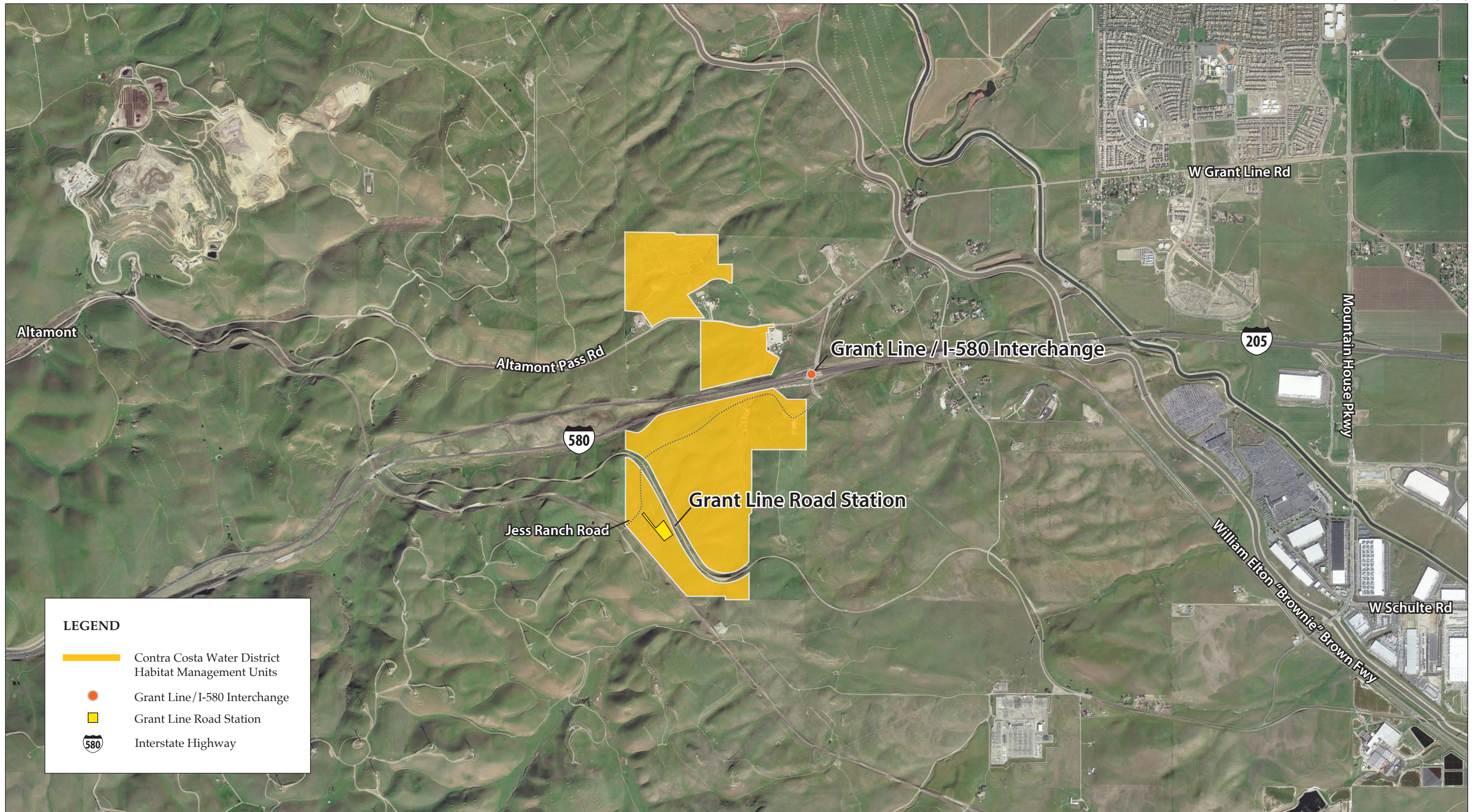
Grant Line Road Station

A station at Grant Line Road in the Altamont Hills was originally included for long-term consideration in the Notice of Preparation. This station was not intended for the initial phase of the Valley Link project, but for the long-term only. Figure 5-3 shows the preliminary station location.

The Authority conducted some preliminary environmental evaluation of the identified station site. The identified station site and all the land between Grant Line Road and the identified station site on the south side of I-580 is within a conservation easement owned by the Contra Costa Water District (CCWD), which was established to permanently preserve habitat for listed and non-listed species

that would be affected by the Los Vaqueros Reservoir Expansion Project. The placement of a station at this site would require the prior approval of CCWD and would require approval of the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) to void the prior preservation commitments and replace them with alternative preservation elsewhere. This would require a detailed evaluation of alternative preservation options and extensive consultation with CCWD, USFWS, and CDFW and it is uncertain whether permission to advance a Grant Line Road Station could be obtained. Given the uncertainty regarding the conservation easements and the fact that the Grant Line Road Station would only be considered for the long-term Valley Link service, the Authority decided to not advance the Grant Line Road Station at this time and to focus on the other aspects of the project to support the environmental clearance progress in a timely manner.

The Grant Line Road Station may be considered through a separate environmental process later if the Authority decides to work with the involved agencies to explore whether there are feasible ways to advance such a station.



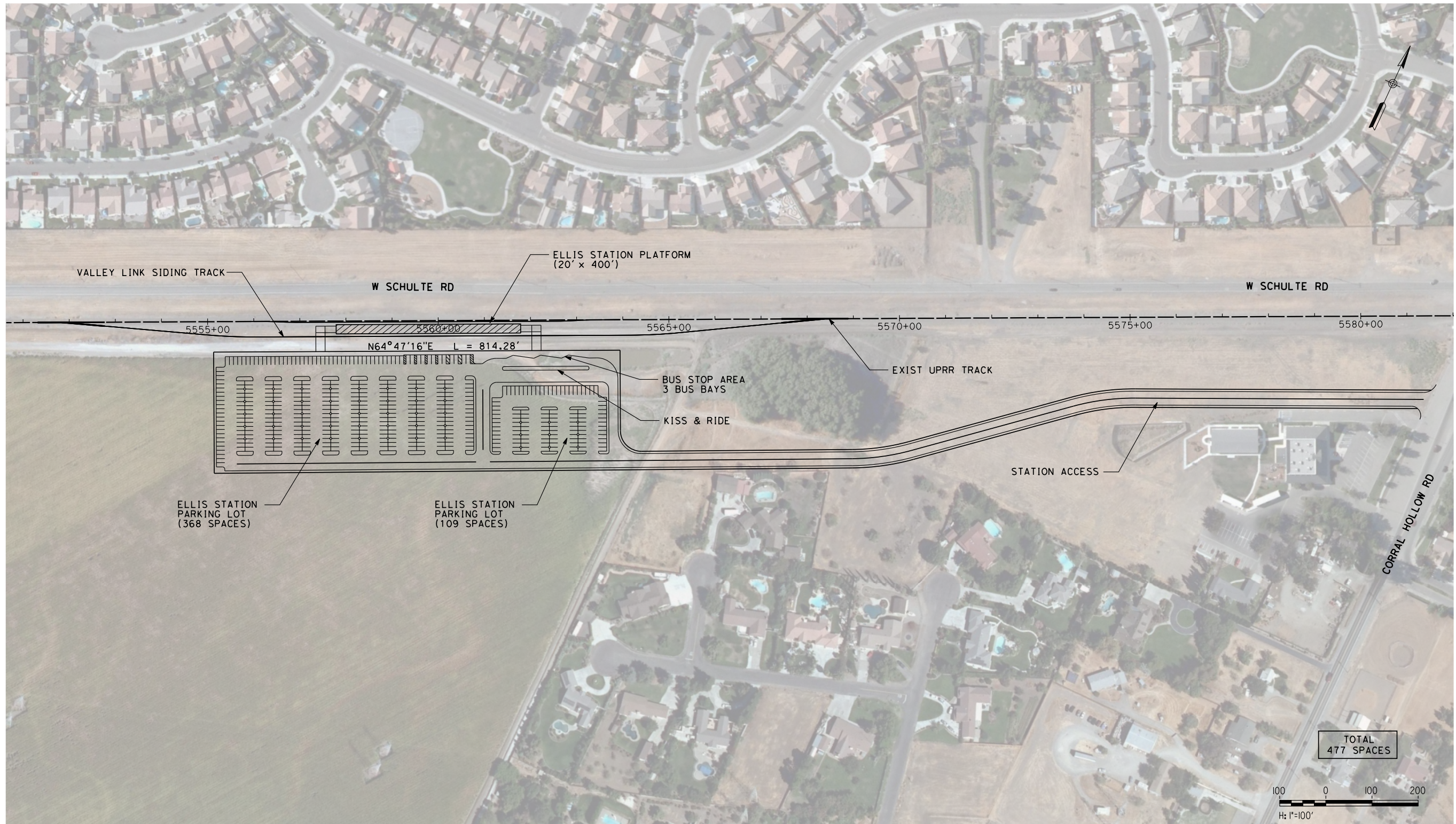
LEGEND

- Contra Costa Water District Habitat Management Units
- Grant Line / I-580 Interchange
- Grant Line Road Station
- 580 Interstate Highway



Source: ICF 2020.

Figure 5-3
Grant Line Road Station



Source: AECOM 2020.

Figure 5-4
Ellis Station

Ellis Station

A station at west of Corral Hollow Road in western Tracy was originally included for long-term consideration in the Notice of Preparation as a future in-fill station. In concept, this would be constructed along the Owens-Illinois Industrial Lead west of Corral Hollow Road in Tracy and include the following improvements. Figure 5-4 (shown above) shows a preliminary station layout.

- Construction of a station track for passing.
- Construction of a 400-foot-long by 20-foot-wide at-grade Valley Link station platform.
- Construction of a 9.9-acre surface parking lot and access road south of the tracks providing approximately 470 parking spaces and three bus bays.
- At-grade pedestrian crossings (including crossing gates, warning lights, and signals) on both ends of the platform across the southern Valley Link tracks including stairs and ADA-compliant ramps to access the platform from the parking lot.
- Passenger amenities including shelters, benches, lighting with security cameras, signage, ticketing, bicycle storage facilities, and emergency call boxes.

Access to the parking lot would be provided from a new access road connecting the lot to Corral Hollow Road.

Most improvements at the Ellis Future Infill Station would be constructed outside the UPRR owned ROW, particularly the parking improvements and access roadway.

Station facilities would be located on agricultural and vacant, undeveloped land near residential uses and undeveloped open space. It would have a potentially significant and unavoidable impact as a result of direct permanent conversion of Important Farmland to nonagricultural uses during project construction. An orchard of almond trees has recently been planted on a large portion of the site. In addition, construction would require ground disturbance, which could affect special-status wildlife in natural land cover. Burrowing owl is known to occur within the footprint for Ellis Future Infill Station (California Department of Fish and Wildlife 2019) and therefore could be affected by construction activities, such as grading and excavation in foraging and nesting habitat, as well as take of individuals. Construction activities could also affect other migratory nesting bird species, foraging and movement corridors for special-status mammals, and foraging habitat for special-status bats.

This station was not intended for the initial phase of the Valley Link project, but for the long-term consideration only. The Authority has determined that this station is not necessary for the current proposed build of the system. The Ellis Future Infill Station may be considered through a separate environmental process later if the Authority decides to work with the involved agencies to explore whether there are feasible ways to advance such a station.

Extension to Stockton

A future extension of Valley Link service to Stockton would likely require additional rail infrastructure including upgrades of existing track and/or new rail alignments in or along existing rail ROW from Lathrop to Stockton. There are two rail lines from Lathrop/Manteca northward to Stockton that support current freight service as well as existing ACE and San Joaquin service. Both rail lines (the Oakland Subdivision and the Fresno Subdivision) are owned by UPRR. Any additional slots on these rail lines for Valley Link service would need to be negotiated with UPRR. In addition to

alignment considerations, there is also the potential for upgrades at the Stockton Station that may be necessary to accommodate Valley Link service. Figure 5-5 shows the future extension to Stockton as shown in a figure in the NOP.

Figure 5-5. Stockton Extension



An extension of Valley Link service to Stockton may be considered through a separate environmental process later, if the Authority decides to work with UPRR and other involved agencies to explore if such a service is advantageous and feasible.

5.8 Alternatives Considered but Withdrawn

This section summarizes the operating technologies, modal alternatives, and alternative alignments and stations that were determined through the alternative screening process to be infeasible, to not avoid or substantially reduce one or more significant impacts of the Proposed Project, or to not meet all or most of the project's goals and objectives. These alternatives were dismissed from further analysis in the Draft EIR.

Valley Link with Third-Rail Technology

This Alternative would retain the same station configuration and alignment as the Proposed Project but would propose use of a third-rail electric system to provide propulsion. In the San Francisco Bay Area, the BART system is powered by such a technology. Because electrical current runs through a third-rail, third-rail systems must operate within fully sealed environments for safety purposes. The proposed Valley Link alignment between Tracy and Lathrop would run within or share tracks with portions of the Union Pacific Railroad right-of-way. Third-rail powered trains would be incompatible along such portions of conventional railroad. At-grade crossings in the Altamont and Tracy to Lathrop segments would need to be grade-separated, which would result in additional environmental impact and cost. Moreover, sealing of the corridor (via fencing or other mechanisms) would not only be incompatible with shared portions of the Union Pacific Corridor, but would also pose substantial additional costs to construct and maintain, while also introducing more substantial environmental effects in several areas, such as visual effects and wildlife corridor movement.

Because sealing the corridor is not considered feasible financially and would result in greater environmental impacts, this alternative was dismissed from further consideration.

CyberTran – Personal Rapid Transit

Another technology option suggested in scoping was a form of personal rapid transit branded as “CyberTran.” Similar to conventional rail, CyberTran would operate along a fixed guideway. However, unlike conventional rail systems, CyberTran would operate on an “on-demand” basis, using relatively small 20 passenger cars operated autonomously. CyberTran further proposes to provide electrical propulsion from solar energy, deriving solar power from a combination of car-mounted and right-of-way mounted solar panels.

CyberTran has a Bay Area presence with its headquarters at the UC Berkeley Global Campus (also known as the Richmond Field Station) in Richmond. While the proposition of solar-powered vehicles theoretically offers great potential, there is no working system or functional model employing the CyberTran technology. Moreover, there are relatively few personal rapid transit systems operating world-wide. The few existing, including at West Virginia University and at London Heathrow Airport, operate along much shorter alignments than the Valley Link project corridor.

CyberTran was considered but dismissed from further analysis for a number of reasons: the technology is not proven to operate on the scale of the Proposed Project, personal rapid transit systems more generally have not been proven to operate successfully in a corridor as long as that proposed for Valley Link, and the system would have to operate in its own fixed guideway, greatly reducing or eliminating any opportunities for sharing alignments within the Union Pacific Railroad right-of-way between Tracy and Lathrop.

5.8.1.1 Modal Alternatives

The following modal alternatives were considered but dismissed from further analysis:

BART Extension from Dublin/Pleasanton to Isabel or Greenville

For many years, BART studied multiple alternatives to extend rail infrastructure and service to the east. In a Final Program EIR published in 2010, BART considered several potential routing alignments both within and south of the I-580 corridor. In a project EIR published in early 2018, BART evaluated an eastward 5.5-mile extension via the I-580 corridor to a new station at Isabel Avenue. While the BART Board of Directors opted in May 2018 to certify the project-level EIR, the Board declined to identify an alternative to approve. BART directors cited the high cost of constructing the extension (estimated then at \$1.6 billion) as a key factor in declining to move forward. Earlier plans to construct BART into downtown Livermore (south of the I-580), with stations in both Downtown Livermore and at Vasco Road, were set aside in 2011 after the Livermore City Council indicated its preference for a BART alignment entirely within the I-580 corridor. Relative to Valley Link (the Proposed Project), these BART alignments would have fallen short of reaching the populations of San Joaquin County. Even in its program EIR, BART did not contemplate extending service any further east than Greenville Road.

Given the long history of exploring BART extensions east from Dublin/Pleasanton, the program and project-level EIRs evaluating such options, and the ultimate decision by the BART Board to not approve any alternative contemplating a BART extension eastward given cost as a major

consideration, this EIR does not further consider any alternative involving the further extension of BART service eastward from the Dublin/Pleasanton Station.

Travel Demand Management

The project feasibility report investigated a “rideshare” option intended to facilitate shuttles, vanpools, traditional carpools, casual carpools, and ride hailing. This option would have pick up and drop off points at existing park-and-rides throughout the project corridor. While promotion and facilitation of such services would likely result in some reduction of single-passenger interregional automobile trips, such travel demand management services would have severely limited capacity to substantially reduce such trips relative to other modal options. Because Travel Demand Management would have severe constraints in meeting basic project objectives, it was dismissed from further consideration.

ACE on Valley Link Alignment

Scoping comments suggested an alternative to run ACE on the Valley Link Alignment to link to BART. In concept, this could take several forms. The minimal version of this alternative would be to construct a connection from the Oakland Subdivision to the Valley Link Alignment near Greenville to allow ACE to reach the Valley Link stations at Isabel and at the BART Dublin/Pleasanton station. More expansive versions of this alternative would link ACE to Valley Link at the West Tracy vicinity or Mountain House and allow ACE to run westward or running ACE on the Valley Link Alignment from either North Lathrop to Dublin/Pleasanton.

The Proposed Project will provide a linkage of ACE service to Valley Link service at Greenville which will allow ACE riders to access BART through Valley Link and vice versa. ACE trains consist of a diesel locomotive pulling passenger carriages. The current ACE alignment on the Oakland Subdivision between the West Tracy vicinity and Greenville and the Valley Link alignment are both winding alignments following previously established railroad grades. As a result, routing ACE along the Valley Link would not result in shortened service times for ACE compared to remaining on the Oakland Subdivision. Routing ACE along the Valley Link Alignment from North Lathrop to Greenville would require relocation of the ACE Station to downtown Tracy, which would be disruptive to existing ACE riders, especially those located in south Tracy. In addition, SJRRC, after completion of the *ACEforward* Draft EIR, decided to not advance any ACE direct linkage to BART using the I-580 alignment or other alignments due to funding, logistical, and other constraints at present.

Alternatives that would route ACE service on the Valley Link alignment were dismissed from further consideration because the Valley Link alignment over the Altamont Pass is not faster than the current ACE route (and thus would not help ACE service times), and because relocating the ACE Tracy Station would result in additional cost and disruption to existing ACE riders.

Combined ACE/Valley Link Station in West Tracy Vicinity

Scoping comments suggested that ACE and Valley Link should share a station in the West Tracy vicinity. Logistically, this could include either constructing an ACE station siding track between the Oakland Subdivision and the Valley Link Mountain House Station or the Valley Link Mountain House Station Alternative or constructing a station siding track between the Valley Link alignment and the Oakland Subdivision to a combined ACE/Valley Link station along the Oakland Subdivision.

The Valley Link Alignment and the Oakland Subdivision are between 0.5 mile and 0.7 mile apart in West Tracy near I-580. Construction of tracks to connect the Valley Link Alignment to the Oakland Subdivision or the Oakland Subdivision to the Valley Link Alignment would require additional tracks to be built east or west of I-580 and would require additional construction and additional property acquisition. East of I-580 this could require displacement of existing land uses and a new crossing of the California Aqueduct and/or the Delta Mendota Canal. West of I-580, this would require additional displacement of habitat for listed and non-listed species. East-west train travel times would be slower for either ACE service or for Valley Link service, depending on where the combined station would be located. Thus, a combined station would result in more construction impacts, more permanent ROW impacts, and greater cost.

The Proposed Project includes an ACE to Valley Link connection at North Lathrop and at Greenville allowing riders to move between the two systems, without the need for construction of additional connecting tracks between the two systems, thus avoiding the additional costs and environmental impact of a combined station in the West Tracy vicinity, in addition to delays in service time to one of the services. Thus, this alternative was dismissed from further analysis because it would result in additional environmental impact and additional cost compared to the Proposed Project and because the Proposed Project already provides connectivity between ACE and Valley Link services.

5.8.1.2 Alignment and Station Alternatives Tri Valley Segment

The following other alternative elements were considered but dismissed from further analysis.

Aerial I-580 Alignment

An aerial I-580 alignment would include an aerial alignment from the Greenville Station to the BART Dublin/Pleasanton Station instead of an at-grade alignment in the median of I-580. A variant on this alternative would use the I-580 alignment over the Altamont Pass instead of the Alameda County Transportation Corridor ROW (which was the former SPRR alignment). This alternative would require more substantial construction than the Proposed Project along I-580 due to the installation of a concrete viaduct. The elevated viaduct would have more substantial aesthetic impacts than the Proposed Project along the I-580 corridor, including over the Altamont Pass if the viaduct were extended over the pass. An elevated viaduct would be much more costly than the Proposed Project. Due to the additional environmental impact and cost, this alternative was dismissed from further analysis.

Downtown Livermore Alignments

This alternative would mean that train service from San Joaquin County would either use the UPRR Oakland Subdivision (currently used by ACE) or the Alameda County Transportation Corridor ROW to cross the Altamont Pass and then reach central Livermore and then would need to reach the I-580 alignment and then use the I-580 alignment to reach the BART Dublin/Pleasanton Station. The alignment between downtown Livermore and I-580 would likely require a lengthy tunnel to avoid disruption to existing residential and commercial development between downtown Livermore and I-580. The service time for a downtown Livermore alignment would be much slower for Valley Link riders using the Greenville Station or any stations in San Joaquin County.

As discussed in the *ACEforward* Draft EIR (SJRRRC 2017), increased train service along the UPRR Oakland Subdivision would require installing additional tracks to accommodate the increased train use and obtain UPRR approval; UPRR would also control dispatch of all passenger trains on the

UPRR Oakland Subdivision. The Alameda County Transportation Corridor ROW is owned by Alameda County and could be used by a Valley Link service to downtown Livermore and then onward to link with BART at the Dublin/Pleasanton Station.

Downtown Livermore alignments were dismissed from further consideration because the City of Livermore does not support a downtown alignment and favors an I-580 alignment, Valley Link service times would be inferior to an I-580 alignment for eastern Livermore and San Joaquin County riders, would result in greater construction impacts due to a longer route, additional track connections, and a lengthy tunnel segment, and would be far costlier than other alternatives due to the longer alignment and the lengthy tunnel. With the Proposed Project, Livermore residents and workers can utilize the Greenville and Isabel Stations.

Iron Horse Trail

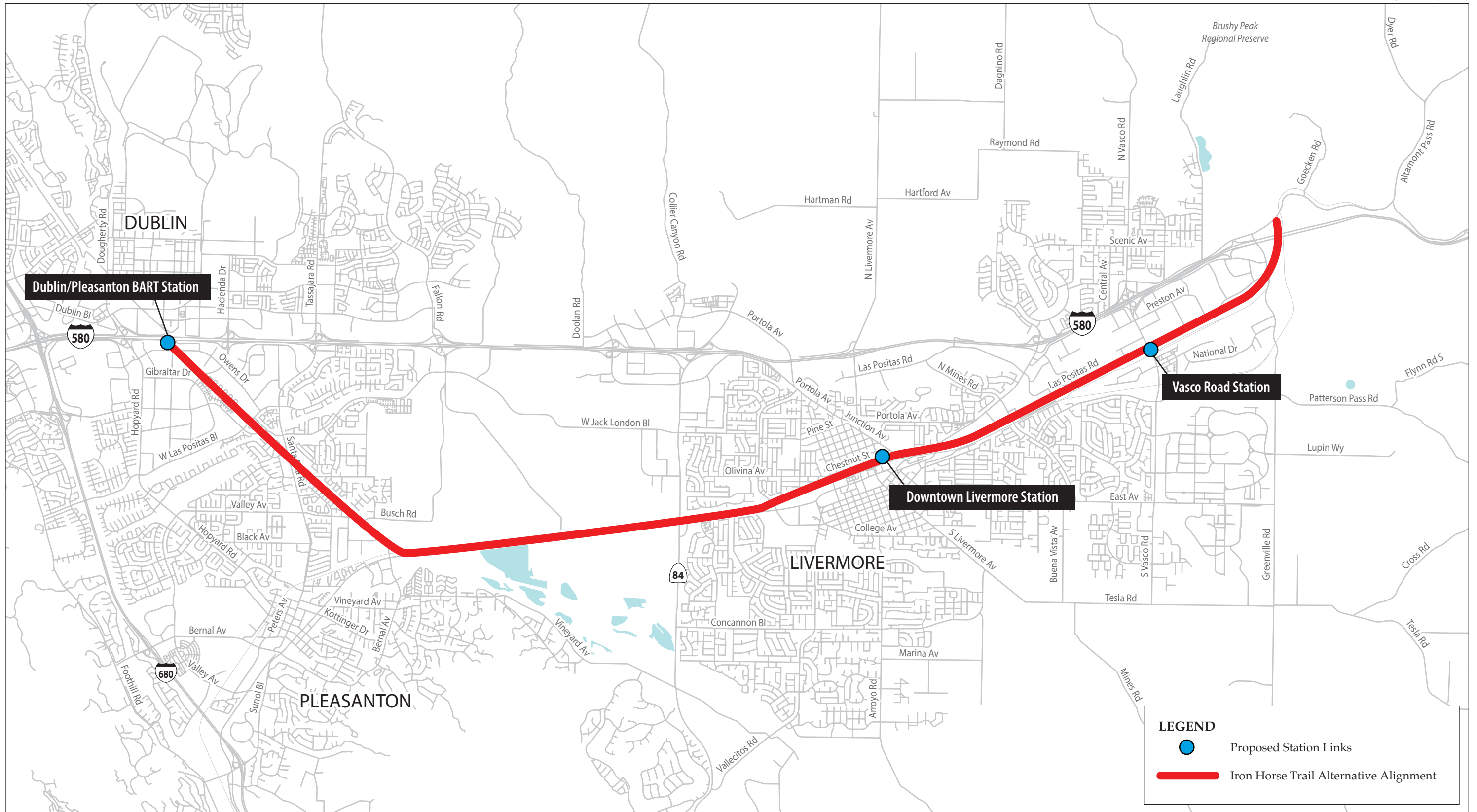
This alternative, suggested in scoping, would utilize the Iron Horse Trail alignment in Pleasanton to connect the BART Dublin/Pleasanton Station to rail services along the UPRR Oakland Subdivision or Alameda County Transportation Corridor ROW through Livermore and eastern Pleasanton. Figure 5-6 shows the approximately alignment of this alternative in the Tri-Valley.

The use of the UPRR Oakland Subdivision through Livermore and eastern Pleasanton would require the installation of additional tracks to accommodate the additional train service and to obtain UPRR approval and UPRR would control dispatch of passenger trains. ACE service is currently limited by UPRR to four round trip trains per day along the Oakland Subdivision and UPRR has indicated to ACE that service could only be expanded if the Oakland Subdivision capacity were increased to accommodate increased passenger rail service. Passenger service on lines shared with freight operations can be subject to delays when priority is given the freight service. The Alameda County Transportation Corridor ROW is available from Greenville to eastern Pleasanton as it is owned by Alameda County.

The Iron Horse Trail was previously a railroad alignment, but it has been converted into a walking and biking trail and several public park areas that are adjacent to residential neighborhoods and commercial areas in Pleasanton. Conversion of the trail back to an operating railroad would displace or disrupt existing trail and park uses, introduce rail noise and disruption through residential neighborhoods, and would require substantial modifications to a number of roadways that cross the alignment to accommodate the rail alignment. Due to these concerns, the City of Pleasanton would likely oppose the use of the Iron Horse Trail for railroad operations. As noted above, the City of Livermore opposes Valley Link alignments through downtown Livermore.

Routing of Valley Link service via downtown Livermore and eastern Pleasanton would also result in inferior service times for eastern Livermore and San Joaquin County riders compared to an I-580 alignment in the Tri-Valley.

This alternative was dismissed from further consideration because it would result in additional construction impact in downtown Livermore, in eastern Pleasanton, and along the Iron Horse Trail, is not supported by the City of Pleasanton or the City of Livermore, would result in loss or disruption of public trails and parks in Pleasanton, and would result in inferior service times for Valley Link riders from eastern Livermore and San Joaquin County.



Source: ICF 2020.

FIGURE 5-6
Iron Horse Trail Alternative

Greenville Station Alternative

A station south of I-580 near Greenville Road was considered. This alternative would include a station on the property east of Greenville and immediately south of I-580. Trains from the east would cross under I-580 at the existing railroad undercrossing and enter the station. Tracks would loop around the station on the southside then exist westward rising on an elevated structure to enter the I-580 median. This alternative would require land that has already been approved by the City of Livermore for commercial development. To avoid displacing this planned commercial development and its employment and economic generating benefits, this alternative was dismissed from further consideration.

5.8.1.3 Altamont Segment

The following alternative project elements were considered but dismissed from further analysis.

Altamont Tunnel

This alternative would include a short or long tunnel in the Altamont Pass to shorten service times between West Tracy and eastern Livermore. In concept, a tunnel alignment could be from the Alameda County Transportation Corridor ROW north or south of I-580 to the Greenville area to avoid the circuitous track alignment, while using the Alameda County Transportation Corridor ROW from south of I-580 to west of Tracy. A more ambitious tunnel alignment could be from near the PG&E Midway Substation (east of the Altamont Hills along Patterson Pass Road at Midway Road) to the Greenville area to avoid the entire Alameda County Transportation Corridor ROW.

The *ACEforward* Draft EIR (SJRRRC 2017) analyzed several shorter tunnel alignments between 1.1 miles and 3.8 miles in length along the Oakland Subdivision, which were estimated to cost \$177 million to \$587 million and were estimated to save between 2 and 6 minutes of ACE travel time. Figure 5-7 shows one example Altamont Tunnel (then called the “top tunnel”) from the *ACEforward* Draft EIR.

The Altamont Corridor Vision is a long-term vision to establish a universal rail corridor connecting the San Joaquin Valley and the Tri-Valley to San Jose, Oakland, San Francisco, and the Peninsula. Improvements included in this vision include more frequent rail service, a lengthy Altamont Pass Tunnel and other alignment improvements. This concept is not yet included in the San Joaquin Council of Government’s or Metropolitan Transportation Commission’s Regional Transportation Plans and is not funded.

A longer tunnel from near the PG&E Midway Station would be 7 to 8 miles long and could cost \$1.1 to \$1.2 billion or more (based on the *ACEforward* tunnel costs per mile and the increased length) but would improve service times more substantially. As the base technology assumed for the Proposed Project is a DMU, any tunnel options would likely need to add tunnel ventilation, which would add to tunneling costs.

While a short or long tunnel would result in lower Valley Link service times, the additional substantial costs of a tunnel are considered beyond a realistic funding plan for Valley Link. Due to limited current available funding, it may take many years to obtain sufficient funding for this alternative, which would not meet the project’s objective of bringing Valley Link service to fruition in the near-term. Due to cost and delay concerns, this alternative was dismissed from further consideration.

A short or long tunnel may be financially feasible in the future if additional regional or state funding sources are identified. It may also be possible to construct a combined tunnel for both ACE and Valley Link that could improve travel times for both services as called for in the Altamont Corridor Vision. At the time a viable funding plan is established for a tunnel, separate environmental review would be required.

5.8.1.4 Tracy to Lathrop

The following alternative project elements were considered but dismissed from further analysis.

North of Tracy Alignment

This alternative would avoid the use of the UPRR Tracy Subdivision between North Lathrop and Tracy and most, if not all, of the Owens-Illinois Industrial Lead (also owned by UPRR). The purpose of this alternative is to minimize or avoid encroachment into UPRR-owned ROW to have an alignment on which Valley Link could run independent of UPRR dispatching and control and also in the event that UPRR decides not to permit Valley Link to use its ROW.

This alternative would be routed in the median of I-580 from Grant Line Road eastward, then transition to the median of I-205 through Tracy, then continue in the median of I-205 or be located adjacent to I-205 on the north side, then follow the Manthey Road alignment to a new crossing of the San Joaquin River, then transition to Golden Valley Parkway alignment, then transition to W. Lathrop Road to reach the North Lathrop Station. In some locations, the alignment would likely need to be on viaduct to minimize displacement of roadways or existing development, but the alignment would likely displace farmland, open grassland, and commercial and residential development in certain locations. Construction within I-580 or I-205 medians would require either widening these freeways or use of a median viaduct. Given this alignment, the Mountain House Station would need to be located likely near the Mountain House Parkway crossing of I-205. The Tracy Station would be located on the north side of Tracy. The River Islands Station would be located slightly south of the location in the Proposed Project.

This alternative was dismissed from further consideration because it would result in much higher construction impacts, property acquisitions, and displacement of farmland and commercial and residential properties, and higher costs than the Proposed Project due to approximately 20 miles of new alignment outside of existing railroad ROW. In addition, the locations of the Tracy Station would not support plans for the City of Tracy for transit-oriented development in downtown Tracy.

The San Joaquin Council of Governments, in its Preliminary Draft Congested Corridors Plan (San Joaquin Council of Governments 2019) has identified a Fixed Guideway Concept on I-580/I-205 from Grant Line Road to Paradise Cut as a potential long-term (2035 project). This concept would include a fixed guideway in the median of I-580 and I-205 that could be used for autonomous vehicles, bus rapid transit, reversible lanes, or a passenger rail extension. If a passenger rail extension, the Preliminary Draft identifies that it could connect to the Valley Link Project west of Grant Line Road and east of Paradise Cut. This concept is at a preliminary stage of development, is not included in the San Joaquin Council of Governments 2018 Regional Transportation Plan/Sustainable Communities Strategy (San Joaquin Council of Governments 2018) and is not funded. Thus, this project is not considered further in this cumulative analysis. If this concept is later advanced by the San Joaquin Council of Governments, the Valley Link Project would not preclude its completion. In addition, it should be noted that the Preliminary Draft Congested Corridors Plan includes Valley Link (including a downtown Tracy alignment and station) as a

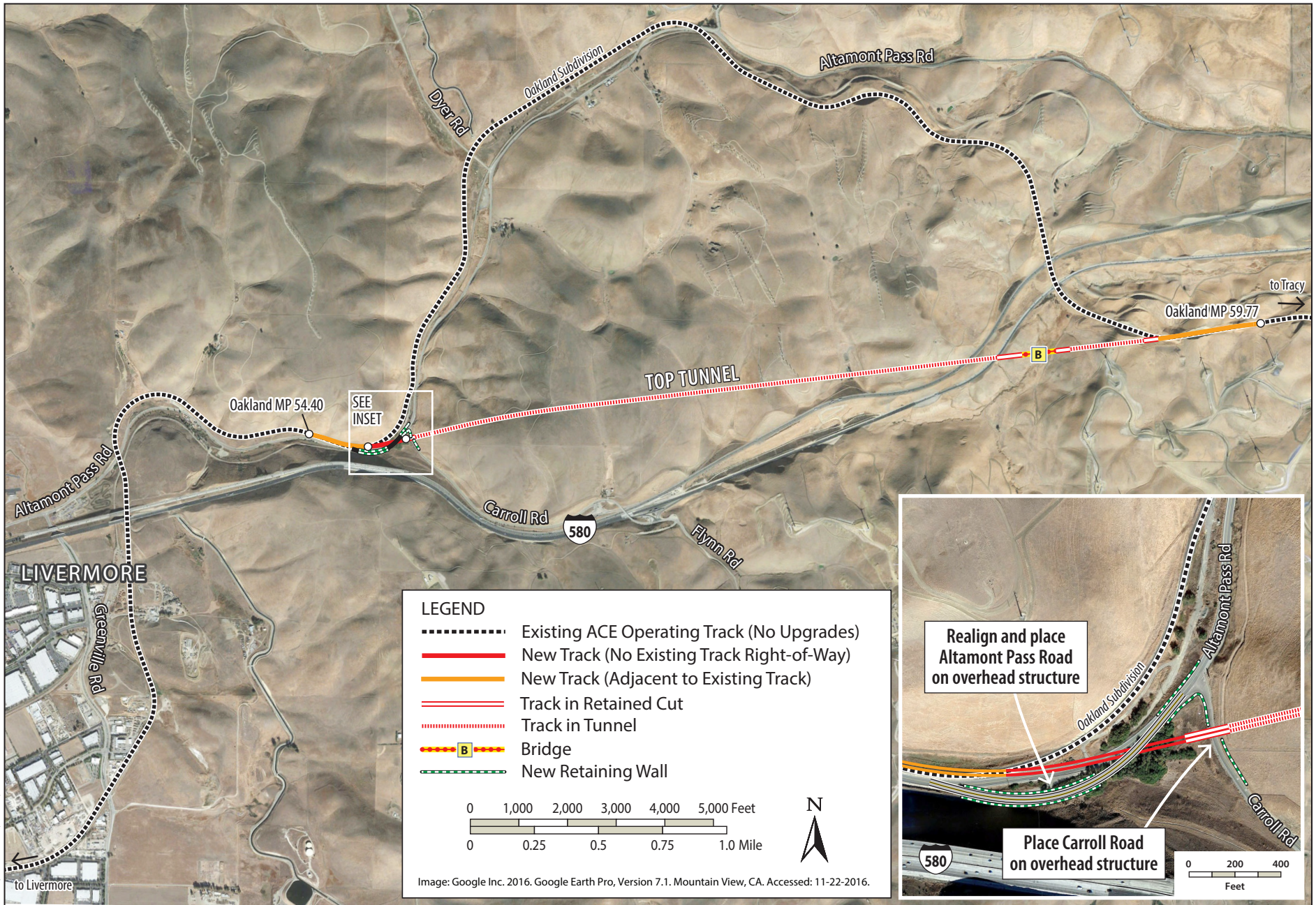


Figure 5-7
Altamont "Top" Tunnel
 from ACEforward Draft EIR

recommended project for the medium term (2030), so there does not appear to be any inconsistency between the Valley Link Project and the Preliminary Draft Congested Corridors Plan.

Tracy 11th Street Alignment

This alternative would avoid the use of the UPRR Tracy Subdivision between North Lathrop and Tracy and most, if not all, of the Owens-Illinois Industrial Lead (also owned by UPRR). The purpose of this alternative is to minimize or avoid encroachment into UPRR-owned ROW to have an alignment on which Valley Link could run independent of UPRR dispatching and control and also in the event that UPRR decides not to permit Valley Link to use its ROW.

This alternative would be routed in the median of I-580 from Grant Line Road eastward and then transition to the median of I-205 to the W. 11th St. exit and then would follow 11th St. through Tracy and then continue along E. 11th St. alignment to the I-205/I-5 interchange and then follow the same route as the North of Tracy Alignment Alternative to the North Lathrop Station. In some locations, the alignment would likely need to be on viaduct to minimize displacement of roadways or existing development, but the alignment would likely displace farmland, open grassland, and commercial and residential development in certain locations. Construction within I-580, I-205, 11th St. or other roadway medians would require either widening these roadways or use of a median viaduct. Given this alignment, the Mountain House Station would need to be located likely near the Mountain House Parkway crossing of I-205. The Tracy Station would be located on 11th St. at North Central Ave. The River Islands Station would be located slightly south of the location in the Proposed Project.

This alternative was dismissed from further consideration because it would result in much higher construction impacts, property acquisitions, and displacement of farmland and commercial and residential properties, and higher costs than the Proposed Project due to approximately 20 miles of new alignment outside of existing railroad rights of way. This alternative would be highly disruptive and likely require extensive property acquisitions within the City of Tracy.

South of Tracy Alignment

This alternative would avoid the use of the UPRR Tracy Subdivision between North Lathrop and Tracy and most, if not all, of the Owens-Illinois Industrial Lead (also owned by UPRR). The purpose of this alternative is to minimize or avoid encroachment into UPRR-owned ROW to have an alignment on which Valley Link could run independent of UPRR dispatching and control and also in the event that UPRR decides not to permit Valley Link to use its ROW.

This alternative would depart from the Valley Link Alignment west of I-580 west of Tracy prior to the Owens Illinois Industrial Lead. From that location the alignment would proceed southwesterly along the west side of I-580 to cross the UPRR Oakland Subdivision and then turn easterly and parallel the Oakland Subdivision and head east south of Linne Road south of Tracy, then head northeasterly parallel to the Oakland Subdivision to a new crossing of the San Joaquin River, then cross the Oakland Subdivision and SR 120 to transition to the eastern side of the Tracy Subdivision and then northward to the North Lathrop Station. In some locations, the alignment may need to be on viaduct to minimize displacement of roadways or existing development, but the alignment would likely displace extensive areas of agricultural, commercial, residential, and industrial development in certain locations. Construction within roadway medians would require either widening these roadways or use of a median viaduct. Given this alignment, the Mountain House Station would need

to be located near the Mountain House Station in the Proposed Project. The Tracy Station would be located near the ACE Tracy Station along South Tracy Blvd. This alternative would have no River Islands Station.

This alternative was dismissed from further consideration because it would result in much higher construction impacts, property acquisitions, and displacement of residential, commercial, industrial, and agricultural properties, and higher costs than the Proposed Project due to approximately 19 miles of new alignment outside of existing railroad ROW. This alternative would be highly disruptive especially on the south side of Tracy. This alternative would have lower ridership than the Proposed Project due to the Tracy Station location south of Tracy and the lack of a River Islands Station.

5.9 Screening Process

Alternative project elements were evaluated in three tiers:

1. Whether they would meet most of the project's basic objectives
2. Whether they are feasible
3. Whether they would avoid or substantially lower one or more significant impacts of the Proposed Project

5.9.1 Tier 1: Project Objectives Screening

The first tier of screening involves evaluating whether potential alternative project elements meet the Proposed Project's objectives (which are described Chapter 2, *Project Description*).

CEQA does not require alternatives to be analyzed if they do not meet most of a project's basic objectives. The objectives for the Proposed Project are to provide all the following:

- Establish rail connectivity between the BART District's rapid transit system and the ACE commuter service in the Tri-Valley.
- Pursue project implementation that is fast, cost-effective, and responsive to the goals and objectives of the communities it will serve.
- Improve connectivity within the Northern California Megaregion: connecting people, jobs, and housing.
- Support the vision of the California State Rail Plan to connect the Northern California Megaregion to the State rail system.
- Be a model of sustainability in the design, construction, and operation of the system through the incorporation of multiple unit technology with the ability to convert to battery-powered in the future and the use of onsite energy production, energy-efficient lighting, drought-tolerant landscaping, and minimized light pollution at Valley Link stations.

Table 5-12 below presents the results of the Tier 1 screening.

5.9.2 Tier 2: Feasibility Screening

The second tier of screening involves examining whether potential alternative project elements would be feasible. Only feasible alternative elements passed this screening. Several aspects of feasibility were examined.

- Technically feasible—can the alternative project element be built using current construction techniques as proposed and operated?
- Logistically feasible—can the alternative be implemented considering legal, social, or regulatory constraints?
- Financially feasible—can the alternative be implemented within the financial capability of the project sponsor?

Table 5-13 below presents the results of the Tier 2 screening.

5.9.3 Tier 3: Environmental Impact Screening

For the third tier of screening, alternatives were examined to see whether they would avoid or substantially reduce one or more significant impacts of the Proposed Project.

An alternatives analysis focuses on the potentially significant impacts of the Proposed Project over existing conditions that may be avoided or substantially reduced with the implementation of a feasible alternative that meets the basic goals and objectives of the Proposed Project. The significant impacts of the Proposed Project are identified in Chapter 3 and Chapter 4. Alternatives need not reduce all impacts of the Proposed Project. Alternatives that would avoid or substantially reduce one or more of the significant impacts were considered to pass this level of screening. The potentially significant and unavoidable impacts of the Proposed Project (See Section 5.2, *Significant and Unavoidable Impacts*) that were the focus of the environmental screening were as follows.

Construction Period Effects

- Agricultural Resources – conversion of important farmland
- Noise and Vibration – construction noise

Operational Period Effects

- Biological Resources – wildlife movement
- Land Use/Population and Housing – policy inconsistency/unplanned growth in localized area around the Greenville Station and the Mountain House Station
- Noise and Vibration – operational train/horn noise

Table 5-14 below presents the results of the Tier 3 screening.

5.9.4 Screening Results and Conclusions

The following tables present the results of the screening process for each of the alternatives considered. Tables 5-12 through 5-14 show the Tier 1, 2, and 3 results, respectively, for the alternatives' ability to meet the project objectives, their level of feasibility, and their ability to avoid impacts on the environment associated with the Proposed Project.

Based on this screening, the Proposed Project and a select number of alternatives were analyzed in equal detail in Chapters 3 and 4. Several additional alternatives (Bus/BRT, and EMU/OCS) also passed the screening evaluation and are analyzed in this chapter at a lesser level of detail.

Table 5-12. Alternatives Screening, Tier 1: Project Objectives

Code	Title of Alternative	Establish connectivity between BART and ACE?	Fast, cost-effective, and responsive project implementation?	Improve connectivity within the megaregion?	Support State Rail Plan vision?	Be a model of sustainability?	PASS?	Notes
NP	No Project Alternative	No	No	No	No	No	Yes	Required to be analyzed under CEQA
Operating Technologies								
DMU	Diesel Multiple Unit – Traditional or Renewable Diesel	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
HBMU	Hybrid-Battery Multiple Unit – Traditional or Renewable Diesel	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
BEMU	Battery-Electric Multiple Unit with Altamont OCS	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
Locomotive	Diesel Locomotive Haul	Yes	Yes	Yes	Yes	No	Yes	Part of Proposed Project
EMU/OCS	Electric Multiple Unit with Overhead Catenary System	Yes	No	Yes	Yes	Yes	Yes	Analyzed in Chapter 5
	Valley Link with Third-Rail	Yes	No	Yes	Yes	Yes	Yes	
	CyberTran – Personal Rapid Transit	Yes	Unknown	Yes	Yes	Yes	Yes	Due to lack of in-service examples, cost effectiveness is undetermined
Modal Options								
	Bus/BRT Alternative	Yes	Yes	Yes	No	Yes	Yes	Analyzed in Chapter 5
	BART Extension from Dublin/Pleasanton to Isabel or Greenville	Yes	No	Yes	Yes	Yes	Yes	
	Travel Demand Management	No	No	No	No	Yes	No	Would only meet one of the project objectives.
	ACE on Valley Link Alignment	Yes	No	Yes	Yes	No	Yes	
	Combined ACE/Valley Link Station in West Tracy Vicinity	Yes	No	Yes	Yes	Yes	Yes	
Tri Valley Alignments/Elements								
	Tri-Valley Alignment	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Aerial I-580 Alignment	Yes	No	Yes	Yes	Yes	Yes	
	Downtown Livermore Alignments	Yes	No	Yes	Yes	Yes	Yes	
	Iron Horse Trail	Yes	No	Yes	Yes	No	No	Would require displacement of existing trails and parks
	Dublin/Pleasanton Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Isabel Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Southfront Road Station Alternative	Yes	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
	Greenville Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Greenville Station Alternative	Yes	Yes	Yes	Yes	Yes	Yes	
Altamont Alignment/Elements								
	Altamont Alignment, Variants 1 and 2	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Stone Cut Alignment Alternative	Yes	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
	Altamont Tunnel	Yes	No	Yes	Yes	Yes	Yes	
	Interim OMF	Yes	Yes	Yes	Yes	No	Yes	Part of Proposed Project

Code	Title of Alternative	Establish connectivity between BART and ACE?	Fast, cost-effective, and responsive project implementation?	Improve connectivity within the megaregion?	Support State Rail Plan vision?	Be a model of sustainability?	PASS?	Notes
	West Tracy OMF	Yes	Yes	Yes	Yes	No	Yes	Analyzed in Chapters 3 and 4
	Tracy OMF	Yes	Yes	Yes	Yes	No	Yes	Part of Proposed Project
	Mountain House Station	Yes	Yes	Yes	Yes	No	Yes	Part of Proposed Project
	Mountain House Station Alternative	Yes	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
Tracy to Lathrop Alignment/Elements								
	Tracy to Lathrop Alignment, Variants 1 and 2	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	North of Tracy Alignment	Yes	No	Yes	Yes	No	Yes	
	Tracy 11th Street Alignment	Yes	No	Yes	Yes	No	Yes	
	South of Tracy Alignment	Yes	Yes	Yes	Yes	No	Yes	
	Downtown Tracy Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Downtown Tracy Station, Parking Alternatives 1 and 2	Yes	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
	River Islands Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	North Lathrop Station	Yes	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project

ACE = Altamont Corridor Express
 BART = Bay Area Rapid Transit
 I = Interstate
 ROW = right-of-way
 UPRR = Union Pacific Railroad

Table 5-13. Alternatives Screening, Tier 2: Feasibility

Code	Title of Alternative	Technically Feasible?	Logistically Feasible?	Financially Feasible?	Otherwise Feasible?	PASS?	Notes
NP	No Project Alternative	Yes	Yes	Yes	Yes	Yes	Required to be analyzed under CEQA
Technology Variants and Alternatives							
DMU	Diesel Multiple Unit – Traditional or Renewable Diesel	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
HBMU	Hybrid-Battery Multiple Unit – Traditional or Renewable Diesel	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
BEMU	Battery-Electric Multiple Unit	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
Locomotive	Diesel Locomotive Haul	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
EMU/OCS	Electric Multiple Unit with Overhead Catenary System	Yes	No	Yes	Yes	Yes	Analyzed in Chapter 5; UPRR may not allow OCS on alignment from Tracy to Lathrop.
	Valley Link with Third-Rail	Yes	No	No	Yes	No	Not compatible with UPRR ROW from Tracy to Lathrop
	CyberTran – Personal Rapid Transit	Yes	Unknown	Unknown	Yes	No	Due to lack of in-service examples, cost effectiveness is undetermined
Modal Options							
	Bus/BRT Alternative	Yes	Yes	Yes	Yes	Yes	
	BART Extension from Dublin/Pleasanton to Isabel or Greenville	Yes	No	No	Yes	No	BART Board has rejected extension of system; substantially higher cost than Proposed Project
	ACE on Valley Link Alignment	Yes	No	No	Yes	No	Substantial higher cost due to I-580 overpasses; uncertain ability to obtain extra passenger slots on UPRR ROW
	Combined ACE/Valley Link Station in West Tracy Vicinity	Yes	Yes	No	Yes	Yes	Substantial higher costs due to linking tracks
Tri Valley Alignments/Elements							
	Tri-Valley Alignment	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Aerial I-580 Alignment	Yes	Yes	No	Yes	No	Substantially higher cost for aerial alignment
	Downtown Livermore Alignments	Yes	No	No	No	No	Livermore opposed to downtown alignment; substantial higher cost than Proposed Project
	Iron Horse Trail	Yes	No	No	No	No	Requires downtown Livermore alignment; Opposed by Pleasanton; substantially higher cost than Proposed Project
	Dublin/Pleasanton Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Isabel Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Southfront Road Station Alternative	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
	Greenville Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Greenville Station Alternative	Yes	No	Yes	Yes	No	Land is not available as City of Livermore has approved site for new commercial development.
Altamont Alignment/Elements							
	Altamont Alignment, Variants 1 and 2	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Stone Cut Alignment Alternative	Yes	Yes	Yes	Yes	Yes	Will require approval of UPRR. Analyzed in Chapter 3 and 4.
	Altamont Tunnel	Yes	Yes	No	Yes	No	Substantial higher costs than Proposed Project; available funding insufficient at this time
	Mountain House Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Mountain House Station Alternative	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapter 3 and 4
	Interim OMF	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	West Tracy OMF Alternative	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapter 3 and 4

Code	Title of Alternative	Technically Feasible?	Logistically Feasible?	Financially Feasible?	Otherwise Feasible?	PASS?	Notes
	Tracy OMF	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
Tracy to Lathrop Alignment/Elements							
	Tracy to Lathrop Alignment, Variants 1 and 2	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	North of Tracy Alignment	Yes	Yes	No	Yes	No	Substantial higher costs than Proposed Project
	Tracy 11th Street Alignment	Yes	No	No	Yes	No	Substantial higher costs than Proposed Project; uncertain if Tracy would support alternative.
	South of Tracy Alignment	Yes	Yes	No	Yes	No	Substantial higher costs than Proposed Project
	Downtown Tracy Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	Downtown Tracy Station, Parking Alternatives 1 and 2	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapters 3 and 4
	River Islands Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project
	North Lathrop Station	Yes	Yes	Yes	Yes	Yes	Part of Proposed Project

ACE = Altamont Corridor Express
 BART = Bay Area Rapid Transit
 I = Interstate
 ROW = right-of-way
 UPRR = Union Pacific Railroad

Table 5-14. Alternatives Screening, Tier 3: Environmental Impact

Code	Title of Alternative	Would the alternative avoid or substantially reduce significant project impacts relative to the following subject areas?						Notes
		Conversion of Farmland?	Construction Noise?	Wildlife Impacts?	Land Use/Population and Housing Impacts?	Operational train noise?	Avoids or Substantially Reduced One or More Project Impacts?	
NP	No Project Alternative	Yes	Yes	Yes	Yes	Yes	Yes	Required to be analyzed under CEQA
Technology Alternatives								
Locomotive	Diesel Locomotive Haul	No	No	No	No	No	No	Would worsen air quality, GHG, energy use, and noise conditions relative to Proposed Project
EMU/OCS	Electric Multiple Unit with Overhead Catenary System	No	No	No	No	Yes	Yes	Would improve air quality, GHG, energy use, and noise conditions relative to Proposed Project
	Valley Link with Third-Rail	No	No	No	No	Yes	Yes	Would improve air quality, GHG, energy use, and noise conditions relative to Proposed Project
	CyberTran – Personal Rapid Transit	Unknown	Unknown	Yes	No	Unknown	Yes	Could be on column through the Altamont Pass which would have less effect on wildlife movement.
Modal Alternatives								
	Bus/BRT Alternative	Yes	Yes	Yes	Yes	Yes	Yes	Analyzed in Chapter 5
	BART Extension from Dublin/Pleasanton to Isabel or Greenville	No	No	No	No	Yes	Yes	BART trains quieter than DMUs

		Would the alternative avoid or substantially reduce significant project impacts relative to the following subject areas?						
Code	Title of Alternative	Conversion of Farmland?	Construction Noise?	Wildlife Impacts?	Land Use/Population and Housing Impacts?	Operational train noise?	Avoids or Substantially Reduced One or More Project Impacts?	Notes
	ACE on Valley Link Alignment	No	No	No	No	No	No	
	Combined ACE/Valley Link Station in West Tracy Vicinity	No	No	No	No	No	No	
Tri Valley Alternatives								
	Aerial I-580 Alignment	No	No	Yes	No	No	Yes	Would only lower wildlife movement impacts if aerial alignment extended through Altamont Pass
	Downtown Livermore Alignments	No	No	No	No	No	No	
	Iron Horse Trail	No	No	No	No	No	No	
	Southfront Road Station Alternative	No	No	Yes	Yes	No	Yes	Would lower impact on wildlife movement at Greenville undercrossing as proposed Greenville station.
	Greenville Station Alternative	No	No	No	No	No	No	Would have similar impact on wildlife movement at Greenville undercrossing as proposed station.
Altamont Alternatives								
	Stone Cut Alignment	No	No	No	No	No	Yes	Would have shorter alignment and faster service and thus lower criteria pollutants, GHG emissions, and energy use compared to the Proposed Project.
	Altamont Tunnel	No	No	Yes	No	No	Yes	No important farmland or sensitive noise receptors in tunnel areas
	Mountain House Station Alternative	Yes	No	Yes	No	No	Yes	Less farmland and biological resource impacts than Mountain House Station
	West Tracy OMF Alternative	Yes	Yes	No	No	No	Yes	Less farmland impacts but higher biological resource impacts than Tracy OMF
Tracy to Lathrop Alternatives								
	North of Tracy Alignment	No	Yes	No	No	Yes	Yes	Avoids construction and train operations through middle of Tracy but would result in higher overall construction impacts due to approximately 20 miles of new alignment outside existing rail ROW.
	Tracy 11th Street Alignment	No	No	No	No	No	No	
	South of Tracy Alignment	No	Yes	No	No	Yes	Yes	Would avoid construction and train operations through middle of Tracy but would result in higher overall construction impacts due to approximately 20 miles of new alignment outside existing rail ROW.
	Downtown Tracy Station Parking Alternatives 1 and 2	No	No	No	No	No	No	Smaller grading footprint, but higher visual effects.

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